Centennial Coal

Coxs River Catchment Improvement and Land Management Plan

Springvale Mine

March 2018

Table of contents

1. Introduction 1
   - 1.1 Project background 1
   - 1.2 CILMP structure 2
   - 1.3 CILMP objectives 3
   - 1.4 Rural Land Use Code of Practice 3
   - 1.5 Security of the land 3
   - 1.6 Consultation 4
2. Project overview 5
   - 2.1 Project site 5
   - 2.2 Site description 8
   - 2.3 Roles and responsibilities 13
3. CILMP Management actions and specifications 20
   - 3.1 Preliminary works 20
   - 3.2 CILMP North – Riparian Management Area 26
   - 3.3 CILMP Central – Riparian Management Area 35
   - 3.4 CILMP South – Riparian Management Area 40
   - 3.5 Monitoring 48
4. Schedule of works 50
5. Completion criteria 51
6. Disclaimer 53
7. References 54

Table index

Table 1-1 Springvale SSD-5594 CILMP consent conditions 1

Table 1-2 Statement of commitments (SSD-5594 Modification 2 Response to Submissions) 2

Table 2-1 Management areas within the project site 5

Table 2-2 Land ownership within the CILMP Project Site 6

Table 2-3 Key characteristics of the CILMP project site 8

Table 2-4 Key roles and responsibilities 14

Table 3-1 Revegetation species list – CILMP North Riparian Management Area 24

Table 3-2 Revegetation species list – CILMP Central and South Riparian Management Areas 25

Figure index

Figure 2.1 Project Site 7
Figure 2.2 Land Management Actions 15
Figure 4.1 Proposed CILMP schedule of works 50

Appendices

Appendix A – Correspondence with regulators
Appendix B – Consultation outcomes
Appendix C – Summary Works Descriptions
Appendix D – Centennial Rural Land use Code of Practice Requirements Summary
Appendix E – Priority weeds at the project site.
Appendix F – Threatened Species Record

1. Introduction

1.1 Project background

GHD Pty Ltd (GHD) has been engaged by Centennial Springvale Pty Ltd (Springvale) to produce a Catchment Improvement and Land Management Plan (CILMP) for riparian areas of the upper Coxs River on Centennial owned land at Lidsdale, New South Wales. The CILMP is intended to guide water quality and catchment improvement measures associated with the approval of Centennial's Springvale Mine Extension Project State Significant Development (SSD) 5594 Modification 2.

In accordance with Schedule 4 Condition 12 of SSD 5594 Modification 2, Springvale is required to meet a range of water management performance measures to improve the water quality and aquatic and riparian habitats of the Upper Coxs River Catchment. This CILMP is to be implemented to help achieve the performance measures required under Schedule 4, Condition 12 of SSD 5594.

1.1.1 Statutory requirements

This CILMP addresses Springvale development consent SSD-5594. The relevant requirements of the CILMP are shown in Table 1-1, along with the sections of the CILMP where these have been addressed. The following consent conditions, and statement of commitments (see Section 1.1.2) form the aims of this CILMP.

Table 1-1 Springvale SSD-5594 CILMP consent conditions

Consent condition		Where addressed in this document
Schedule 2, Condition 18a	The Applicant must prepare and implement a Catchment Improvement and Land Management Plan for the land shown (in Figure 2.1), to the satisfaction of the Secretary. This plan must:	
(a)	be prepared in consultation with Local Land Services, WaterNSW and OEH, and be submitted to the Secretary for approval by the end of October 2017;	Appendix A identifies correspondence with regulators. Appendix B identified consultation outcomes.
(b)	describe the measures that would be implemented to protect and manage the subject land, and improve its riparian habitat;	Management actions and specifications are identified in Section 3 of this CILMP. Section 3 identifies riparian habitat management measures. Section 2.2.2 and the Centennial Coal Rural Land use Code of Practice (2015) identifies measures for portions of land parcels not associated with riparian habitat.
(c)	detail the schedule of works, completion criteria and the monitoring program that would be implemented to measure the success of the improvements; and	The proposed monitoring program for the Coxs River CILMP is detailed in Section 3.5 of this report. The schedule of works for the Coxs River CILMP is detailed in Section 4 report. Completion criteria for the Coxs River CILMP is detailed in Section 5.

Consent condition		Where addressed in this document
(d)	make arrangements to manage, protect and provide long-term security for the subject land.	The management of land associated with this CILMP is identified within Section 3. The protection and long-term security of the subject land is identified within Section 1.5.

1.1.2 Statement of commitments

Springvale Mine Extension Project SSD-5594 Modification 2 Response to Submissions provided the following commitments for the proposed deferral of salinity reductions.

Table 1-2 Statement of commitments (SSD-5594 Modification 2 Response to Submissions)

Commitment	Where addressed in this document
Improved aquatic habitat and with a potential improvement to stream health.	The management measures and outcomes proposed to improve riparian land under this CILMP is identified within Section 3.
Improved oxygenation of water in the river by macrophytes which will result in better dissolved oxygen (DO) levels in the river.	The management measures and outcomes proposed to improve riparian land under this CILMP is identified within Section 3.
Less eutrophication in the river which will result in lower nitrogen based nutrient concentrations and hence reduced propensity for algal blooms.	The management measures and outcomes proposed to improve riparian land under this CILMP is identified within Section 3.
Describe the measures that would be implemented to protect and manage the subject land, and improve its riparian habitat.	The protection and long-term security of the subject land is detailed within Section 1.5 The management measures and outcomes proposed to improve riparian land under this CILMP is identified within Section 3.

1.2 CILMP structure

This CILMP is intended as a working document to guide native vegetation and riparian management and works at the project site. A brief outline of this report is as follows:

- Section 1: relevant project background.
- Section 2: brief overview site description and site context.
- Section 3: detailed project site descriptions for discrete land units and associated management actions, including monitoring specifications.
- Section 4: proposed schedule of works for specified management actions.
- Section 5: Summary of completion criteria under this CILMP.

All site and works mapping is provided and referred to in relevant parts of this CILMP.

1.3 CILMP objectives

The objectives of this CILMP are to fulfil Centennial's statutory requirements and statement of commitments under Schedule 2 Condition 18A of Springvale SSD-5594 consent by:

- Providing a flexible and adaptable best-practice approach to native vegetation and riparian management and restoration at the project site.
- Guiding native vegetation and riparian management and restoration planning and works for a 10 year period.
- Protecting, restoring and enhancing in-stream native vegetation associations of the project site.
- Protecting, restoring and enhancing native vegetation associations within the riparian corridor of the project site.
- Partial restoration of natural Coxs River flows and hydrological function.
- Stabilising areas of active in-stream erosion.
- Directing the cost-effective management and delivery of best-practice native vegetation community restoration outcomes.
- Advise best-practice and ecologically sustainable grazing management upon tenanted Centennial lots.

1.4 Rural Land Use Code of Practice

The aims of this CILMP focus upon ecological improvement of riparian areas of the upper Coxs River. Management of Centennial-owned subject lands that lie outside riparian areas is undertaken in accordance with Centennial's *Rural Land Use Code of Practice* (the Code) (Centennial Coal 2015). Non-riparian lands within the CILMP project site are managed under tenement or directly by Centennial Coal (see Table 2-2). The Code has been developed by Centennial to assist its tenants (lessees and licensees) and land management team to achieve, in partnership, best practice management on Centennial-owned lands. The Code is designed to address the general broad principles of land management and direct the expectations of site specific management plans. The issues addressed in the Code are a basis for developing sustainable agricultural management and contributing to overall ecosystem and catchment health.

A summary of the Code as it applies to non-riparian lands within the CILMP project site is provided in Appendix D.

1.5 Security of the land

The requirement for protection and long-term security of land identified in this CILMP is identified within SSD-5594 Schedule 3 Condition 18A (d). The placement of the requirement on the consent is legally binding.

Ongoing management of the lands within this CILMP will be through a positive covenant on the land title under Section 88B of the *Conveyancing Act* 1919; the terms of the Section 88B instrument will make reference to a Plan of Management. This security is in perpetuity with the land titles burdened by the requirements of this CILMP, including:

- Permanent protection of the Riparian Management Area (see Section 2.1.1).
- To bind the minimum requirements of land management for identified grazing zones within the Land Management Area (see Section 2.1.2).

Protection of the Riparian Management Area will be through funding by Centennial Springvale to undertake the activities within this CILMP. Ongoing management of the grazing zones within the Land Management Area will be through current and future tenancy requirements within this CILMP.

1.6 Consultation

The CILMP was provided to Local Land Services, OEH, and WaterNSW on 28 September 2017. All correspondence with government regulators is provided in Appendix A. Consultation comments are provided in Appendix B, along with how these comments have been addressed in the CILMP.

2. Project overview

2.1 Project site

The CILMP project site comprises two broad management areas (Riparian Management Area [RMA] and Land Management Area [LMA]) across three discrete component sites (CILMP North, CILMP Central and CILMP South) that occur along the upper Coxs River. The three component sites of the overall project site are located:

- CILMP North: north of the Angus Place Colliery to Blackman's Flat haul road, with a small land area also present adjacent and to the south of the haul road.
- CILMP Central: at the former Commonwealth Coal site comprising an approximately 1 km reach of the Coxs River from the southern end of the flooded former mine pit.
- CILMP South: from the southern boundary of the residential property at 1305 Castlereagh Highway in the north to Brays Lane in the south.

Location of the project site, its three component sites and the two Management Areas is shown in Figure 2.1 and Figure 2.2.

The areas of the RMA and LMA within each of the component sites is shown in Table 2-1.

Table 2-1 Management areas within the project site

Management Area	CILMP North (ha)	CILMP Central (ha)	CILMP South (ha)	Total (Project Site) (ha)
Riparian Management Area	45.77	10.07	10.17	66.00
Land Management Area	88.29	19.61	29.30	137.20
Total	**134.06**	**29.68**	**39.47**	**203.20**

2.1.1 Riparian Management Area

The Riparian Management Area forms the focus of this CILMP. The RMA is restricted to riparian areas of the upper Coxs River occurring on Centennial-owned land (see Figure 2.1 and Figure 2.2). The RMA includes all channel and bank formations of the Coxs River as well as a terrestrial riparian corridor of 15-50 m. The width of the terrestrial riparian corridor included in the RMA is greater where areas of remnant woodland vegetation adjoin the upper banks of the Coxs River (see Figure 2.2).

2.1.2 Land Management Area

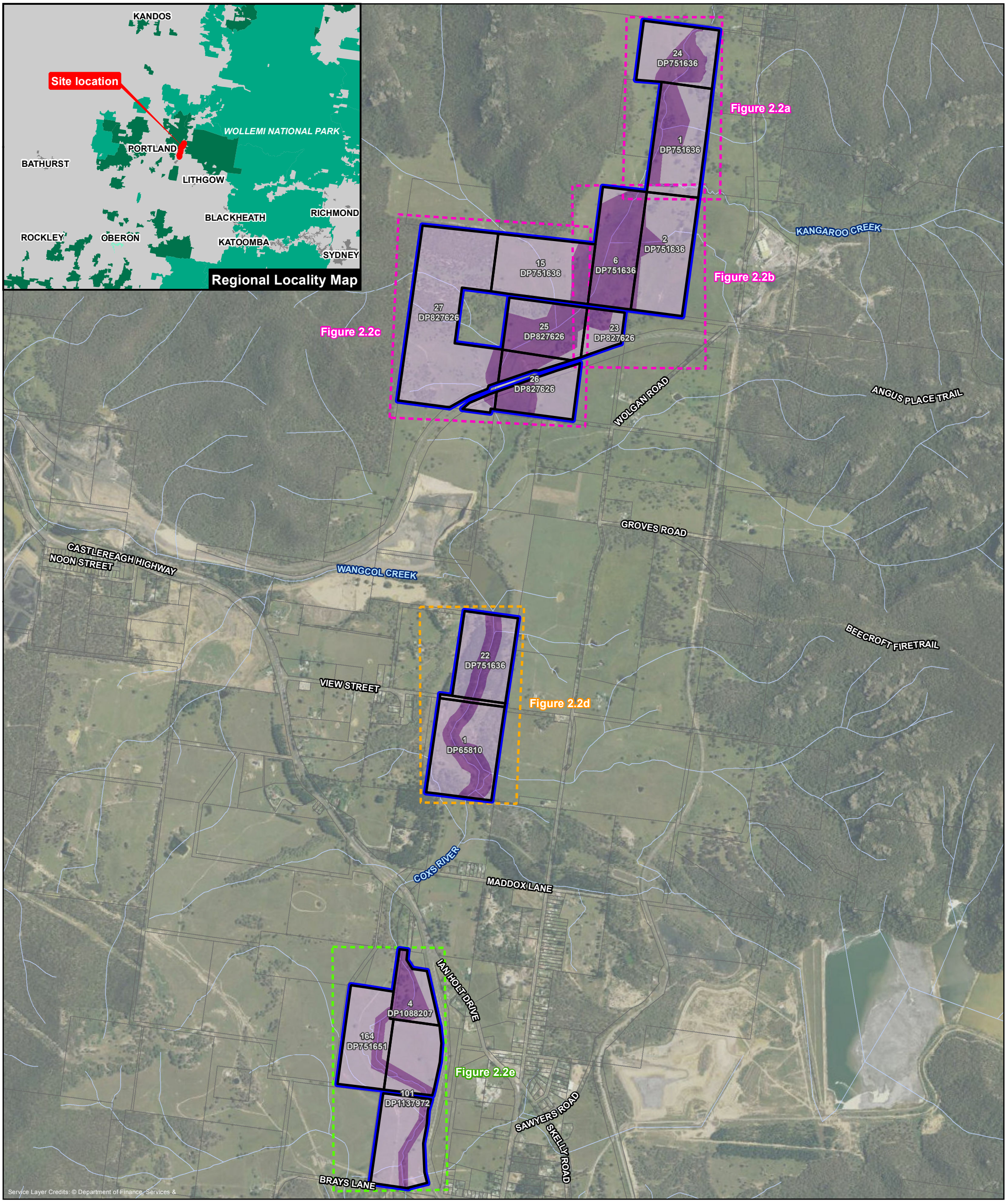
The Land Management Area includes all remaining areas of Centennial-owned land that comprise the project site, that are not part of the RMA. LMAs within the CILMP project site are managed under tenement or directly by Centennial Coal (see Table 2-2).

LMAs of CILMP North and South are managed under a grazing tenement, in consultation with Centennial, with the principle land management practice at both sites being domestic cattle grazing and breeding. At both sites, the grazing lease occurs within the LMA as well as adjoining grazing lands that lie beyond the project site. Land management within the non-tenanted LMA of CILMP Central is presently restricted to weed and pest control undertaken directly by Centennial Coal.

Centennial owned lots included within the project site are shown in Table 2-2.

Table 2-2 Land ownership within the CILMP Project Site

Project Site	Subject lots	Ownership	Tenancy
CILMP North	Lot 24 DP751636 Lot 1 DP751636 Lot 2 DP751636 Lot 6 DP751636 Lot 15 DP751636 Lot 23 DP827626 Lot 25 DP827626 Lot 26 DP827626 Lot 27 DP827626	Centennial Fassifern Pty Ltd	Rural tenancy/ management
CILMP Central	Lot 22 DP751636 Lot 1 DP65810	Centennial Fassifern Pty Ltd	Centennial managed
CILMP South	Lot 4 DP1088207 Lot 164 DP751651 Lot 101 DP1137972	Ivanhoe Coal Pty Ltd	Rural tenancy/ management



LEGEND

- Project Site
- Riparian Management Area
- Land Management Area
- Centennial Owned Lots
- Cadastre
- Waterways
- CILMP North
- CILMP Central
- CILMP South

Paper Size A3

0 200 400 800

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Centennial Coal Pty Ltd
Cox's River RHCIP

Job Number 22-19098
Revision A
Date 26 Sep 2017

Cox's River CILMP Site Location

Figure 2.1

N:\AU\Sydney\Projects\22\19098\GIS\Maps\Deliverables\22_19098_CoxsRiverCILMP_Z005_SiteLocation.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: General topo - NSW LPI DTDB 2015 & 2012, Aerial imagery - SIXmaps 2017, Vegetation mapping & Coxs River Lots - Centennial Coal, Inset map - Geoscience Australia. Created by:jrprice

2.2 Site description

2.2.1 Key site characteristics

A summary description of the character of the CILMP project site is provided in Table 2-3

Table 2-3 Key characteristics of the CILMP project site

Feature	Description
Local Government Area:	Lithgow LGA
Geology: (Bryan, 1966)	Coxs River and floodplain (CILMP North and CILMP Central): • Unconsolidated Quaternary alluvium, gravel, sand, silt and clay Valleys and lowlands (CILMP North, Central and South): • Permian Illawarra Coal Measures shale, sandstone, conglomerate and chert with coal and torbanite seams • Berry Formation sandstone, shale and conglomerate of the Shoalhaven Group
Soils: (King, 1993)	Coxs River and floodplain (CILMP North): • Long Swamp Soil Landscape – level to very gently inclined swamps on recent alluvium overlying Permian Illawarra Coal Measures. Soils moderately deep wet peaty loams, grey earths and humic clays. Coxs River and floodplain, valleys and lowlands (CILMP Central): • Disturbed terrain – level plains to undulating terrain that has been disturbed to a depth of at least 100 cm. Original soil has been removed, greatly disturbed or buried. Coxs River bed and floodplain, valleys and lowlands (CILMP South): • Piper's Flat Soil Landscape – level to gently undulating drainage depressions and floodplains on recent alluvium overlying the Berry Formation and Illawarra Coal Measures. Moderately deep to deep grey-brown alluvial soils, leached loams, soloths and gleyed podzolic soils.

Feature	Description
Mitchell Landscapes: (DECC 2008)	Capertee Plateau The Capertee Plateau landscape is characterised by 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. General elevation occurs between 800 to 1000 m, with a local relief between 100-120 m. Isolated flat top mountains occur in the valleys formed as pinnacles or remnant pieces of plateau. Shoulder slopes with stone pillars or 'pagodas' occur above steep canyons on tributary streams falling into gorges. This landscape comprises low gradient swampy streamlines with shallow stony texture-contrast profiles, over tough yellow or grey poorly drained clays and organic sand in swamps. Woodlands in the open valleys consist 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.). Scribbly gum (*Eucalyptus sclerophylla*), red stringybark (*Eucalyptus macrorhyncha*) and broad-leaved ironbark (*Eucalyptus fibrosa* ssp. *fibrosa*) occur on the talus slopes. Silvertop ash (*Eucalyptus sieberi*) and Sydney peppermint (*Eucalyptus piperita*) occur on the sandstone peaks, whilst Dwarf casuarina (*Allocasuarina nana*), tea-tree (*Leptospermum* sp.), and sedges occur on the pagoda margins.
Hydrology:	The Coxs River dissects the majority of the project site, running in a north-south direction. Numerous tributaries junction with the Coxs River throughout the extent of the project site. The majority of these have been substantially altered and degraded due to historical or current land use practices. The Coxs River drains to Lake Burragorang approximately 65 km south-east of the project site, which forms Sydney's principal water supply.
Climate: (BOM 2017)	Mean annual rainfall: 862 mm Mean monthly rainfall range: 58.9 mm (Sept) – 94.3 mm (Jan) Mean monthly temperature range: 25.5 ^{o}C-11.9 ^{o}C (Jan) - 10.4 ^{o}C -0.7 ^{o}C (July)

Feature	Description
Native vegetation communities: (RPS 2017)	Recent native vegetation mapping within the project site is shown in Figure 2.2 (RPS 2017). RPS (2017) identify native vegetation communities present within the project site as: • Tableland Gully Snow Gum – Ribbon Gum Montane Grassy Forest (map unit 11) • Derived Tableland Gully Snow Gum – Ribbon Gum Montane Grassy Forest (map unit 11) • Tableland Hollows Black Gum – Black Sallee Open Forest (map unit 15) • Derived Tableland Hollows Black Gum – Black Sallee Open Forest (map unit 15) • Coxs Permian Red Stringybark – Brittle Gum Woodland (map unit 37) • Derived Coxs Permian Red Stringybark – Brittle Gum Woodland (map unit 37) • Mountain Hollow Grassy Fen (map unit 53) • Typha orientalis Wetland • Exotic
Threatened Ecological Communities:	Three of the above native vegetation communities form local occurrences of two threatened ecological communities listed under the NSW *Biodiversity Conservation Act 2016* (BC Act). One of these communities is also listed under the Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act). The threatened ecological communities are: • *Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland in the South Eastern Highlands, Sydney Basin, South East Corner and NSW South Western Slopes Bioregions* (EEC – BC Act) (equivalent to map unit 15 – Tableland Hollows Black Gum – Black Sallee Open Forest and map unit 11 - Tableland Gully Snow Gum – Ribbon Gum Montane Grassy Forest). • *Montane Peatlands and Swamps of the New England Tableland, NSW North Coast, Sydney Basin, South East Corner, South Eastern Highlands and Australian Alps bioregions* (EEC - BC Act; EEC EPBC Act) (equivalent to map unit 53 – Mountain Hollow Grassy Fen). **EEC - Endangered Ecological Community** **CEEC - Critically Endangered Ecological Community**

Feature	Description
Threatened species:	Two threatened flora species, *Eucalyptus aggregata* (Black Gum), listed as vulnerable under the BC Act and EPBC Act, and *Eucalyptus cannonii* (Capertee Stringybark), listed as vulnerable under the BC Act, has been recorded within the project site (RPS 2017). A single threatened fauna species, Gang-gang Cockatoo (*Callocephalon fimbriatum*), listed as vulnerable under the BC Act, has been recorded within the project site (RPS 2017). Dusky Woodswallow (*Artamus cyanopterus cyanopterus*) (V – BC Act), Scarlet Robin (*Petroica boodang*) V – BC Act, White-bellied Sea-Eagle (*Haliaeetus leucogaster*) V – BC Act and Purple Copper Butterfly (*Paralucia spinifera*) E – BC Act, V – EPBC Act have also been recorded in close proximity to the CILMP project site. In addition, the CILMP project site is located within areas of Saving Our Species (SOS) conservation projects for Purple Copper Butterfly, Capertee Stringybark and Black Gum. Locations of threatened species within the project site are shown in Figure 2.2.
Land use:	The CILMP North and CILMP South areas have a long history of native vegetation clearing and swamp drainage for agricultural development and livestock grazing. Livestock grazing currently continues within both areas under tenement to Centennial Coal (see Section 2.1.2). A maximum of 60 cows and calves currently stock the CILMP North LMA and adjoining grazing lands, with a maximum of 74 cows and calves stocking the CILMP South LMA and its adjoining grazing lands. The CILMP Central area is the previous site of the Commonwealth Coal Mine. The entire CILMP Central area is in a highly disturbed and unproductive condition with substrates comprised of chitter and rubble. The CILMP Central area currently has no designated land use and is being managed by Centennial Coal for weed control.
Cultural heritage:	There are no heritage items or archaeological sites listed in the Lithgow City Council LEP Schedule 5 – Environmental Heritage within the project site. There are no heritage items listed on the Commonwealth Heritage Register, the s170 registers (state owned items), or on the NSW State Heritage Register within the project site (RPS 2017).

2.2.2 Site overview

Riparian Management Area

The Coxs River and its associated native riparian vegetation cover is in a highly modified condition throughout the Riparian Management Area (RMA), with the degree of modification varying considerably between the CILMP North, Central and South areas.

The majority of remnant native vegetation within the RMA occurs in the CILMP North area. Native vegetation within the CILMP North area comprises a mix of Derived and remnant Tableland Hollows Black Gum – Black Sally Open Forest (EEC), Mountain Hollow Grassy Fen (EEC) and *Typha orientalis* Wetland. No patches of entirely exotic vegetation occur within the CILMP North RMA. In contrast, only minor occurrences of degraded remnant native vegetation (Tableland Hollows Black Gum–Black Sallee Open Forest) are present within the CILMP Central and South areas. The majority of vegetation cover within the CILMP Central area comprise exotic vegetation, with the CILMP South area comprising species-poor occurrences of Derived Tableland Hollows Black Gum–Black Sallee Open Forest. A summary of Priority Weeds for the NSW Central Tablelands, as listed under the *Biosecurity Act 2015*, present within the RMA and to be targeted under the CILMP is provided in Appendix E.

Similarly, the channel course and hydrological flows of the Coxs River have been historically modified to varying degrees throughout the RMA. Within the CILMP North area, numerous channel diversions, drains and berms were constructed to drain the Mountain Hollow Grassy Fen in the area. Modifications to the Coxs River channel course can be identified in Figure 2.2, highlighted by areas of native riparian vegetation and proposed water management structures lying outside the mapped water course. The entire existing Coxs River channel within the CLIMP Central Area is constructed, following diversion and realignment in conjunction with the open-cut Commonwealth Coal Mine operations. To the north of the CILMP South area, an approximately 200 m reach of the Coxs River has been straightened to divert flows from a westward meander of the original channel.

Summary descriptions of the RMA within each site (CILMP North, Central and South) are provided in Section 3.2, 3.3, 3.4 in association with management specifications within each component site.

Land Management Area

As with the RMA, native vegetation within terrestrial lands that form the Land Management Area (LMA) is in a highly modified condition, with the degree of modification varying considerably between the CILMP North, Central and South areas.

The majority of remnant native vegetation within the LMA occurs in CILMP North. The majority of vegetation cover within CILMP North LMA comprises Derived Tableland Hollows Black Gum – Black Sally Open Forest pastures. Pasture areas include a scattered presence of paddock trees. Paddock composition generally includes a high component of native grasses, with native understorey species diversity increasing within lesser-grazed slopes to the west of Coxs River and including numerous native forb and sedge species.

The majority of vegetation cover within CILMP South LMA also comprises Derived Tableland Hollows Black Gum – Black Sally Open Forest pasture. Native pastures within the CILMP South LMA are in a less robust condition than CILMP North, likely due to historical clearing and grazing practices. No native tree cover is present within the CILMP South LMA. Native pasture cover is nonetheless present throughout CILMP South and will be retained as an important ongoing component of cattle feed.

The high proportion of native species within existing pasture cover throughout the CILMP North LMA, and to a lesser extent CILMP South, is a result of current and past sustainable land management practices and is reflective of the best-practice management approach guided by Centennial's Rural Land Use Code of Practice (Centennial Coal 2015). In particular, sustainable approaches to land management is also reflected in the condition of in-stream native vegetation in the CILMP North RMA which, with the exception of designated crossing/watering points, did not show any signs of cattle ingress at the time of inspection. This is largely due to cattle preference for pasture grass feed (versus sedges/rushes and tussock grasses within riparian swamp vegetation) and low stocking rates. Historical and ongoing grazing management practices that have contributed to the retention of native vegetation at CILMP North and South include:

- Avoidance of overgrazing via rotation grazing and maintenance of low stocking rates.
- Adapting grazing regimes to prevailing climatic conditions (e.g. longer pasture rest periods and decreased stocking rates during periods of dry weather).
- Regular monitoring of grass condition by the Farm Manager to ensure retention of viable and diverse grass root and stem stock.
- Establishment of designated cattle watering/crossing points via installation of fencing and gates.
- Establishment and maintenance of off-stream stock watering points situated outside the riparian area (see Figure 2.2).
- Engagement with Local Land Services to undertake riparian protection projects, including fencing around the Kangaroo Creek riparian corridor.

The majority of vegetation cover within CILMP Central comprises exotic vegetation that is to be managed By Centennial in accordance with the Rural Land Use Code of Practice (Centennial Coal 2015). A summary of Priority Weeds for the NSW Central Tablelands, as listed under the *Biosecurity Act 2015*, present within the Riparian Management Area and to be targeted under the CILMP is provided in Appendix E.

2.3 Roles and responsibilities

The title holder has responsibility for the implementation and management of the land parcels that form the CILMP. Centennial Springvale has an established an Environmental Management Strategy which the CILMP will form a component of.

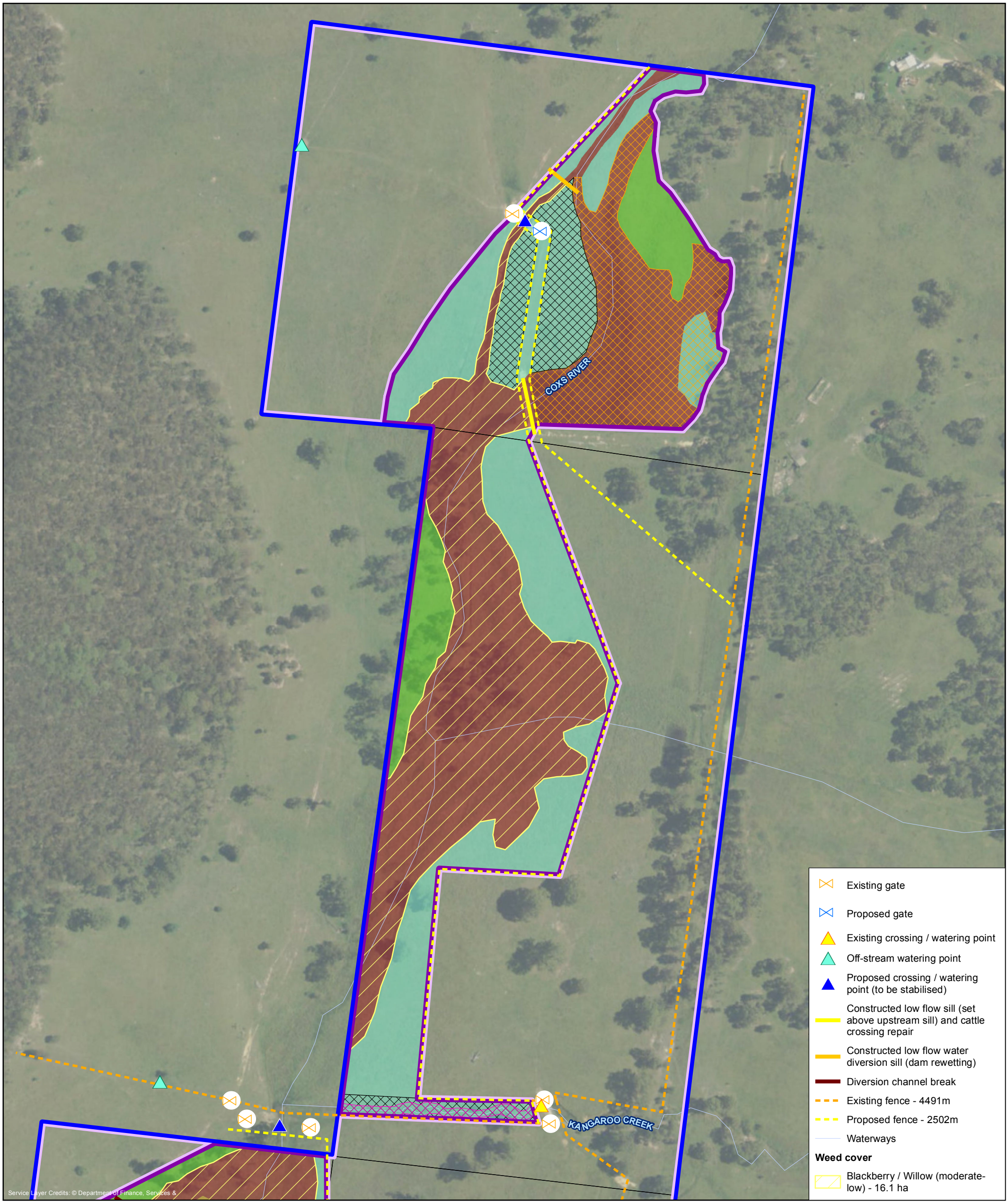
As required by ISO14001, the General Manager Environment and Approvals has the responsibility and appropriate authority to:

- Ensure that environmental management system (EMS) requirements are established, implemented and maintained generally in accordance with ISO14001.
- Report on the performance of the EMS to senior management for review and as a basis for improvement of the system.
- Update personnel on changes in environmental legislation, policy and guidelines and to notify each site's management team and other relevant staff of changes that may significantly affect the operations.

Each employee and contactor is responsible for adhering to the Centennial Coal Environmental Policy. Whilst the obligation of complying with the Environmental Policy lies with the entire workforce, further environmental management responsibilities that are considered as a part of the normal functioning of some positions relevant to this CILMP are described in Table 2-4.

Table 2-4 Key roles and responsibilities

Role	Responsibility
Group Manager Property, Titles and Survey	• Review of the document. • Provide a copy of this document to the Property Management Contractor. • Provide feedback of opportunities, issues, near-misses or incidents to the Environmental Specialist or Environment and Community Coordinator.
Property Manager Contractor	• Review of the document and adhere to requirements. • Provide a copy of this document to any lessee's sub-contractors. • Provide feedback of opportunities, issues, near-misses or incidents to the Centennial Group Manager Property, Titles and Survey.
Lessees and Sub-contractors	• Review of the document and adhere to requirements. • Provide feedback of opportunities, issues, near-misses or incidents to the Property Management Contractor.
Environmental Specialist	• Provide advice as required. • Providing review of the document. • Undertaking consultation as required with external stakeholders. • Record keeping associated with the management and monitoring activities. • Undertaking consultation as required with external stakeholders.
Environment and Community Coordinator	• Implementing management actions as required under this CILMP. • Reporting as required to external stakeholders. • Budgeting for management activities.
Contractors implementing this CILMP	• Review of the document and adhere to requirements. • Provide advice as required. • Provide quarterly and/or annual reporting as agreed. • Record keeping associated with the work completed.



LEGEND

- Project Site
- Riparian Management Area
- Land Management Area
- Centennial Owned Lots
- Revegetation: shrub/canopy mid-upper banks
- Montane peatlands & swamps rewetting
- Revegetation: In-stream / bank stabilisation

Native Vegetation (RPS 2017)

- 15 Derived Tableland Hollows Black Gum - Black Sally Open Forest
- 15 Tableland Hollows Black Gum - Black Sally Open Forest (EEC)
- 53 Mountain Hollow Grassy Fen (EEC)
- Typha orientalis Wetland

Paper Size A3

0 25 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Centennial Coal Pty Ltd
Cox's River RHCIP

Cox's River CILMP - Management Action (CILMP North)

Job Number 22-19098
Revision A
Date 26 Sep 2017

Figure 2.2a

N:\AU\Sydney\Projects\22\19098\GIS\Maps\Deliverables\22_19098_CoxsRiverCILMP_Z002_PAP.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: General topo - NSW LPI DTDB 2015 & 2012, Aerial imagery - SIXmaps 2017, Vegetation mapping & Coxs River Lots - Centennial Coal. Created by:jrprice

COXS RIVER

Service Layer Credits: © Department of Finance, Services &

- Existing gate
- Proposed crossing / watering point (to be stabilised)
- Diversion channel block
- Diversion channel break
- Head-cut stabilisation
- Stream sill installation
- Existing fence - 4491m
- Proposed fence - 2502m
- Waterways

Threatened species (RPS 2017)

- *Eucalyptus aggregata* (vulnerable)

Weed cover

- Blackberry (moderate-high) - 3.2 ha
- Blackberry / Willow (moderate-low) - 16.1 ha

LEGEND

- Project Site
- Riparian Management Area
- Land Management Area
- Centennial Owned Lots
- Revegetation: shrub/canopy mid-upper banks
- Montane peatlands & swamps rewetting
- Revegetation: In-stream / bank stabilisation

Native Vegetation (RPS 2017)

- 15 Derived Tableland Hollows Black Gum - Black Sally Open Forest
- 15 Tableland Hollows Black Gum - Black Sally Open Forest (EEC)
- 53 Mountain Hollow Grassy Fen (EEC)
- Typha orientalis Wetland

Paper Size A3

0 25 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Centennial Coal Pty Ltd
Cox's River RHCIP

Cox's River CILMP - Management Action (CILMP North)

Job Number 22-19098
Revision A
Date 26 Sep 2017

Figure 2.2b

N:\AU\Sydney\Projects\22\19098\GIS\Maps\Deliverables\22_19098_CoxsRiverCILMP_Z002_PAP.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: General topo - NSW LPI DTDB 2015 & 2012, Aerial imagery - SIXmaps 2017, Vegetation mapping & Coxs River Lots - Centennial Coal. Created by:jrprice

COXS RIVER

Service Layer Credits: © Department of Finance, Services &

- Diversion channel block
- Diversion channel break
- Head-cut stabilisation
- Stream sill installation
- Existing fence - 4491m
- Proposed fence - 2502m
- Waterways

Threatened species (RPS 2017)

- *Eucalyptus aggregata* (vulnerable)

Weed cover

- Blackberry (moderate-high) - 3.2 ha
- Blackberry / Willow (moderate-low) - 16.1 ha

LEGEND

- Project Site
- Riparian Management Area
- Land Management Area
- Centennial Owned Lots
- Montane peatlands & swamps rewetting
- Revegetation: In-stream / bank stabilisation
- Typha orientalis Wetland

Native Vegetation (RPS 2017)

- 15 Derived Tableland Hollows Black Gum - Black Sally Open Forest
- 15 Tableland Hollows Black Gum - Black Sally Open Forest (EEC)
- 53 Mountain Hollow Grassy Fen (EEC)

Paper Size A3

0 25 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Centennial Coal Pty Ltd
Cox's River RHCIP

Cox's River CILMP - Management Action (CILMP North)

Job Number 22-19098
Revision A
Date 26 Sep 2017

Figure 2.2c

N:\AU\Sydney\Projects\22\19098\GIS\Maps\Deliverables\22_19098_CoxsRiverCILMP_Z002_PAP.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: General topo - NSW LPI DTDB 2015 & 2012, Aerial imagery - SIXmaps 2017, Vegetation mapping & Coxs River Lots - Centennial Coal. Created by:jrprice

VIEW STREET

COXS RIVER

Service Layer Credits: © Department of Finance, Services &

Existing fence - 954m

Waterways

LEGEND

Project Site

Riparian Management Area

Land Management Area

Centennial Owned Lots

Revegetation: shrub/canopy mid-upper banks

Native Vegetation (RPS 2017)

15 Tableland Hollows Black Gum - Black Sally Open Forest (EEC)

Exotic

Paper Size A3

0 25 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Centennial Coal Pty Ltd
Cox's River RHCIP

Cox's River CILMP - Management Action (CILMP Central)

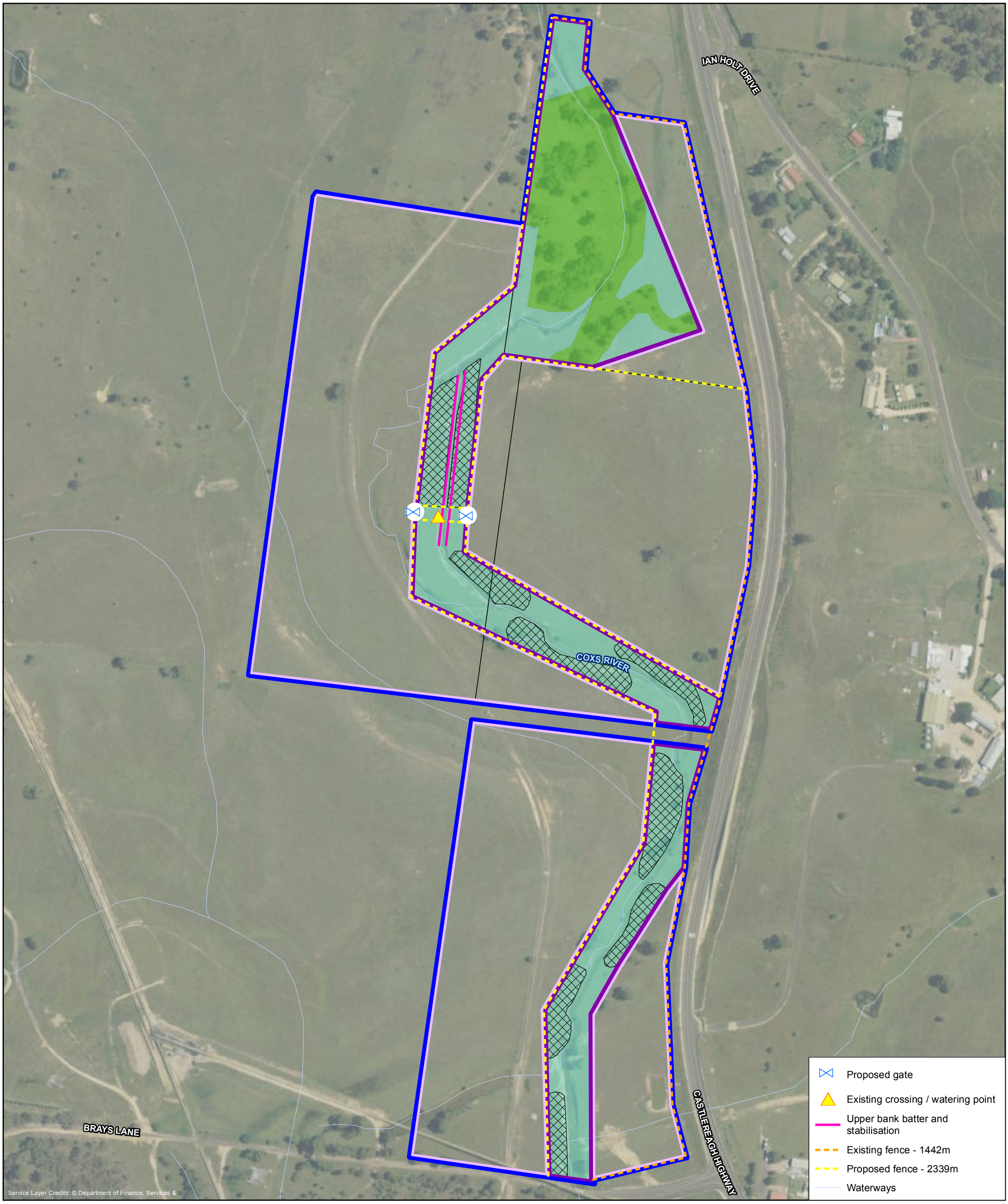
Job Number 22-19098
Revision A
Date 26 Sep 2017

Figure 2.2d

N:\AU\Sydney\Projects\22\19098\GIS\Maps\Deliverables\22_19098_CoxsRiverCILMP_Z002_PAP.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: General topo - NSW LPI DTDB 2015 & 2012, Aerial imagery - SIXmaps 2017, Vegetation mapping & Coxs River Lots - Centennial Coal. Created by:jrprice



LEGEND

- Project Site
- Riparian Management Area
- Land Management Area
- Centennial Owned Lots
- Revegetation: shrub/canopy mid-upper banks

Native Vegetation (RPS 2017)

- 15 Derived Tableland Hollows Black Gum - Black Sally Open Forest
- 15 Tableland Hollows Black Gum - Black Sally Open Forest (EEC)

Paper Size A3

0 25 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Centennial Coal Pty Ltd
Cox's River RHCIP

Cox's River CILMP - Management Action (CILMP South)

Job Number 22-19098
Revision A
Date 26 Sep 2017

Figure 2.2e

N:\AU\Sydney\Projects\22\19098\GIS\Maps\Deliverables\22_19098_CoxsRiverCILMP_Z002_PAP.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: General topo - NSW LPI DTDB 2015 & 2012, Aerial imagery - SIXmaps 2017, Vegetation mapping & Coxs River Lots - Centennial Coal. Created by:jrprice

3. CILMP Management actions and specifications

The location of all management actions specified in the following works tables are shown in Figure 2.2

Summary Works Descriptions, relating to the general approach to be taken to native vegetation management and restoration under the CILMP is provided in Appendix C.

3.1 Preliminary works

Works	Objectives	Action	Notes
All works within remnant bushland and Threatened Ecological Communities (EEC/CEEC)	• Ensure required legislative approvals are sought prior to commencement of catchment management and restoration works.	• Acquire Section 132C licence to undertake bush regeneration works within the project area from OEH prior to works commencement. • Acquire Threatened Species Licence under Part 2 of the NSW *Biodiversity Conservation Act 2016* to '…pick a plant that is a threatened species of part of a threatened ecological community', in relation to all minor construction works to be undertaken within in-stream areas of Montane Peatlands and Swamps (EEC). • Acquire Controlled Activity Approval from Crown Lands and Water under the Water Management Act 2000, for controlled activities in waterfront land, namely, '…the carrying out of an activity that affects the quantity or flow of water in a water source'. • Submit referral under the EPBC Act to Commonwealth Minister for the Environment to determine whether the management actions proposed under the CILMP have the potential to have a significant impact upon any Matter of National Environmental Significance (MNES). • Liaise with relevant OEH threatened species experts and SOS project co-ordinators regarding the rehabilitation and restoration of TECs and threatened species habitat at the CILMP project site.	

Works	Objectives	Action	Notes
Project Management	• Establish single point of contact regarding catchment management and restoration works throughout the project site. • Ensure appropriate oversight, management and delivery of best-practice of catchment management and restoration works for the duration of the project. • Maximise cost efficiency of works delivery. • Avoid wastage due to poor project planning.	• An appropriately qualified and experienced, dedicated project manager is to be assigned to oversee catchment management and restoration works for the duration of the period covered by this CILMP. • Project manager should be sufficiently resourced to inspect the project site on a regular basis and to undertake regular meetings with the bush regeneration contractor regarding project works, progression and outcomes.	
Engage appropriately qualified, experienced and resourced bush regeneration company	• Ensure delivery of high quality catchment and native vegetation management and restoration services. • Ensure appropriate resourcing of catchment management and restoration works. • Maximise continuity of management and supervision over the life-span of contracted catchment management and restoration works.	• Catchment management and restoration works are to be implemented by an appropriately qualified and experienced bush regeneration contractor. In addition to compliance with standard workplace requirements and laws, the bush regeneration contractor must: - Provide a statutory declaration stating their compliance with provisions of the National Gardening & Landscape Services Award 2010. - Have previous experience undertaking bushland restoration works within the Central West of NSW. - Provide a dedicated internal project manager to manage and oversee all contract works. - Provide site supervisor(s) with minimum qualifications and experience including Certificate III Conservation & Land Management and one year full-time equivalent experience as a trained bush regenerator. - Provide a minimum of one trained bush regenerator (plus supervisor) per team of four. - Provide a minimum of two trained bush regenerators (plus supervisor) per team of five/six. - Ensure that untrained bush regenerators do not make	• Minimum trained bush regenerator qualifications and experience of Certificate III Conservation & Land Management and one year full-time equivalent experience as a bush regenerator.

Works	Objectives	Action	Notes
		up more than 50% of a bush regeneration contractor team at any time. - Schedule appropriately resourced regular site visits for the duration of the contract period. - All bush regeneration crew members undertaking herbicide spray applications must hold a current chemicals application training certificate to AQF Level III.	
Revegetation Seed Collection/Plant Supply	• Supply local provenance plant stock for site revegetation works. • Maintain genetic integrity of local native vegetation.	• **In order to achieve the specified native species revegetation within the specified timeframes it is critical that appropriate lead-time is allowed for seed collection and propagation works.** - A minimum lead-time of 1 year should be provided for all provenance plant supply. For orders of 20,000+ plants up to 2 years' lead time should be provided. • All seed collection/plant supply to be of provenance stock in accordance with Florabank Guidelines & Code of Practice (www.florabank.org.au). - Seed sourcing should prioritise collection of high quality and genetically diverse seed in order to maximise the adaptive potential of restoration efforts to current and future environmental change. Seed should be collected as locally as possible, however, the matching of environmental conditions at the planting site with those of the collection location should be the most important consideration in establishing the collection range. Conversely, collection of 'local' material, defined by the application of an arbitrary distance, should not form the principal priority that guides seed collection. • At a minimum, all seed collection works will adhere to the following guidelines: - Target species ranges have been well defined prior to commencement of collection. - Site environmental conditions including soils, geology, topography, climate and vegetation type are matched	• Specified timeframes for revegetation works are provided in Section 4 – Schedule of Works) • It is assumed that catchment management works will commence during late 2017/early 2018. • A written statement/letter from the plant supplier is required which states that the supplied plants are of appropriate provenance and that provides the locations from which seed for the supplied plants was collected. • Revegetation species lists are provided in Table 3-1 and Table 3-2.

Works	Objectives	Action	Notes
		as closely as possible with collection sites. - Seed is collected from the largest, healthiest and most genetically diverse populations available. - Seed is only collected within pre-defined target ranges for each plant species. - Seed is never over-collected from individual sites (<20% available seed). - Seed is collected from as many different individual parents as is practicably possible. - Seed is not collected from previous plantings unless this is absolutely certainty of the provenance of the stock. - Seed is processed and stored immediately to ensure that viability is maximised. - Landholder permission is acquired prior to seed collection. • All seed collection is to be undertaken by specialist experienced and licenced native seed collection contractors. • All plant propagation is to be undertaken by a specialist native plant nursery, qualified and experienced in provenance plant propagation. • All grasses, forbs and macrophytes are to be supplied in hiko trays. Tree and shrub species are to be supplied in forestry tubes (50 x 50 x 120 mm) where available, but may otherwise be supplied in hiko trays. • Upon supply, all plants to be in the following condition: - appropriately hardened-off. - fully developed root system. - not root bound or over-mature. - in a healthy and robust condition. - free of pests, disease and weed infestation. - free of malformations and other defects.	

Table 3-1 Revegetation species list – CILMP North Riparian Management Area

Scientific name	Common name	Location
Canopy		
Eucalyptus aggregata	Black Gum	Mid-upper banks
Eucalyptus bridgesiana	Apple Box	Mid-upper banks
Eucalyptus pauciflora	Snow Gum	Mid-upper banks
Eucalyptus stellulata	Black Sally	Mid-upper banks
Eucalyptus viminalis	Ribbon Gum	Mid-upper banks
Shrubs		
Acacia dealbata	Silver Wattle	Mid-upper banks
Hibbertia obtusifolia	Hoary Guinea Flower	Mid-upper banks
Leptospermum polygalifolium	Tantoon	Mid-upper banks
Macrophyte/Groundcover		
Carex gaudichaudiana	-	In-stream/bank stabilisation
Eleocharis acuta	-	In-stream/bank stabilisation
Juncus sarophorus	-	In-stream/bank stabilisation
Lomandra longifolia	Spiny-headed Mat-rush	In-stream/bank stabilisation
Microlaena stipoides	Weeping Grass	Bank stabilisation
Poa labillardierei	Tussock Grass	Bank stabilisation
Poa sieberiana	-	Bank stabilisation
Themeda australis	Kangaroo Grass	Bank stabilisation

Table 3-2 Revegetation species list – CILMP Central and South Riparian Management Areas

Scientific name	Common name	Location
Canopy		
Eucalyptus aggregata	Black Gum	Mid-upper banks
Eucalyptus dalrympleana	Mountain Gum	Mid-upper banks
Eucalyptus rubida	Candlebark	Mid-upper banks
Eucalyptus viminalis	Ribbon Gum	Mid-upper banks
Shrubs		
Acacia dealbata	Silver Wattle	Mid-upper banks
Acacia falciformis	Hickory Wattle	Mid-upper banks
Indigofera australis	Australian Indigo	Mid-upper banks
Leptospermum polygalifolium	Tantoon	Mid-upper banks
Leptospermum trinervium	Flaky-barked Tea-tree	Mid-upper banks
Macrophyte/Groundcover		
Carex gaudichaudiana	-	In-stream/bank stabilisation
Eleocharis acuta	-	In-stream/bank stabilisation
Juncus sarophorus	-	In-stream/bank stabilisation
Lomandra longifolia	Spiny-headed Mat-rush	In-stream/bank stabilisation
Microlaena stipoides	Weeping Grass	In-stream/bank stabilisation
Rytidosperma racemosum	-	
Poa labillardierei	Tussock Grass	In-stream/bank stabilisation
Poa sieberiana	-	In-stream/bank stabilisation
Themeda australis	Kangaroo Grass	In-stream/bank stabilisation

3.2 CILMP North – Riparian Management Area

Area:	RMA: 45.77 ha LMA: 88.29 ha
Description:	The CILMP North RMA comprises the most ecologically intact, resilient and highest conservation significance portion of the RMA across all three sites. Vegetation cover within the CILMP North RMA is predominately composed of Montane Hollow Grassy Fen (RPS 2017) which forms a local occurrence of the threatened ecological community Montane Peatlands and Swamps (EEC – BC Act; EEC – EPBC Act). Drier portions of Montane Hollow Grassy Fen tend to be dominated by *Carex* spp. and *Poa labillardierei* var. *labillardierei* (Tussock Grass), with the diversity of native herbaceous wetland species increasing within more consistently flooded/wet areas, in particular within the large central swamp. Within the swamp, Mountain Hollow Grassy Fen intermixes with patches of *Typha orientalis* Wetland where deeper standing pools have formed. A greater cover of Montane Hollow Grassy Fen is intermixed with *Typha orientalis* (Cumbungi) here than shown in RPS (2017) native vegetation mapping (see Figure 2.2b). *Leptospermum polygalifolium* subsp. *polygalifolium* (Tantoon) is also starting to emerge. Mountain Hollow Grassy Fen within the CILMP North RMA provides important habitat for a high diversity of native wetlands flora species within the locality and provide foraging and nesting habitat for a wide range of native fauna species including amphibians, reptiles, birds, fish and mammals, including a number of threatened species. Terrestrial vegetation within the CILMP North RMA is composed of remnant Tableland Hollows Black Gum-Black Sallee Open Forest (RPS 2017), which forms a local occurrence of the threatened ecological community *Tablelands Snow Gum, Black Sallee, Candlebark and Ribbon Gum Grassy Woodland* (EEC – BC Act; CEEC EPBC Act). Patches of tableland Hollows Black Gum-Black Sallee Open Forest occur within the RMA as under-scrubbed remnant stands of *Eucalyptus aggregata* (Black Gum), *E. rubida* (Candlebark) and *E. stellulata* (Black Sallee), with an understorey dominated by native grasses and other herbaceous species. Remaining areas of terrestrial vegetation in the CILMP North RMA are composed of Derived Tableland Hollows Black Gum-Black Sallee Open Forest (RPS 2017) which retains a relatively diverse mix of native understorey grasses and other herbaceous species. Existing inoperative three-strand electric fencing is present along the western boundary of the Coxs River and associated riparian vegetation, from the northern end of the Riparian Management Area, adjoining the existing fence running along the boundary of the electricity easement to the south of the *Typha orientalis* Wetland.

Condition:	• GHD (2017a) recorded Riparian, Channel and Environmental (RCE – see below) scores of 54% and 50% at two habitat condition monitoring points that occur within the CILMP North RMA, based on the dominance of grasses/pastures, lack of riparian trees, narrow riparian strip, lack of riffle/pool sequence, accumulation of fine sediment and limited instream habitat (Riparian, Channel and Environmental [RCE] inventory system [Peterson 1992] categorises aquatic habitat condition and modification. The higher the RCE score the closer the assessed riparian system is to reference condition). • Partially modified riparian morphology in the form of swamp drainage diversion channels, drains and berms. • Large areas of Montane Hollow Grassy Fen are in good condition. Remaining areas retain sufficient resilience that their restoration could be achieved by relatively low levels of weed control combined with rewetting via modification of remaining man-made drainage structures. • Terrestrial native vegetation predominately cleared. Remnant native canopy cover present in patches and relatively high resilience present in the understorey. • Relatively high proportion of native species in grazed understorey due to current (and likely historical) low grazing pressures.
Ecological Issues / Threats:	• Historical clearing of terrestrial native vegetation through majority of RMA. • Ongoing low intensity cattle grazing (cattle generally only enter areas of Mountain Hollow Grassy Fen and *Typha orientalis* Wetland at a number of riparian crossings and watering points). • Bank erosion and instream disturbance at cattle crossing/watering points. • Swamp drainage diversion channels, drains and berms (historical attempts to drain swamps within were only partly successful and drainage structures have been variously removed or modified in recent years). • Incised diversion channels exhibiting steep bank erosion. Incised drainage channel on eastern valley margin upstream of Angus Pl to Mt Piper haul road at risk of incising into upstream intact valley fill deposits (GHD 2017b). • *Rubus* spp. (Blackberry) infestations at varying density throughout Montane Hollow Grassy Fen and *Typha orientalis* Wetland (infestations generally grading from low in upper reaches to high within the lower reaches of LMA). Scattered infestation of *Rubus* spp. infestation within terrestrial areas. • *Salix* sp. (Willow) infestation scattered through central and lower reaches of the LMA.

CILMP North Aims	• Strategic reconstruction and restoration of fully structured riparian bank vegetation. • Strategic revegetation of macrophytes along eroding stream banks and channels. • Fencing of RMA along primary access boundaries. • Control of major noxious and environmental weed species. • Modification of man-made drainage structures to achieve rewetting and restoration of Mountain Hollow Grassy Fen. • Installation of bank stabilisation and in-stream structures to slow rates of erosion within cleared and incised channels and cattle crossings.
Outcomes	• Improved aquatic habitat via: – Reconstruction and restoration of fully structured bank vegetation. – Revegetation of macrophytes along eroding stream banks and channels. – Increased source of woody debris in the waterway resulting in habitat creation for macroinvertebrates and fish. – Restoration of Mountain Hollow Grassy Fen. – Exclusion of cattle from the RMA. – Control of Priority Weeds. • Improved oxygenation of the water in the Coxs River via: – Revegetation of macrophytes along eroding stream banks and channels. – Reduced algal growth from increased shading on revegetated riparian banks. • Reduced nutrification of the Coxs River via: – Establishment of vegetated riparian corridors to act as a buffer to soil and farm nutrient flows in adjacent waterways. – Stabilisation of riparian banks and slowing of water flows, slowing rates of erosion and associated nutrient flows into adjacent waterways. – Reduced algal growth from increased shading on revegetated riparian banks.

Works	Objectives	Action	Timing/Effort	Condition Target
Fence installation	• Control stock movements into riparian corridor and remnant vegetation along primary access boundaries. • Reduce impact on water quality by improving stock crossings.	• Supply and install stock exclusion fencing (3-5 strand plain wire rural fencing), and rural gates, as per Figure 2.2, to prevent access to key access points along riparian area.	• Year 3 (following tractor ripping for revegetation) • Rural fence installation: 2,500 m • Rural gate installation: 3 gates	• Stock fencing installed and maintained as per specification. • Integrity of exclusion fencing maintained for the duration of CILMP.
Cattle crossing stabilisation & bank stabilisation and flow controls	• Arrest/minimise further erosion of waterway and diversion channel banks. • Reinstate natural flow pathways. • Improved instream function with ponds and riffles. • Install instream rock armoured gradient control structures. • Prevent cattle from impacting directly upon waterway bed at designated waterway crossing/watering points.	• Rock revetment to be installed via mini-excavator at designated fenced and gated cattle waterway crossing /watering points (see Figure 2.2). • Stabilise erosion prone area with soft engineering structures including coir logs, coir mat and targeted revegetation (see Table 3-1 for revegetation species list). • Undertake erosion control works at head cuts and nick points. • Install stream bed control structures.	• Year 1-2 - 20 hrs 3-5T excavator p.a. - 20 hrs excavator supervision p.a. - Rock/earth supply • Any additional revegetation works required for localised bank stabilisation works to be undertaken as appropriate plant stock becomes available.	• Cattle watering/crossing points appropriately stabilised with cattle not impacting directly upon the waterway bed. • Reduced instances of observable local active erosion. • Maintain integrity of channel blocks, gradient control structures and flow diversion structures maintained for duration of CILMP.

Works	Objectives	Action	Timing/Effort	Condition Target
Environmental and noxious weed control	• Reduce cover of major environmental and noxious weeds to low levels. • Control seed set of all major noxious and environmental weed infestations in Year 1 and maintain control from year 1-10. • Reduce competition of exotic species on native vegetation. • Prevent establishment of serious noxious and environmental weeds infestations on site.	<u>*Rubus fruticosus* ssp. ag (Blackberry)</u> • To be achieved primarily via manual cut and painting the crown with Roundup® (glyphosate) Biactive in order to avoid contamination of waterway with herbicide. - Primary control of mod-high infestations of Blackberry (see Figure 2.2) is to be completed prior to the commencement of Mountain Hollow Grassy Fen rewetting works (see below). - If appropriate (i.e. within drained Mountain Fen areas) primary control of dense areas of Blackberry infestation may also utilise high-volume spraying. <u>*Salix* sp.</u> • Drill and inject or cut and paint with Roundup® (glyphosate) Biactive.	• Years 1 & 2 (primary control) - 864 hrs manual BR p.a. - 16 hrs high-volume spraying p.a. • Years 3-5 (secondary control) - 624 hrs manual BR p.a. • Years 6-10 (maintenance control) - 288 hrs manual BR p.a.	• Environmental and noxious weed control completed as specified and accurately reported in biannual/annual reporting.
Revegetation: shrub/canopy mid-upper banks	• Establish vegetated riparian buffer zones to soil and nutrient flows to waterways. • Provide soil stability through the re-introduction of indigenous vegetation. • Provide habitat opportunities for fauna through revegetation. • Ensure maximum survival of all installed tubestock.	• For all revegetation works, refer to seed collection and propagation specifications in Section 3.1. • Shrub/canopy revegetation is to be undertaken in all areas identified in Figure 2.2a-c. • Plantings to include a representative mix of shrub and canopy species, that aims to maximise diversity, as identified in Table 3-1. • Shrubs: - 1 plant/10 m^2 • Canopy: - 1 plant/20 m^2 • Revegetation areas to be prepared by deep-ripping via tractor-mounted ripper a minimum of three months prior to planting.	• Revegetation works to be undertaken during Year 3 & 4. • Total revegetation area: 1 ha • Tubestock supply: - Shrubs: 1,000 - Trees: 500	• Plant supply and installation undertaken as per specification. • Specified revegetation densities achieved. • Minimum 80% plant survival. - If 80% plant survival is not achieved, appropriate supplementary plant installations should be undertaken to achieve the specified plant densities.

Works	Objectives	Action	Timing/Effort	Condition Target
		• Revegetation works should be timed to occur during early spring in order to avoid mortality of juvenile plants due to winter frosts and allow for sufficient establishment of tube-stock prior to the summer months. • All plant installations to: - Ensure that plant root ball is in a moist condition immediately prior to installation. - Include addition of Gypsum as well as an appropriate soil conditioner (water crystals, wetting agent, nutrient, growth promoter) such as Terraform® Plant Establisher or equivalent to each plant hole prior to plant installation. - Install plant directly and fully into soil. - Install the top of the root ball below the level of surrounding soil in order to produce a small 'well' at the base of the plant. - Firm the soil around the root ball following installation. - Thoroughly water the plant immediately following installation. - Ensure all woody plant stems are clear of excess soil, mulch or other material that could cause collar rot. - Install a biodegradable plant guard around all installed canopy/shrub.		
Revegetation: In-stream/bank stabilisation	• Stabilisation of eroding riparian banks. • Establish and increase in-stream and bank vegetation cover.	• For all revegetation works, refer to seed collection and propagation specifications in Section 3.1. • In-stream/bank stabilisation revegetation is to be undertaken in all areas identified in Figure 2.2 a-c. • Plantings to include a representative mix of	• Revegetation works to be undertaken during Year 3 & 4. • Total revegetation area: 3,245 m^2.	• Plant supply and installation undertaken as per specification. • Specified revegetation densities achieved.

Works	Objectives	Action	Timing/Effort	Condition Target
	• Stabilise and filter mobile in-stream silts and associated nutrients. • Enhance fauna habitat opportunities. • Ensure maximum survival of all installed tubestock.	macrophyte and groundcover species, that aims to maximise diversity, as identified in Table 3-1. • Macrophytes/groundcovers: - 2 plants/m^2 • All planting to be achieved via manual installation/hand-held auger. • Revegetation works should be timed to occur during early spring in order to avoid mortality of juvenile plants due to winter frosts and allow for sufficient establishment of tube-stock prior to the summer months. • All plant installations to: - Ensure that plant root ball is in a moist condition immediately prior to installation. - Include addition of Gypsum as well as an appropriate soil conditioner (water crystals, wetting agent, nutrient, growth promoter) such as Terraform® Plant Establisher or equivalent to each plant hole prior to plant installation. - Install plant directly and fully into soil. - Install the top of the root ball below the level of surrounding soil in order to produce a small 'well' at the base of the plant. - Firm the soil around the root ball following installation. - Thoroughly water the plant immediately following installation. - Ensure all woody plant stems are clear of excess soil, mulch or other material that could cause collar rot. - Install a biodegradable plant guard around all installed canopy/shrub.	• Tubestock supply: - Macrophytes/groundcover: 6,490	• Minimum 80% plant survival. - If 80% plant survival is not achieved, appropriate supplementary plant installations should be undertaken to achieve the specified plant densities.

Works	Objectives	Action	Timing/Effort	Condition Target
Revegetation Revegetation Watering & Maintenance	• Ensure establishment of revegetated native plant species.	• Additional watering of all installed plants to be undertaken: - Twice within two weeks of installation. - Once during the third/forth week since installation. - Further watering as required. • Plants are to be closely monitored throughout their establishment phase with additional watering to be undertaken as required to ensure their establishment and survival. • All emerging herbaceous, vine and woody weeds are to be maintained to low levels throughout the revegetation site on an ongoing basis: - In particular, maintenance of emerging weed species will be critical during native revegetation establishment. - Care to be taken to manually remove weed species emerging within plant guards. • Weed control works to be sufficiently structured, planned and resourced such that best-practice maintenance methods can be applied at all times. • At no time is any off-target herbicide damage to native plant species to occur. • At all times priority to be given to minimisation of weed seed set. • To be achieved via a combination of manual removal, brush-cutting, cut/scrape and poisoning and careful spot spraying as appropriate. • Following establishment of a dominant native species cover: - Plant guards are to be removed and appropriately disposed of. - Maintenance works to be incorporated into that of surrounding areas.	• Years 3-7 • Additional watering: 2 hrs p.a. (Years 3 & 4) • Weed maintenance: 32 hrs p.a. • Guard removal: 32 hrs	• Minimum 80% plant survival. - If 80% plant survival is not achieved, appropriate supplementary plant installations should be undertaken to achieve the specified plant densities. • All plant guards removed 5 years after plant installation.

Works	Objectives	Action	Timing/Effort	Condition Target
Mountain Hollow Grassy Fen re-wetting	• Reinstatement of natural hydrological functions and flow paths through vegetated peatland and swamps. • Restoration of Montane Hollow Grassy Fen vegetation. • Stabilise and filter mobile in-stream silts and associated nutrients.	• Install channel blocks, gradient control structures and flow diversion structures at northern dam and within central swampland. • Restore dam wall/cattle crossing at northern dam. • Stabilise erosion prone areas with soft engineering structures. • Undertake erosion control works at head cuts and nick points. • Install piezometers in areas to be rewetted in order to monitor soil water levels.	• Rewetting works to be undertaken from Year 3-4, following completion of primary Blackberry control. • Mini-excavator: 40 hrs p.a. • Works supervision: 40 hrs p.a. • Manual works: 64 hrs p.a.	• Increase ground water levels within target re-wetting areas. • Natural regeneration of Fen vegetation. • Integrity of channel blocks, gradient control structures and flow diversion structures maintained for duration of CILMP.

3.3 CILMP Central – Riparian Management Area

Area:	RMA: 10.07 ha LMA: 19.61 ha
Description:	CILMP Central comprises the most degraded portion of the RMA, having been extensively impacted by historic Commonwealth Coal open-cut mining activities. With the exception of a small area at the south-west corner of CILMP Central, soils throughout the site have been displaced and are presently composed of overburden fill and tailings dumps. Vegetation throughout areas of overburden fill and tailings comprises a combination of planted vegetation and invasive weed species. Within the northern half of CILMP Central, canopy is composed of the exotic species *Pinus radiata* (Radiata Pine). *P. radiata* wildlings are present throughout and spreading beyond the primary stand. However, very low cover of *P. radiata* is present along the immediate banks of the Coxs River. Scattered occurrences of the widespread native shrub *Cassinia arcuata* (Sifton Bush) are present in the mid-storey while understorey cover is dominated by *Eragrostis curvula* (African Love Grass). Within the southern half of CILMP Central canopy cover is patchy, composed of a mix of native species, including *Casuarina cunninghamiana* (River Oak) and *Eucalyptus rubida* (Candlebark). Large *P. radiata* wildlings also occur on the eastern bank of the Coxs River channel. As with the northern half of the site, very low cover of *P. radiata* is present along the immediate banks of the Coxs River. The south-west corner of the site includes a small portion of a patch of Tableland Hollows Black Gum-Black Sallee Open Forest (RPS 2017). Understorey within the southern half of CILMP Central is composed of a mix of exotic perennial grass species. Other environmental weed species present throughout the CILMP Central include *Cortaderia selloana* (Pampas Grass), *Cytisus scoparius* (Scotch Broom), *Hypericum perforatum* (St John's Wort) and *Rubus* spp. aggregate (Blackberry). *E. curvula* (African Love Grass) forms the dominant vegetation along the constructed Coxs River banks within CILMP Central, while frequent dense stands of *Typha orientalis* (Broadleaf Cumbungi) occur within the channel itself, with *Eleocharis* sp. also present.
Condition:	• GHD (2017a) recorded an RCE score of 50% at a single habitat condition monitoring point within the CILMP Central RMA, based on the sparse riparian vegetation and low levels of channel shading, low levels of large instream woody debris and detritus, accumulation of fine sediment, and high proportion of exotic tree and grasses cover. (Riparian, Channel and Environmental [RCE] inventory system [Peterson 1992] categorises aquatic habitat condition and modification. The higher the RCE score the closer the assessed riparian system is to reference condition). • Highly modified river system flowing through mine pit voids and overburden/tailings dumps (GHD 2017b). • Poor channel morphological diversity and altered channel floodplain connectivity, with only large flood events able to engage with the land formed 'floodplains' (GHD 2017b). • Channel does not exhibit any significant evidence of ongoing lateral or vertical erosion issues (GHD 2017b).

	• Vegetation cover comprised almost entirely of exotic vegetation with little native vegetation community resilience. • Some aquatic vegetation habitat present in the form of localised dense patches of *Typha orientalis* (Broadleaf Cumbungi).
Ecological Issues/Threats:	• No natural native vegetation community resilience due to past mining activity, including removal of aquatic and terrestrial native vegetation associations, and soils through majority of Riparian Management Area. • High cover of noxious and environmental weed species throughout RMA including *Cortaderia selloana* (Pampas Grass), *Cytisus scoparius* (Scotch Broom), *Eragrostis curvula* (African Love Grass), *Hypericum perforatum* (St John's Wort) and *Rubus* spp. aggregate (Blackberry). • Ongoing invasion of noxious and environmental weeds species into Tableland Hollows Black Gum - Black Sallee Open Forest and other remnant native vegetation communities bordering the Riparian Management Area. • Lack of instream woody debris.
CILMP Central Aims	• Extensive and costly rehabilitation works would be required to re-establish self-sustaining native vegetation associations within CILMP Central. Only minimal rehabilitation actions, targeted at progressive improvement of native species cover and riparian habitat, and reduction of noxious and environmental weeds are recommended. • Short- to medium-term retention of mature stands of *Pinus radiata* in lieu of establishment of appropriate replacement native mid-storey and canopy cover. • Control of major noxious and environmental weed species within RMA and progressive removal of *P. radiata* wildlings. • Progressive installation of local native shrub and canopy species within the north of the site to replace *P. radiata* over the long-term management of the site. • Strategic reconstruction and restoration of fully structured bank vegetation.
Outcomes	• Improved aquatic habitat via: – Reconstruction of fully structured bank vegetation. – Increased source of woody debris in the waterway resulting in habitat creation for macroinvertebrates and fish. • Improved oxygenation of the water in the Coxs River via: – Reduced algal growth from increased shading on revegetated riparian banks. • Reduced nutrification of the Coxs River via: – Establishment of vegetated riparian corridors to act as a buffer to soil nutrient flows into adjacent waterways. – Reduced algal growth from increased shading on revegetated riparian banks.

Works	Objectives	Action	Timing/Effort	Condition Target
Environmental and noxious weed control	• Reduce cover of major environmental and noxious weeds to low levels. • Control seed set of all major noxious and environmental weed infestations in Year 1 and maintain control from year 1-10. • Reduce competition from exotic species on native vegetation.	*Pinus radiata* (Radiata Pine) • All *P. radiata* individuals <50 mm dbh are to be removed throughout the RMA: - To be achieved via a combination of cut/scrape and painting and/or stem injection with herbicide. *Rubus fruticosus* ssp. ag (Blackberry) • To be achieved via a combination of manual cut/scrape and painting or spot-spraying as required. *Cytisus scoparius* (Scotch Broom) • To be achieved principally via manual cut/scrape and painting. *Hypericum perforatum* (St John's Wort) • To be achieved principally via spot-spraying. *Cortaderia sellonana* (Pampas Grass) • To be achieved via a combination of manual cut/scrape and painting or spot-spraying as required.	• Year 1-2 (primary control) - 192 hrs manual BR p.a. - 16 hrs p.a. high-volume spraying • Years 3-5 (secondary control) - 144 hrs manual BR p.a. - 8 hrs p.a. high-volume spraying • Years 6-10 (maintenance control) - 144 hrs manual BR p.a. - 8 hrs p.a. high-volume spraying	• No *P. radiata* individuals <50 mm dbh present within RMA after Year 2. • Environmental and noxious weed control completed as specified and accurately reported in biannual/annual reporting.
Revegetation: shrub/canopy mid-upper banks	• Establish vegetated riparian buffer zones to soil and nutrient flows to waterways. • Provide soil stability through the re-introduction of indigenous vegetation. • Provide habitat opportunities for fauna through revegetation. • Ensure maximum survival of all installed tubestock.	• For all revegetation works, refer to seed collection and propagation specifications in Section 3.1. • Shrub/canopy revegetation is to be undertaken in all areas identified in Figure 2.2d. • Plantings to include a representative mix of shrub and canopy species, that aims to maximise diversity, as identified in Table 3-2. • Shrubs: - 1 plant/10 m^2 • Canopy: - 1 plant/20 m^2 • Revegetation areas to be prepared by deep-ripping via tractor-mounted ripper a minimum of three months prior to planting.	• Revegetation works to be undertaken during Year 3 & 4. • Total revegetation area: 1.18 ha • Tubestock supply: - Shrubs: 1,180 - Trees: 590	• Plant supply and installation undertaken as per specification. • Specified revegetation densities achieved. • Minimum 80% plant survival. - If 80% plant survival is not achieved, appropriate supplementary plant installations should be undertaken to achieve the specified plant densities.

Works	Objectives	Action	Timing/Effort	Condition Target
		• An additional 100 shrub and canopy tubestock are to installed annually within the northern *P. radiata* stand from Years 3-8 of CILMP works in order to progressively establish an alternative vegetation and habitat. Tubestock is to be installed within areas of decreased weed cover following annual weed control works. • Revegetation works should be timed to occur during early spring in order to avoid mortality of juvenile plants due to winter frosts and allow for sufficient establishment of tube-stock prior to the summer months. • All plant installations to: - Ensure that plant root ball is in a moist condition immediately prior to installation. - Include addition of Gypsum as well as an appropriate soil conditioner (water crystals, wetting agent, nutrient, growth promoter) such as Terraform® Plant Establisher or equivalent to each plant hole prior to plant installation. - Install plant directly and fully into soil. - Install the top of the root ball below the level of surrounding soil in order to produce a small 'well' at the base of the plant. - Firm the soil around the root ball following installation. - Thoroughly water the plant immediately following installation. - Ensure all woody plant stems are clear of excess soil, mulch or other material that could cause collar rot. - Install a biodegradable plant guard around all installed canopy/shrub.		

Works	Objectives	Action	Timing/Effort	Condition Target

Revegetation
Revegetation Watering & Maintenance
	• Ensure establishment of revegetated native plant species.	• Additional watering of all installed plants to be undertaken:
		  - Twice within two weeks of installation.
		  - Once during the third/forth week since installation.
		  - Further watering as required.
		• Plants are to be closely monitored throughout their establishment phase with additional watering to be undertaken as required to ensure their establishment and survival.
		• All emerging herbaceous, vine and woody weeds are to be maintained to low levels throughout the revegetation site on an ongoing basis:
		  - In particular, maintenance of emerging weed species will be critical during native revegetation establishment.
		  - Care to be taken to manually remove weed species emerging within plant guards.
		• Weed control works to be sufficiently structured, planned and resourced such that best-practice maintenance methods can be applied at all times.
		• At no time is any off-target herbicide damage to native plant species to occur.
		• At all times priority to be given to minimisation of weed seed set.
		• To be achieved via a combination of manual removal, brush-cutting, cut/scrape and poisoning and careful spot spraying as appropriate.
		• Following establishment of a dominant native species cover:
		  - Plant guards are to be removed and appropriately disposed of.
		• Maintenance works to be incorporated into that of surrounding areas.
			• Years 3-7
			• Additional watering: 2 hrs p.a. (Years 3 & 4)
			• Weed maintenance: 37 hrs p.a.
			• Guard removal: 37 hrs
				• Minimum 80% plant survival.
				  - If 80% plant survival is not achieved, appropriate supplementary plant installations should be undertaken to achieve the specified plant densities.
				• All plant guards removed 5 years after plant installation.

3.4 CILMP South – Riparian Management Area

Area:	RMA: 10.17 ha LMA: 29.30 ha
Description:	Overall, ecological condition within CILMP South is poor, with the majority of native vegetation having been cleared and understorey vegetation modified and grazed for a long period of time. The Coxs River has also been diverted through a portion of its course at the site. Terrestrial vegetation cover within CILMP South is composed predominately of Derived Tableland Hollows Black Gum-Black Sallee Open Forest (RPS 2017). The Tableland Hollows vegetation type is in poorer condition to that of CILMP North, with substantially less understorey native species diversity, resilience and cover present within CILMP South. A small patch of poor condition Tableland Hollows Black Gum-Black Sallee Open Forest (RPS 2017) occurs at the north of site. The Tableland Hollows patch is composed of scattered canopy cover with patchy remnant native understorey intermixed with exotic invasive and pasture grass species. Native shrub and mid-storey is absent throughout CILMP South. Moderate infestation of *Eragrostis curvula* (African Love Grass) occurs within the Riparian Management Area. Other major noxious and environmental weed species within CILMP South include *Crataegus monogyna* (Hawthorn), *Cytisus scoparius* (Scotch Broom), *Lycium ferocissimum* (African Boxthorn) and *Ulex europaeus* (Gorse). Vegetation within and along the banks of the Coxs River is composed of grasses and minor macrophyte growth only, with deeper-rooted woody vegetation absent. The waterway has been subject to past channelisation through straightening and enlargement (GHD 2017b). As is the case in CILMP North, where artificial channels have been constructed they have become incised and exhibit steep bank erosion.
Condition:	• GHD (2017a) recorded an RCE score of 44% at a single habitat condition monitoring point within the CILMP South RMA, based on the lack of woody vegetation and dominance of exotic vegetation in the riparian zone, frequent bank undercutting, lack of woody debris and lack of detritus (Riparian, Channel and Environmental [RCE] inventory system [Peterson 1992] categorises aquatic habitat condition and modification. The higher the RCE score the closer the assessed riparian system is to reference condition). • Moderate to high river morphology modification, characterised by a system that has been subject to past channel diversions (GHD 2017b). • Overall poor terrestrial and aquatic native vegetation condition with limited resilience. • Vegetation dominated by exotic species cover.
Ecological Issues / Threats:	• Near-absent native mid-storey and canopy cover. • Low levels of instream macrophyte cover. • Moderate cover of environmental and noxious weed species. • Deep channel incision and bank erosion along channelised reaches (GHD 2017b). • Ongoing cattle grazing. • Bank erosion and instream disturbance at cattle crossing/watering points.

	• Considerable growth of filamentous algae due to limited shading of the watercourse. • Low levels of instream woody debris.
CILMP Central Aims	• Strategic reconstruction and restoration of fully structured bank vegetation. • Strategic revegetation of macrophytes along eroding stream banks and channels. • Fencing of Riparian Management Area, including stock watering and river crossing points. • Control of major noxious and environmental weed species. • Installation of bank stabilisation and in-stream structures to slow rates of erosion within cleared and incised channels and cattle crossings.
Outcomes	• Improved aquatic habitat via: – Reconstruction and restoration of fully structured bank vegetation. – Revegetation of macrophytes along eroding stream banks and channels. – Increased source of woody debris in the waterway resulting in habitat creation for macroinvertebrates and fish. – Exclusion of cattle from the Riparian Management Area. – Control of Priority Weeds. • Improved oxygenation of the water in the Coxs River via: – Revegetation of macrophytes along eroding stream banks and channels. – Reduced algal growth from increased shading on revegetated riparian banks. • Reduced nutrification of the Coxs River via: – Establishment of vegetated riparian corridors to act as a buffer to soil and farm nutrient flows in adjacent waterways. – Stabilisation of riparian banks and slowing of water flows, slowing rates of erosion and associated nutrient flows into adjacent waterways. – Reduced algal growth from increased shading on revegetated riparian banks.

Works	Objectives	Action	Timing/Effort	Condition Target
Fence installation	• Control stock movements into riparian corridor and remnant vegetation along primary access boundaries. • Reduce impact on water quality by improving stock crossing.	• Provide and install suitable material to ensure stock crossing/drinking water have a minimal impact on water quality • Supply and install stock exclusion fencing (3-5 strand rural fencing) to prevent access and river bank damage.	• Year 3 (following tractor ripping for revegetation) • Rural fence installation: 2,340 m	• Stock fencing installed and maintained as per specification. • Integrity of exclusion fencing maintained for the duration of CILMP
Environmental and noxious weed control	• Reduce cover of major environmental and noxious weeds to low levels. • Control seed set of all major noxious and environmental weed infestations in Year 1 and maintain control from year 1-10. • Reduce competition of exotic species on native vegetation. • Prevent establishment of serious noxious and environmental weeds infestations on site.	*Crataegus monogyna* (Hawthorn) • To be achieved primarily via manual cut and painting: - Initially only small plants (below 2 m) are to be treated. Remaining individuals to be retained as bird habitat until revegetation (see below) has established. *Ulex europaeus* (Gorse) • Primary treatment to be achieved via manual cut and painting: - A high degree of caution is to be taken to avoid injury from plant spines when treating *U. europaeus*. - All emerging seedlings to be spot sprayed. *Eragrostis curvula* (African Lovegrass) • To be achieved via a combination of manual removal and spot spraying: - In particular, *E. curvula* is to be hand removed when infestations occur around native plant species.	• Years 1 (primary control) - 240 hrs manual BR - 16 hrs high-volume spraying • Years 2-5 (secondary control) - 144 hrs manual BR p.a. - 8 hrs high-volume spraying. • Years 6-10 (maintenance control) - 96 hrs manual BR p.a. - 8 hrs high-volume spraying.	• Environmental and noxious weed control completed as specified and accurately reported in biannual/annual reporting.

Works	Objectives	Action	Timing/Effort	Condition Target

Bank stabilisation and flow controls	• Reduce erosion and sediment release into the Coxs River through erosion control works.
	• Establish suitable bank gradients that allow revegetation to establish and provide long term stability to the stream banks
		• Batter incised upper banks of constructed diversion channel to a stable grade.
		  - To be achieved via use of a mini-excavator.
		• Following excavation, a single row of coir logs is to be installed along the base of the batter:
		  - 300 mm diameter coir logs to be used (CocoLogs 30 as supplied by Maccaferri Australia Pty Ltd or equivalent).
		  - Logs to be fixed with 50 x 50 x 750 mm hardwood stakes.
		  - A minimum of 3 stakes per log to be utilised, with 2 stakes at lower edge (min staked at 1.2 m).
		  - Trenched into ground 75 to 125 mm.
		• Coir mesh to be installed on all excavated soil surfaces:
		  - Mac Coir 7 (as supplied by Maccaferri Australia Pty Ltd) or equivalent to be utilised.
		  - To be fastened with 5 mm diameter 300 mm long steel U-shaped pins at a minimum 3-4 pins per m^2.
		  - Adjacent runs of mesh to be overlapped a minimum of 100 mm with overlapping edge facing downstream/away from water flow.
		  - Upslope mesh edges to be buried to a minimum depth of 300 mm.
		  - All extraneous mesh to be trimmed as required.
		  - Mesh is to be fixed under coir logs fixed along the base of the batter (see below).
		• All excavated batter surfaces are to be revegetated following stabilisation (see below).
			• Year 1
			• 3-5T excavator: 30 hrs
			• Excavator supervision: 30 hrs
			• Coir logs: ~125 logs
			• Coir mat: ~1,150 m^2
				• Controls are to be installed as per specification.
				• Controls maintained as intact until revegetation is fully established.

Works	Objectives	Action	Timing/Effort	Condition Target
Revegetation: shrub/canopy mid-upper banks	• Establish vegetated riparian buffer zones to soil and nutrient flows to waterways. • Provide soil stability through the re-introduction of indigenous vegetation. • Provide habitat opportunities for fauna through revegetation. • Ensure maximum survival of all installed tubestock.	• For all revegetation works, refer to seed collection and propagation specifications in Section 3.1. • Shrub/canopy revegetation is to be undertaken in all areas identified in Figure 2.2e. • Plantings to include a representative mix of shrub and canopy species, that aims to maximise diversity, as identified in Table 3-2. • Shrubs: - 1 plant/10 m^2 • Canopy: - 1 plant/20 m^2 • With the exception of bettered and stabilised upper bank areas, revegetation areas to be prepared by deep-ripping via tractor-mounted ripper a minimum of three months prior to planting. • Revegetation works should be timed to occur during early spring in order to avoid mortality of juvenile plants due to winter frosts and allow for sufficient establishment of tube-stock prior to the summer months. • All plant installations to: - Ensure that plant root ball is in a moist condition immediately prior to installation. - Include addition of Gypsum as well as an appropriate soil conditioner (water crystals, wetting agent, nutrient, growth promoter) such as Terraform® Plant Establisher or equivalent to each plant hole prior to plant installation. - Install plant directly and fully into soil. - Install the top of the root ball below the level of surrounding soil in order to produce a	• Revegetation works to be undertaken during Year 3 & 4. • Total revegetation area: 2.35 ha • Tubestock supply: - Shrubs: 2,360 - Trees: 1,180	• Plant supply and installation undertaken as per specification. • Specified revegetation densities achieved. • Minimum 80% plant survival. - If 80% plant survival is not achieved, appropriate supplementary plant installations should be undertaken to achieve the specified plant densities.

Works	Objectives	Action	Timing/Effort	Condition Target
		small 'well' at the base of the plant. - Firm the soil around the root ball following installation. - Thoroughly water the plant immediately following installation. - Ensure all woody plant stems are clear of excess soil, mulch or other material that could cause collar rot. - Install a biodegradable plant guard around all installed canopy/shrub. • Where planting into laid coir mesh, holes are to be cut in mesh using appropriate jute/mesh-cutter such that a clean cut is made.		
Revegetation: In-stream/bank stabilisation	• Stabilisation of eroding riparian banks. • Establish and increase in-stream and bank vegetation cover. • Stabilise and filter mobile in-stream silts and associated nutrients. • Enhance fauna habitat opportunities. • Ensure maximum survival of all installed tubestock.	• For all revegetation works, refer to seed collection and propagation specifications in Section 3.1. • In-stream/bank stabilisation revegetation is to be undertaken at all points where bank stabilisation is required at the site. • Plantings to include a representative mix of macrophyte and groundcover species, that aims to maximise diversity, as identified in Table 3-2. • Macrophytes/groundcovers: - 1 plant/m^2 • All planting to be achieved via manual installation/hand-held auger. • Revegetation works should be timed to occur during early spring in order to avoid mortality of juvenile plants due to winter frosts and allow for sufficient establishment of tube-stock prior to the summer months. • All plant installations to: - Ensure that plant root ball is in a moist condition immediately prior to installation.	• Revegetation works to be undertaken during Year 3 & 4. • Approximate revegetation area: 4,500 m^2. • Tubestock supply: - Macrophytes/groundcover: 4,500	• Plant supply and installation undertaken as per specification. • Specified revegetation densities achieved. • Minimum 80% plant survival. • If 80% plant survival is not achieved, appropriate supplementary plant installations should be undertaken to achieve the specified plant densities.

Works	Objectives	Action	Timing/Effort	Condition Target
		- Include addition of Gypsum as well as an appropriate soil conditioner (water crystals, wetting agent, nutrient, growth promoter) such as Terraform® Plant Establisher or equivalent to each plant hole prior to plant installation. - Install plant directly and fully into soil. - Install the top of the root ball below the level of surrounding soil in order to produce a small 'well' at the base of the plant. - Firm the soil around the root ball following installation. - Thoroughly water the plant immediately following installation. - Ensure all woody plant stems are clear of excess soil, mulch or other material that could cause collar rot. - Install a biodegradable plant guard around all installed canopy/shrub. • Where planting into laid coir mesh, holes are to be cut in mesh using appropriate jute/mesh-cutter such that a clean cut is made.		
<u>Revegetation</u> Revegetation Watering & Maintenance	• Ensure establishment of revegetated native plant species.	• Additional watering of all installed plants to be undertaken: - Twice within four weeks of installation. - Twice during the third/forth week since installation. - Further watering as required. • Plants are to be closely monitored throughout their establishment phase with additional watering to be undertaken as required to ensure their establishment and survival. • All emerging herbaceous, vine and woody weeds	• Years 3-7 • Additional watering: 4 hrs p.a. (Years 3 & 4) • Weed maintenance: 74 hrs p.a. • Guard removal: 74 hrs	• Minimum 80% plant survival. - If 80% plant survival is not achieved, appropriate supplementary plant installations should be undertaken to achieve the specified plant densities. • All plant guards removed 5 years after plant installation.

Works	Objectives	Action	Timing/Effort	Condition Target
		are to be maintained to low levels throughout the revegetation site on an ongoing basis: - In particular, maintenance of emerging weed species will be critical during native revegetation establishment. - Care to be taken to manually remove weed species emerging within plant guards. • Weed control works to be sufficiently structured, planned and resourced such that best-practice maintenance methods can be applied at all times. • At no time is any off-target herbicide damage to native plant species to occur. • At all times priority to be given to minimisation of weed seed set. • To be achieved via a combination of manual removal, brush-cutting, cut/scrape and poisoning and careful spot spraying as appropriate. • Following establishment of a dominant native species cover: - Plant guards are to be removed and appropriately disposed of. • Maintenance works to be incorporated into that of surrounding areas.		

3.5 Monitoring

Monitoring Aims	• Establish an adaptive management framework that allows for flexible decision making adjusted to consider uncertainties as management outcomes are understood. • Determine maintenance requirements and outcomes for future works. • Establish annual fixed photo-point monitoring. • Assess water quality of receiving environment.

Works	Objectives	Monitoring action	Frequency
Photo-monitoring	• Provide standardised visual chronological record of native vegetation change at the project site.	• Photo monitoring points are to be established within representative areas of project area. • Initial photos to be taken prior to the commencement of works, with subsequent photos being taken annually. • Establishment of photo monitoring points will: - Place two six foot star pickets (with safety caps) 10 m apart. - Record location of first star picket with a GPS. - Two digital photos (landscape and portrait) of each photo monitoring point to be taken from the first star picket, towards the second star picket, with the whole length of the second star picket visible in the photo to act as a reference point. - Each digital image to be named/labelled with a unique identification number indicating location of the photo monitoring point and date the photo was taken.	• Annually
Routine site inspections	• Undertake regular routine visual inspections of the project site in order to assess completion and maintenance of prescribed Management Actions Condition Targets.	• To be completed by the Environment and Community Coordinator. • Initial assessment of native revegetation survival rates to be assessed by visual estimates. If it is suspected that survival targets are not achieved, confirmation should be sought via randomised replicated plot sampling. • Site inspections should include checks of stabilisation and channel diversion structures and if erosion is occurring.	• Quarterly (minimum)

Works	Objectives	Monitoring action	Frequency
Reporting	• Document works undertaken at the project site.	• Works reporting is to be completed on a biannual basis including (but not limited to) documentation of: - Dates, locations and type of catchment management works undertaken during the works period. - Resources used for works undertaken. - Inventory of plants installed. - Completion of works in relation to identified condition targets. - Observations and management recommendations. - Projections of resources required for upcoming works and to maintain specified condition targets. • Centennial Springvale completes an Annual Review by the end of March each year in accordance with the Department of Planning and Environment Guideline in accordance with SSD_5144 Schedule 6 Condition 12. The Annual Review will include identification of management and monitoring activities associated with the CILMP. • This CILMP will be made available on the Centennial Springvale website. Annual updates provided through the Annual Review will be published on the website in accordance with the DP&E Web-Based Reporting Guideline.	• Biannual/Annual
UCRAMP water quality monitoring	• Regular ongoing upper Coxs River water quality monitoring under existing Upper Coxs River Action and Monitoring Plan (Centennial Coal 2017).	• Existing water quality and stream health monitoring undertaken in accordance with the Upper Coxs River Action and Monitoring Plan (UCRAMP) (Centennial Coal 2017) will contribute to decision making regarding the success of CILMP management actions.	• As specified in the UCRAMP (Centennial Coal 2017)
CILMP review	• Review and update of ongoing maintenance and other works requirements.	• This CILMP will be internally audited on an annual basis following the review of management actions and monitoring results. Where changes are identified to this CILMP, formal approval will be sought from DP&E. • Centennial Springvale SSD_5594 Schedule 6 Condition 13 Independent Environmental Audit requires this CILMP to be audited every three years.	• Annual • Every 3 years

4. Schedule of works

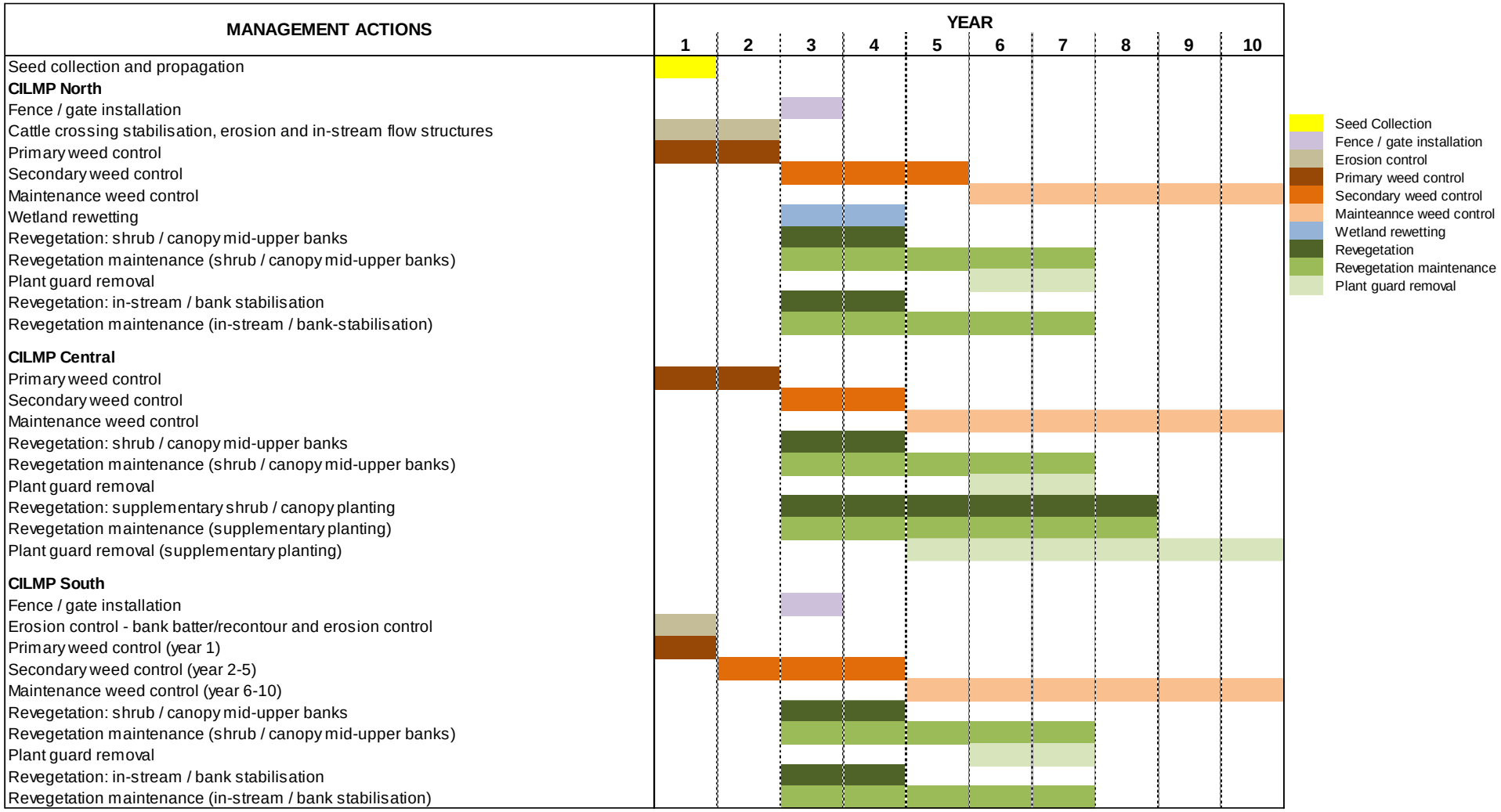


Figure 4.1 Proposed CILMP schedule of works

5. Completion criteria

Works	Condition target	Timing/Effort	CILMP Site
Fence installation	• Stock fencing installed and maintained as per specification. • Integrity of exclusion fencing maintained for the duration of CILMP.	• Year 3 (following tractor ripping for revegetation) - install 4,840 m rural fence - install 3 rural gates	• CILMP North • CILMP South
Environmental and noxious weed control	• Environmental and noxious weed control completed as specified and accurately reported in biannual/annual reporting. • No *P. radiata* individuals <50 mm dbh present after Year 2 (CILMP Central).	• Year 1: - 1,296 BR hrs - 48 hrs high-volume spraying • Year 2: - 1,200 BR hrs - 40 hrs high-volume spraying • Year 3: - 912 BR hrs - 16 hrs high-volume spraying • Year 4-5: - 912 BR hrs p.a. - 16 hrs high-volume spraying p.a. • Year 6-10: - 528 BR hrs p.a. - 16 hrs high-volume spraying p.a.	• CILMP North • CILMP Central • CILMP South
Revegetation: shrub/canopy mid-upper banks	• Plant supply and installation undertaken as per specification. • Specified revegetation densities achieved. • Minimum 80% plant survival. - If 80% plant survival is not achieved, appropriate supplementary plant installations should be undertaken to achieve the specified plant densities.	• Revegetation works to be undertaken during Year 3-4. • Total revegetation area: 4.53 ha • Tubestock supply: - Shrubs: 4,540 - Trees: 2,270	• CILMP North • CILMP Central • CILMP South
Revegetation: In-	• Plant supply and installation undertaken as per specification.	• Revegetation works to be undertaken during Year 3-4.	• CILMP North • CILMP South

Works	Condition target	Timing/Effort	CILMP Site

stream/bank stabilisation	• Specified revegetation densities achieved.
	• Minimum 80% plant survival.
	  - If 80% plant survival is not achieved, appropriate supplementary plant installations should be undertaken to achieve the specified plant densities.
		• Total revegetation area: 7,745 m^2.
		• Tubestock supply:
		  - Macrophytes/groundcover: 10,990	

Revegetation Revegetation Watering & Maintenance	• Minimum 80% plant survival. - If 80% plant survival is not achieved, appropriate supplementary plant installations should be undertaken to achieve the specified plant densities. • All plant guards removed 5 years after plant installation.	• Years 3-4: Additional watering - 8 hrs p.a. • Years 3-7: Weed maintenance - 144 hrs p.a. • Years 6-7: Guard removal - 32 hrs p.a.	• CILMP North • CILMP Central • CILMP South
Mountain Hollow Grassy Fen re-wetting	• Increase ground water levels within target re-wetting areas. • Natural regeneration of Fen vegetation. • Integrity of channel blocks, gradient control structures and flow diversion structures maintained for duration of CILMP.	• Year 3-4: Re-wetting works to be undertaken following completion of primary Blackberry control. • Mini-excavator: 40 hrs p.a. • Works supervision: 40 hrs p.a. • Manual works: 64 hrs p.a.	• CILMP North

Bank stabilisation and flow controls	• Controls are to be installed as per specification.
	• Reduced instances of observable local active erosion.
	• Cattle watering/crossing points appropriately stabilised with cattle not impacting directly upon the waterway bed.
	• Integrity of channel blocks, gradient control structures and flow diversion structures maintained for duration of CILMP (CILMP North).
	• Coir logs and matting maintained as intact until revegetation is fully established (CILMP South).
		• Year 1-2 (CILMP North):
		  - 20 hrs 3-5T excavator p.a.
		  - 20 hrs excavator supervision p.a.
		  - Rock/earth supply
		• Any additional revegetation works required for localised bank stabilisation works to be undertaken as appropriate plant stock becomes available.
		• Year 1 (CILMP South)
		• 3-5T excavator: 30 hrs
		• Excavator supervision: 30 hrs
		• Coir logs: ~125 logs
		• Coir mat: ~1,150 m^2
			• CILMP North
			• CILMP South

6. Disclaimer

This report: has been prepared by GHD for Centennial Coal and *may only be used and relied on by Centennial Coal for the purpose agreed between GHD and the Centennial Coal as set out in section 1… of this report.*

GHD otherwise disclaims responsibility to any person other than Centennial Coal arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer section(s) 1 of this report). GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Centennial Coal and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

7. References

BOM (2017). *Climate Data Online*. Website of the Australian Government Bureau of Meteorology - http://www.bom.gov.au/climate/data/index.shtml?bookmark=200. Website accessed 01/09/2017.

Bryan, J. H. (1966) *Sydney 1:250,000 Geological Sheet SI/56-05, 3rd edition.* Geological Survey of New South Wales, Sydney.

Centennial Coal (2017). *Springvale Mine Upper Coxs River Action and Monitoring Plan*. Centennial Coal Company Limited, July 2017.

Centennial Coal (2015). *Rural Land Use Code of Practice*. Centennial Coal, Mandalong, April 2015.

DECC (2008). *Descriptions for NSW (Mitchell) Landscapes: Version 2 (2002) Based on descriptions compiled by Dr. Peter Mitchell*. DECC, NSW Department of Environment and Climate Change.

DPE (2017). *Environment Management Plan – Post Approval Requirements Series*. NSW Department of Planning and Environment. Final draft Version 6.0, July 2017.

GHD (2017a). *Centennial Biodiversity & Offset Plan – Coxs River Aquatic Habitat Condition*. Letter report produced for Centennial Coal, August 2017.

GHD (2017b). *Springvale Mine – Baseline geomorphology assessment for Coxs River*. Prepared by NSW Soil Conservation Service on behalf of GHD.

GHD (2017c). *Western Coal Services Water Management Plan*. Report produced by GHD on behalf of Springvale Coal Services Pty Ltd, July 2017.

Petersen, Robert. C. (1992). *The RCE: a Riparian, Channel and Environmental Inventory for small streams in the agricultural landscape*. Freshwater Biology, 27(2), pp. 295-306. April 1992.

RPS (2017). *Coxs River Land Management Site – Catchment Improvement and Land Management Plan*. Prepared for Centennial Springvale, August 2017.

SERA (2016). *National Standards for the Practice of Ecological Restoration in Australia*. Prepared by Standards Reference Group, Society for Ecological Restoration Australasia (SERA), in consultation with key partners, March 2016.

King, D. P. (1993). *Soil Landscapes of the Wallerawang 1:100 000 Sheet*. Pub. Department of Conservation and Land Management.

Appendices

Appendix A – Correspondence with regulators

From: Ravi Sundaram <ravi.sundaram@waternsw.com.au>
To: '"james.wearne@centennialcoal.com.au"' <james.wearne@centennialcoal.com.au>
Cc: Peter Dupen <Peter.Dupen@waternsw.com.au>, Malcolm Hughes <Malcolm.Hughes@waternsw.com.au>
Date: 20/10/2017 12:19 PM
Subject: RE: Springvale Mine Catchment Improvement and Land Management Plan

Hello James

Thank you for providing WaterNSW the opportunity to review the Springvale Mine Catchment Improvement and Land Management Plan (CILMP) focusing on riparian area management and catchment improvement of the Upper Coxs River on Centennial owned land near Lidsdale associated with Centennial's Springvale Mine Extension Project SSD-5594 Modification 2.

WaterNSW has completed reviewing the plan and:

- Considers that the CILMP has adequately addressed the requirements for the CILMP in the Springvale Mine Extension Project SSD-5594 consent conditions and the Statement of Commitments made by Centennial in the SSD-5594 Modification 2 Response to Submissions;
- Notes that both the riparian management area of the Upper Coxs River being targeted as well as the native vegetation within terrestrial lands that form the proposed land management area are in a highly modified condition. The CILMP has considered these challenging conditions and detailed a comprehensive plan which if implemented as proposed that will lead to better water quality outcomes within the Upper Coxs River in the long-term;
- Requests Centennial Coal to consider and update the plan with regards to the following:
  - Section 3.1 page 16 – Controlled Activity Approval under the Water Management Act 2000 is required from Crown Lands and Water and not WaterNSW.
  - Page 42 – Revegetation watering & maintenance – WaterNSW considers that the time allocated for additional watering and weed maintenance to be insufficient and requests Centennial to review these allocations.

Please feel free to contact me if you wish to discuss the above.

Regards.

Ravi
Dr Ravi Sundaram
Mining Catchment Specialist
WaterNSW
Level 14 169 Macquarie Street
PO Box 398
Parramatta, NSW 2124
www.waternsw.com.au

p.: +61 2 9865 2507
m.: +61 428 226 152
email: Ravi.Sundaram@waternsw.com.au

From: James Wearne [mailto:James.Wearne@centennialcoal.com.au]
Sent: Thursday, 28 September 2017 9:47 AM
To: Peter Dupen
Subject: Springvale Mine Catchment Improvement and Land Management Plan

Hi Peter,

Please find attached a copy of the Springvale Mine Catchment Improvement and Land Management Plan for review and comment by WaterNSW.

Regards

James Wearne
Group Manager Approvals

p: +61 (0) 2 4935 8944 | m: +61 (0) 407 207 530

Centennial Coal

Centennial Coal Company Limited | Fassifern
100 Miller Road, Fassifern NSW 2283 Australia
centennialcoal.com.au

Appendix B – Consultation outcomes

OEH	
OEH considers that the CILMP meets the requirements for scheduled 3 condition 18A of the development consent for SSD 5594.	Section 1.1.1 Legislative Requirements identify the conditions of consent for this CILMP. OEH general comment is noted.
We note that there is overlap between land parcels included in the CILMP and those included as land management and rehabilitation areas (not direct offsets) in the Western Region Biodiversity Offset Package (December 2016).	The Western Region Biodiversity Offset Package (December 2016) identified the land parcels within this CILMP as land management and rehabilitation areas. Through the inclusion of the land parcels within this CILMP the land parcels will not be included in a revised Western Region Biodiversity Offset Package.
The CILMP states that the intended instrument for providing long-term security for the subject land is through a positive conveant on the land title under Section 88B of the Conveyancing Act 1919. As accordance with the NSW Biodiversity Offset Policy for Major Projects or its current version, OEH accepts that this security mechanism is appropriate for these parcels.	Section 1.5 Security of the Land identifies a positive covenant as the security mechanism of land within this CILMP. OEH support is noted.
Threatened species and endangered ecological communities The CILMP includes bush regeneration works to rehabilitate and restore two endangered ecological communities (EEC)'s: • Montane Peatlands and Swamps • Tablelands Snow Gum, Black Sallleee, Candlebark and Ribbon Gum Grassy Woodland The CILMP lists three threatened species as being recorded within the project site; Gang-gang Cockatoo, Black Gum and Capertee Stringybark. Please note that a number of additional species have been recorded in the Atlas of NSW Wildlife close to the CILIMP area. These include: • Dusky Woodswallow • Scarlet Robin • Purple Copper Butterfly • White-bellied Sea-eagle	Table 2.3 Key Characteristics of the CILMP project site, subsection Threatened Species has been updated to include: • Dusky Woodswallow • Scarlet Robin • Purple Copper Butterfly • White-bellied Sea-eagle

The CILMP is also located within area of Saving Our Species conservation projects for Purple Coppery Butterfly, Capertee Stringbark and Black Gum. OEH recommends that the CILMP project manager liaise with OEH threatened species experts and SOS species project co-ordinators regarding the rehabilitation and restoration of threatened species habitat.	Report was provided to all parties for consultation. Due to the conditions of consent requiring the report/plan to be submitted by 31st October 2017, not all consultation was received. Where consultation is received after the required date of submission to DPE, these comments will be addressed in subsequent revisions. Feedback received by Centennial is listed below.
As noted in the GHD report, the CILMP area coincides with the delineated SOS project area for E. cannonii. Moreover, it is stated that E. cannonii has been recorded in the CILMP area. I note that the location of the E. cannonii so recorded is not shown in the CILMP maps. As you may already be aware, the E. cannonii SOS project has yet to be initiated. In response: • The proposed actions are not at odds with the SOS project for the E. cannonii. • The E. cannonii records within the CILMP area should be shown in the maps; these records should be submitted to the Atlas of NSW Wildlife (if they have not already); and any new records reported to the Atlas through the course of implementing the management plan. As a separate note: was the very close proximity of Veronica (Derwentia) blakelyi considered during the development of this plan? I refer you to Atlas records for this species (Sarah Bell is the Accountable Officer for this species).	Centennial received comment from OEH Dubbo Threatened Species Officer that the Project is not at odds with the Save Our Species Program for the *E. canonnii.* Appendix F includes the location of the management actions in the CILMP with locations of threatened species from the OEH Wildlife Atlas Database. The location of *Veronica (Derwentia) blakleyii* occurs outside of the CILMP. As such, it has not been considered within this document. Centennial discussed with Sarah Bell the CILMP.
Water NSW	
Considers that the CILMP has adequately addressed the requirements for the CILMP in the Springvale Mine Extension Project SSD-5594 consent conditions and the Statement of Commitments made by Centennial in the SSD-5594 Modification 2 Response to the Submissions;	Section 1.1.1 Legislative Requirements identify the conditions of consent for this CILMP. WaterNSW general comment is noted.
Notes that both the riparian management area of the Upper Coxs River being targeted as well as the native vegetation within terrestrial lands that form the proposed land management area are in a highly modified condition. The CILMP has considered these challenging conditions and	Section 1.3 CILMP Objectives identify the intent of this CILMP. WaterNSW general comment is noted.

detailed a comprehensive plan which if implemented as proposed that will lead to better water quality outcomes within the Upper Coxs River in the long-term;	
Requests Centennial Coal to consider and update the plan with regards to the following: • Section 3.1 page 16- Controlled Activity Approval under the Water Management Act 2000 is required from Crown Lands and Water and not WaterNSW. • Page 42 – Revegetation watering and maintenance – WaterNSW considers that the time allocated for additional watering and weed maintenance to be insufficient and requests Centennial to review these allocations.	Centennial has updated the CILMP to address Water NSW comments: • Section 3.1 page 16 Controlled Activity Approval has been changed to Crown Lands and Water and not WaterNSW. • Section3 CILMP Management Actions and Specification have been reviewed. Changes have made to increase the time for watering and weed maintenance.
Department of Planning and Environment	
1.1 Project Background It is recommended that clarification of wording regarding the Water Management Performance Measures Schedule 4, Condition 12 of SSD-5594, and ensure consistency with the Water Management Plan and other related plans. The Department notes the Statement of Commitments for the proposed deferral of salinity reductions.	The second paragraph under Section 1.1 Project Background has been modified to more clearly summarise and reflect the requirements of Schedule 4, Condition 12 of SSD 5594 with regard to Water Management Performance Measures.
Table 2.3 It is recommended that Table 2.3 be amended to reflect reforms to the updated NSW Biodiversity Conservation Act 2016 and update the threatened ecological communities listing if changes have occurred.	Table 2.3 has been amended to reflect the enactment of the NSW *Biodiversity Conservation Act 2016* and changes to the threat-listing status of ecological communities.
Section 2.2 Riparian Management Area It is recommended that the reference to the Biosecurity Act 1995 be changed to the new Biosecurity Act 2015 and the summary of Priority Weeds species in Appendix E be updated to reflect any changes.	The reference to the Biosecurity Act 1995 has been corrected to the Biosecurity Act 2015. The list of Priority Weeds species in Appendix E remains accurate for the weeds identified at the project site. The general biosecurity duties for these weeds are consistent with those required under the Biosecurity Act 2015.

Appendix C – Summary Works Descriptions

Works	Objectives	Action	Notes
Approach to bush regeneration	• Maximise native species regeneration from existing vegetation community resilience.	• The principal approach to achieving restoration of native vegetation communities throughout the project site should be to facilitate and utilise natural regeneration from *in situ* community resilience and propagule dispersal from surrounding bushland. All management specifications should be considered in context of this approach. • At all times priority is to be given to the consolidation and expansion of native species patches and minimisation of weed seed set. • It is likely that the use of provenance revegetation will also be required in order to re-establish native vegetation cover within areas of poor native vegetation community resilience (see below). • It is assumed that all native vegetation management and restoration works will follow a sequence of primary, secondary and maintenance weed control works, as appropriate to each respective weed species and/or management zone. In general: - *Primary weed control*: refers to the initial removal and control of a mature and stable stand of weed species; - *Secondary weed control*: refers to the period of resource flux immediately following primary weed removal. Secondary stage bush regeneration sites are generally associated with high resource availability and weed growth. In general, this is the most critical and resource-intensive stage of bush regeneration. Secondary bush regeneration works should aim to facilitate a germination and establishment niche for regenerating native species by progressively suppressing competition from and controlling emerging weed species. The secondary phase lasts for as long as it takes to establish a stable native vegetation community, which is dependent upon native vegetation community resilience. Supplementary revegetation may be considered to accelerate establishment of a native vegetation community. Establishment of native 'nurse' species, which themselves have fast-growing weeding characteristics, and other fast-growing and dominant native species may be beneficial in assisting to supress weed growth. Some exotic species may also be utilised as 'nurse' species if	

Works	Objectives	Action	Notes
		they can be sufficiently managed. - *Maintenance weed control*: refers to ongoing selective control of newly emerging weed species/individuals within areas of largely stable remnant and restored native vegetation. Maintenance weed control aims to prevent establishment of large weed infestations and associated negative impacts upon native vegetation community diversity, structure and function. The maintenance stage of management should be considered as ongoing. The resources required will be dependent upon the disturbance history and local context of the site.	
Noxious / Environmental Weed Control	• Prevent establishment of new environmental and listed Noxious Weeds within the project site.	• Target weed species included in this CILMP are representative of the suite of major species present within the project site at the time of site assessment. • Any emerging noxious or invasive environmental weed species not described in this CILMP should be controlled as a matter of priority in order to prevent their establishment and spread.	• Listed Priority Weeds in the Central West Local Government Area can be found at http://weeds.dpi.nsw.gov.au/. • Priority Weeds recorded within the project site are listed in Appendix E.
Herbicide usage	• Responsible use of herbicides by bush regeneration contractors, in accordance with relevant legislation.	• Herbicide spraying is not to be utilised within bushland areas of diverse/resilient remnant native groundcover. • Off-label usage of any herbicide is only to be undertaken in accordance with a permit issued by the Australian Pesticide and Veterinary Medicine Authority (APVMA). • Mixing or decanting of herbicides shall not be undertaken within 20m of any natural or built drainage line or wetland. • Herbicide usage to only be undertaken where there is no risk to any waterway or the immediate environment. Accumulation of translocated residual herbicides into waterways during wet periods to be considered in this context. • All herbicide usage, including storage and transport, to be in accordance with WorkCover NSW (2006) and all relevant legislation, including NSW Pesticides Act 1999.	

Works	Objectives	Action	Notes
		• Any bush regenerator undertaking herbicide spray applications must hold a current chemicals application training certification to AQF Level 3. • Any bush regenerator undertaking herbicide spray applications must possess excellent native and exotic plant identification skills. • At no time is off-target damage to emerging or mature native plant species to occur as a result of targeted spraying of exotic/weed species. • As required, all herbicide spray applications should be preceded by detailed preparatory hand weeding around native species. • Should a herbicide spill occur, incident and spill management procedures shall be immediately implemented. All incidents shall be immediately reported to the Environment and Community Coordinator and land owner.	
Primary weed removal/ Avoidance of over-clearing	• Prevent detrimental impacts upon soil stability, vegetation stabilisation and native fauna habitat due to weed control works.	• At all times, over-clearing of dense weed patches is to be avoided such that: - Exposure of soil substrate does not require subsequent additional stabilisation intervention (unless specified). - Existing native fauna species habitat is not directly impacted upon. - Suitable alternate native fauna species habitat is available within the surrounding area. - The rate of weed removal is commensurate with the rate of native species regeneration. - The rate of weed removal is commensurate with the resources available to properly maintain the cleared areas. - The rate of weed removal is commensurate with the resources available to satisfactorily manage remaining remnant native vegetation throughout the project site.	• This work plan assumes that all primary weed control is to be followed by secondary weed control and ongoing maintenance weed control (see below) in order to maintain low weed levels.
Secondary & Maintenance weed control	• Utilise appropriate secondary and maintenance weed control techniques depending upon bushland site.	• To be achieved via a combination of techniques depending upon the area within which works are being undertaken: - Good bushland/native vegetation areas with dense/diverse native understorey cover: predominately manual removal, cut/scrape and painting as required. - Native vegetation areas/patches with minimal/sparse native understorey cover: as above, plus careful spot spraying preceded by	• Herbicide spray application should be undertaken in a manner that avoids or minimises off-target damage to native species. • Wherever practical, brush-cutting should be avoided when weeds are bearing

Works	Objectives	Action	Notes
		preparatory hand weeding around native plants/patches if required. • Within areas of dense native grass/fern cover that requires weed maintenance, use of brush-cutting is encouraged as a non-lethal and non-chemical vegetation control and removal method to prevent weed seed set and provide better spot-spraying access to target weeds. In particular, brush-cutting should be utilised within areas of dense exotic perennial grass and annual herbaceous cover in order to prevent seed set and facilitate spot spraying of new growth: - Brush-cutting may provide additional benefit of reinvigorating native understorey growth, by promoting new growth of brush-cut native species, as well as opening potential regeneration niches for native species within the soil seed bank. - Soil disturbance resulting from purposeful 'whipping' of the soil during brush-cutting also has the potential to stimulate native species germination from the soil seed bank. • In general, use of herbicides should be minimised at all times. • Maintenance weed control works are to be undertaken during regular throughout sweeps of the project site. • At all times priority is to be given to the consolidation and expansion of native species patches and minimisation of weed seed set. • Regardless of the level of project resourcing, consideration must always be given to the requirement for increased resource output during secondary weed control works and ongoing maintenance within previously worked bushland areas. Proper consideration of future maintenance budgets is critical to ongoing bushland integrity as well as securing the cost-investment of progressing a bushland area to a maintenance stage of restoration in the first instance.	mature seed. • Frequency of site visits during secondary and maintenance works will vary depending upon the success of weed suppression and native plant species regeneration response. In general, secondary weed control is expected to be the most resource intensive stage of regeneration. • All maintenance works should maintain site to relevant condition target (see Section 3.2-3.4).
Soil and water erosion control	• Minimise the impact of soil disturbance on waterways within the project site.	• All works shall be undertaken in a manner that will minimise site disturbance and avoids or minimise erosion and sedimentation. • Any areas disturbed during the works shall be protected by installing appropriate erosion and sedimentation control measures so that sediment-laden runoff does not enter any waterway or wetland.	

Works	Objectives	Action	Notes
Soil borne pathogen protocol	• Prevent introduction or spread of soil borne pathogens in association with native vegetation management and restoration works.	• At all times, all contractors to follow hygiene protocols specified within the Sydney Botanic Gardens Trust Best Practice Management Guidelines for *Phytophthora cinnamomi* within the Sydney Metropolitan Catchment Management Authority Area (Suddaby & Liew, 2008). • No foreign soil should be imported into or along the fringes of bushland within the project site.	
Green waste/debris disposal	• Ensure appropriate disposal of all green waste, in particular weed propagule bearing material. • Prevent spread of weed species due to inappropriate disposal/management of green waste.	• All removed propagative weed material should be bagged, removed from site and disposed of at a registered green waste facility. • All removed woody weed material should be removed from site and disposed of at a registered green waste facility.	
General Waste Disposal	• Maintain a tidy workspace. • Prevent pollution of surrounding catchment.	• All working areas shall be maintained, kept free of rubbish and cleaned up at the end of each working day. Equipment and materials shall be securely stored. • All waste fluids generated during the works, including from the washing of equipment, shall be contained for proper disposal offsite.	

Appendix D – Centennial Rural Land use Code of Practice Requirements Summary

Code Section	Code Requirement
3.1 Biodiversity	Preference not to have horse enterprises on Centennial land
	Plan to preserve or increase biodiversity with farm management decisions.
3.2 Existing Bushland Management	Property Management Plan must include a tree plan. Tree plan to include existing bush and strategic tree planting.
	Inventory of property timber resources. To be used to decide which trees are preserved for habitat and which can be used for farming materials or purposes.
	Rocks can be cleared within existing pasture paddocks that have been slashed or mulched only.
	Firewood can only be taken where on identified and consistent with the Property Management Plan.
3.3 Biodiversity Policies	Tree Management Policy Tree Protection Ensure sufficient trees are maintained to provide shelter for stock Undertake regular checks of trees and remedy and affects of disease or pests Minimise the use of and removal of trees on the property Minimise and control stock movements in areas of sensitive vegetation
	Tree Management Policy Tree Management Tree planting will be planned in advance as part of each Property Management Plan and will include exact objectives of each planting Establishment and maintenance strategies used in regeneration programs will specifically suit the region and will encourage successful and sustainable regeneration Local tree and shrub seed will be collected and propagated to use in property plantings A range of local and regional native species will be planted More midstorey and understory species will be planted Planting will be random rather than in rows
	Tree Management Policy Tree Removal There will be minimal or no falling of old growth trees Where it is safe to do so, dead standing trees that have hollows will be retained to encourage bird and animal habitats for breeding Trees will only be removed in accordance with legislative requirements and with the consent of Centennial Removal of firewood will be monitored
	Tree Management Policy Fallen Timber Leave for animal habitat and erosion control Only remove if absolutory necessary of if it is in an unsafe condition or location

Code Section	Code Requirement
	Bush Fire Management Policy Will only be undertaken if absolutely necessary. Use of hazard reduction fires or other fires must be in accordance with the requirements of the local bush fire management committee Burning activities must be coordinated with the local RFS and neighbours even if outside of the fire permit period Fuel loadings on properties must be managed to reduce any hazards without adversely affecting biodiversity Fire hazard reduction will be a combination of grazing management, to reduce fuel loading and strategic use of controlled fire Rainforest species and any identified threatened flora need adequate fire protection Slashing/mulching will be the first option as an effective fuel reduction tool in preference to burning
	Fence Management Policy Clearing fence lines in bushland areas will be carried out Care to avoid erosion risk will be taken. No topsoil is to be removed In areas of significant bush, the cleared fence line will be kept to a minimum To minimise the use of new timber fence posts from on property or off property, there will be use of concrete posts and galvanised steel posts The use of electric fencing to minimise materials require
	Improved Pasture Management Policy Best land will be improved and maintained at a high level of production
	Native Grassland Areas Management Policy Existing areas of high value native pasture will not be cultivated Native grassland species will be encouraged through strategic grazing and burning Native grasses to be given an effective rest period to encourage health and increase their composition in the pasture Aeration through deep ripping can be used to break down compaction layers, correct poor native grass management and overgrazing
	Protection of Native Wildlife Policy Centennial will cooperate with tenants to manage kangaroo and wallaby populations, preferably through electric fence management
4 Pollution Control 4.1 Fertiliser Use	Fertiliser Use Preference to encourage legumes in pasture and minimise need for nitrogenous fertilisers Fertiliser applications not to occur within 10m of permanent and semi-permanent creeks Natural fertilisers preferred to artificial fertilisers

Code Section	Code Requirement
	Fertiliser Use Policy The use of fertilisers will be encouraged to improve productivity in areas where there will be no negative impact on the environment Fertilisers will only be used in accordance with the approved and planned use in the individual Property Management Plan The use of fertilisers will be closely monitored by Centennial's land management team Frequent and low application rates will be encouraged in preference to less frequent and heavy applications Fertiliser applications near watercourses will be regulated Fertilising in the vicinity of drainage lines will be undertaken with care Fertiliser applications will be planned to coincide with favourable seasonal weather patterns Guidelines for the use of natural fertilisers will be developed for inclusion in the individual Property Management Plan.
4.2 Chemical Use	Chemicals Use Generally chemicals will be used for only agricultural, livestock, termites and other pest purposes. Chemicals that are out of date, do not contain a label or an unknown level are not be used. If the tenant is unaware of the manufacturer's requirements or is unfamiliar with their use they are not to be used until appropriate details are obtained. Tenant must consult with the Centennial land management team prior to the use of any chemical. Only chemicals approved for use and identified in the PMP may be used without obtaining further consent from Centennial. Drenches, lice and tick control products need to be considered by tenants in reference to the impact on the biodiversity of the property due to impact on dung beetle populations.
	Chemical Residues No guarantees are made by Centennial for previous chemical use. All test results will be attached to the PMP>
	Chemical Use Policy Chemical Use The use of chemicals must be strictly in accordance with the manufacturers specification and in accordance with safety and environmental principles. Chemicals that are out of date, do not contain a label or an unknown label are not to be used for any purpose until the correct and appropriate details for safe use are obtained. Only chemicals approved for use and identified in the Property Management Plan for that property may be used unless otherwise approved by Centennial's land management team. The impact of a particular chemical on the biodiversity of the property system, livestock husbandry and the production management system will be assessed prior to its use. The use of antibiotics and other medications will always be within the recommendations of the prescribing veterinarian. Chemicals will only be used in accordance with their approved and planned use. The use of chemicals will be closely monitored by Centennial's land management team.

Code Section	Code Requirement
	Chemical Use Policy Chemical Residues High-risk areas of previous residual chemical use will be identified in each individual Property Management Plan. These include: existing buildings sites of old buildings stock yards and infrastructure old crop areas where Dieldrin may have been used to control black beetle chemical storage sheds electricity power poles
4.3 Waste Management	Waste Management Policy Centennial will: make every effort to ensure that rubbish is removed from our properties in a timely and proper manner. provide appropriate conditions in our leases to control the activities of our tenants in areas of waste management and disposal. ensure that our tenants abide by the waste management obligations in their lease. monitor effluent disposal and ensure that sewage disposal and treatment systems are maintained in accordance with EPA and Council requirements. where possible provide skip bins to assist and encourage our tenants to remove waste.
4.4 Irrigation	Irrigation Policy Centennial will: where appropriate, include an irrigation management plan as part of the Property Management Plan for a property or group of properties. undertake best practice irrigation management to minimise the risk of nutrient runoff or deep percolation. use our best endeavours to establish and maintain 100% groundcover. encourage our tenants to complete an irrigation and drainage plan and to undertake the NSW Agriculture Water Wise Course.
5 Weed Management	Weed Management Policy Centennial will: through weed control discourage weeds and encourage more desirable plant and grass species. focus on the cause of the weed problem and remedy the cause. where appropriate, include a weed control plan as part of the Property Management Plan for a property or group of properties. undertake best practice weed control management to minimise the risk to livestock and catchment health. use our best endeavours to identify and control noxious and other weeds. manage grazing systems and practices to minimise the impact and introduction of weeds and assist in their control.

Code Section	Code Requirement
6 Wetland and Waterway Management	Wetland and Waterway Management Policy Centennial will: consider all existing wetlands and waterways for protection with respect to its rural activities. consider fencing off sensitive areas that have potential to provide improved habitat as a wetland, will increase biodiversity or will improve property sustainability. encourage the planting of native trees in sensitive habitat areas. where appropriate consider the building of dams and undertake dam maintenance to develop constructed wetlands encourage activities on the our properties that will maintain good water quality or improve water quality in the rivers and creeks of the property catchment. minimise the impact of cattle grazing in the vicinity of rivers and creeks of the property catchment. provide appropriate fencing to protect wetlands and waterways. Where possible use existing flood studies to improve our land management. Endeavour to protect existing wetlands and waterways by best practice farming, grazing, irrigation, weed and erosion control.
7 Soil Conservation	Soil Conservation Policy plan grazing systems to allow an adequate rest for each plant on the property. avoid patch grazing by managing livestock numbers to the ability of the pasture to recover and be productive. maintain existing farm tracks and locate new tracks to minimise erosion. where practicable, design farm tracks to include adequate drainage to paddocks and not directly into waterways. minimise land clearing during track building clearing and maintenance. where cropping and replanting of pastures, encourage minimum or zero tillage in preference to cultivation. where cultivation is required, do so after the high risk storm period of the summer has passed. in times of drought: destock as a high priority to protect groundcover. manage properties in accordance with the drought strategy included in this Code.
	Drought Strategy Before Drought Monitor feed supplies and ground cover Maintain reserve stores of fodder (esp. dairy farms) and adequate water supplies Monitor Stock Market prices and if possible, maintain a reserve of cash Monitor fodder prices and costs and availability of agistment Identify potential for irrigation to produce feed or fodder, and assess crop rotation Identify animals to be kept in a drought event; categorise stock for staged destocking Be prepared to destock in a timely manner. Control rabbits (where they occur) Be aware of stock feeding techniques and disease prevention Use cover crops in horticulture Seek advice on technical and financial matters and sources of assistance Use a sacrifice paddock

Code Section	Code Requirement
	During Drought Monitor rainfall prospects, feed supply and ground cover levels Monitor stock and fodder prices; start decreasing stock as planned Start feeding before running out of pasture and stock condition falls Prevent grass butts or lucerne being eaten to the ground Act to reduce disease and suffering Protect water supplies Keep cover on cropping paddocks; reconsider crop or pasture sowing plans Determine optimum use of crops already growing Efficiently use the irrigation water Assess opportunities for fodder sales, buying and fattening stock and providing agistment Seek advice on technical and financial matters and other sources of help After Drought Assess market prospects of various crops /enterprises Allow pastures to recover before restocking Control weeds introduced with animals or fodder Re-sow pastures as soon as possible. Sow fodder crops Rehabilitate lands that were eroded or damaged in any way

Appendix E – Priority weeds at the project site.

Scientific name	Common name	Location	Duty (*Biosecurity Act 2015*)
All species	-	Riparian Management Area	**General Biosecurity Duty** *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.*
Rubus fruticosus species aggregate	Blackberry	Northern LMA Central LMA Southern LMA	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.* **Protect conservation areas, natural environments and primary production lands that are free of blackberry**
Ulex europaeus	Gorse	Southern LMA	**Regional Recommended Measure** Exclusion zone: whole region except for the core infestation area of Bathurst Council, Blayney Council, Lithgow Council and Oberon Council *Core infestation area: Land managers should mitigate spread from their land.*
Cytisus scoparius subsp. *scoparius*	Scotch Broom	Central LMA Southern LMA	**Regional Recommended Measure** *Land managers should mitigate the risk of new weeds being introduced to their land. Land managers should mitigate spread from their land.* **Protect conservation and natural environments that are free of Scotch broom**
Hypericum perforatum	St. John's Wort	Central LMA	**Regional Recommended Measure** *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.* **Protect grazing land that is free of St. John's wort**
Salix species	Willows	Northern LMA	**Mandatory Measure** *Must not be imported into the State or sold* **All species in the *Salix* genus have this requirement, except *Salix babylonica* (weeping willows), *Salix x calodendron* (pussy willow) and *Salix x reichardtii* (sterile pussy willow)**

Appendix F – Threatened Species Record

COXS RIVER

KANGAROO CREEK

Service Layer Credits: © Department of Finance, Services & Innovation 2017

- Existing gate
- Proposed gate
- Existing crossing / watering point
- Off-stream watering point
- Proposed crossing / watering point (to be stabilised)
- Constructed low flow sill (set above upstream sill) and cattle crossing repair
- Constructed low flow water diversion sill (dam rewetting)
- Diversion channel break
- Existing fence - 4491m
- Proposed fence - 2502m
- Waterways

Weed cover

- Blackberry / Willow (moderate-low) - 16.1 ha

LEGEND

- Riparian Management Area
- Land Management Area
- Centennial Owned Lots
- Revegetation: shrub/canopy mid-upper banks
- Montane peatlands & swamps rewetting
- Revegetation: In-stream / bank stabilisation

Native Vegetation (RPS 2017)

- 15 Derived Tableland Hollows Black Gum - Black Sally Open Forest
- 15 Tableland Hollows Black Gum - Black Sally Open Forest (EEC)
- 53 Mountain Hollow Grassy Fen (EEC)
- Typha orientalis Wetland

Threatened Flora Atlas Records (non-sensitive species)

- *Veronica blakelyii* (1)

Paper Size A3

0 25 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Centennial Coal Pty Ltd
Cox's River RHCIP

Job Number 22-19098
Revision A
Date 02 Mar 2018

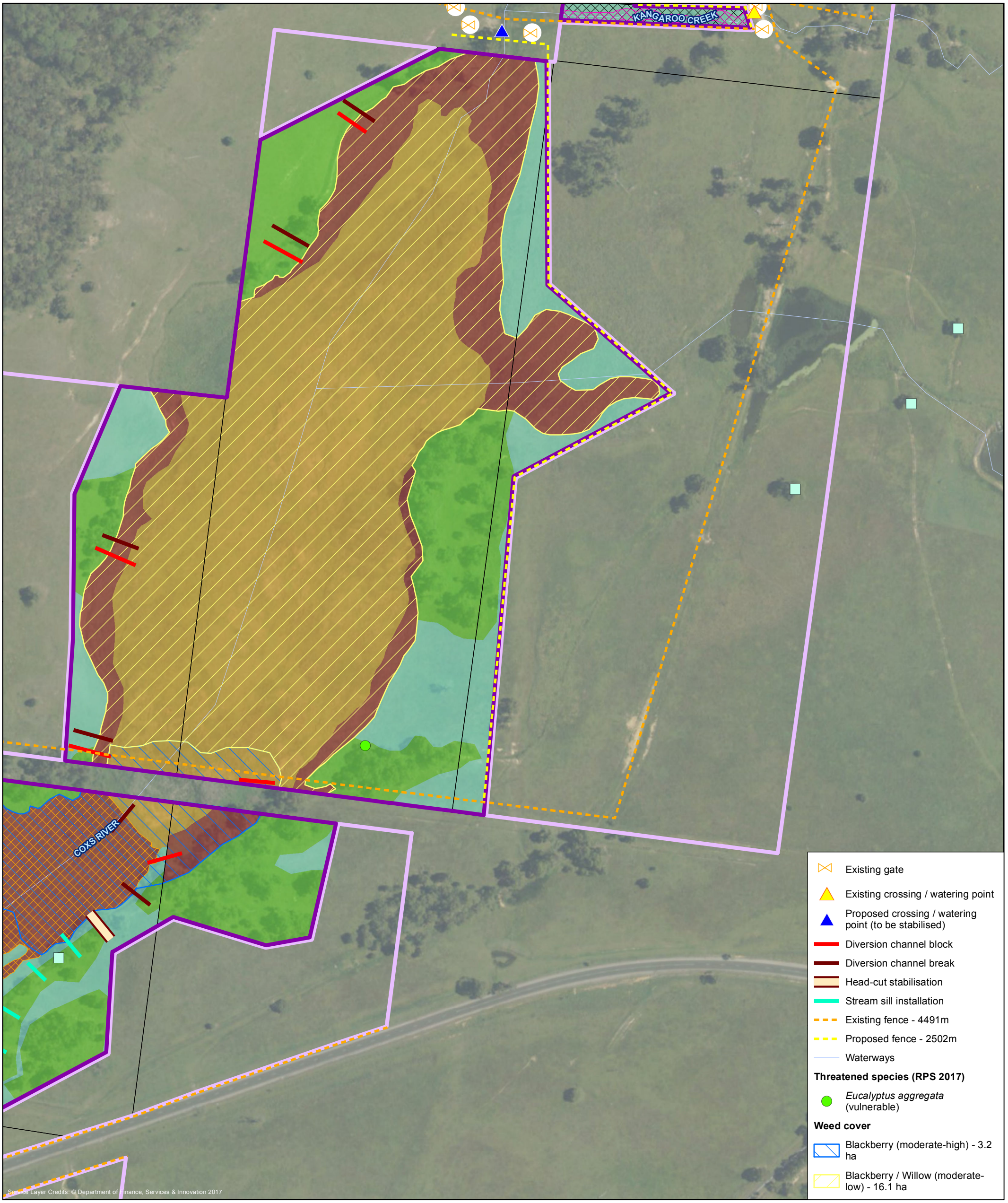
Threatened Species Records (CILMP North)

Figure F1.1

N:\AU\Sydney\Projects\22\19098\GIS\Maps\Deliverables\22_19098_CoxsRiverCILMP_Z006_ThreatenedSpecies.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: General topo - NSW LPI DTDB 2015 & 2012, Aerial imagery - SIXmaps 2017, Vegetation mapping & Coxs River Lots - Centennial Coal; Atlas records - OEH 2018. Created by:jrprice



LEGEND

- Riparian Management Area
- Land Management Area
- Centennial Owned Lots
- Revegetation: shrub/canopy mid-upper banks
- Montane peatlands & swamps rewetting
- Revegetation: In-stream / bank stabilisation

Native Vegetation (RPS 2017)

- 15 Derived Tableland Hollows Black Gum - Black Sally Open Forest
- 15 Tableland Hollows Black Gum - Black Sally Open Forest (EEC)
- 53 Mountain Hollow Grassy Fen (EEC)
- Typha orientalis Wetland

Threatened Flora Atlas Records (non-sensitive species)

- *Eucalyptus aggregata* (4)

Paper Size A3

0 25 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Centennial Coal Pty Ltd
Cox's River RHCIP

Job Number 22-19098
Revision A
Date 02 Mar 2018

Threatened Species Records (CILMP North)

Figure F1.2

N:\AU\Sydney\Projects\22\19098\GIS\Maps\Deliverables\22_19098_CoxsRiverCILMP_Z006_ThreatenedSpecies.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: General topo - NSW LPI DTDB 2015 & 2012, Aerial imagery - SIXmaps 2017, Vegetation mapping & Coxs River Lots - Centennial Coal; Atlas records - OEH 2018. Created by:jrprice

COXS RIVER

Service Layer Credits: © Department of Finance, Services & Innovation 2017

Diversion channel block
Diversion channel break
Head-cut stabilisation
Stream sill installation
Existing fence - 4491m
Proposed fence - 2502m
Waterways

Threatened species (RPS 2017)

Eucalyptus aggregata (vulnerable)

Weed cover

Blackberry (moderate-high) - 3.2 ha

Blackberry / Willow (moderate-low) - 16.1 ha

LEGEND

Riparian Management Area
Land Management Area
Centennial Owned Lots
Montane peatlands & swamps rewetting
Revegetation: In-stream / bank stabilisation

Native Vegetation (RPS 2017)

15 Derived Tableland Hollows Black Gum - Black Sally Open Forest
15 Tableland Hollows Black Gum - Black Sally Open Forest (EEC)
53 Mountain Hollow Grassy Fen (EEC)
Typha orientalis Wetland

Threatened Flora Atlas Records (non-sensitive species)

Eucalyptus aggregata (20)
Eucalyptus cannonii (4)

Paper Size A3
0 25 50 100
Metres
Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Centennial Coal Pty Ltd
Cox's River RHCIP

Job Number 22-19098
Revision A
Date 02 Mar 2018

Threatened Species Records (CILMP North)

Figure F1.3

N:\AU\Sydney\Projects\22\19098\GIS\Maps\Deliverables\22_19098_CoxsRiverCILMP_Z006_ThreatenedSpecies.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: General topo - NSW LPI DTDB 2015 & 2012, Aerial imagery - SIXmaps 2017, Vegetation mapping & Coxs River Lots - Centennial Coal; Atlas records - OEH 2018. Created by:jrprice

VIEW STREET

COXS RIVER

Existing fence - 954m

Waterways

Service Layer Credits: © Department of Finance, Services & Innovation 2017

LEGEND

- Riparian Management Area
- Land Management Area
- Centennial Owned Lots
- Revegetation: shrub/canopy mid-upper banks

Native Vegetation (RPS 2017)

- 15 Tableland Hollows Black Gum - Black Sally Open Forest (EEC)
- Exotic

Threatened Fauna Atlas Records (sensitive species) ~ 10km accuracy

- Gang-gang Cockatoo (2)
- Masked Owl (1)

Threatened Fauna Atlas Records (non-sensitive species)

- Dusky Woodswallow (1)
- Scarlet Robin (1)

Paper Size A3

0 25 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Centennial Coal Pty Ltd
Cox's River RHCIP

Job Number 22-19098
Revision A
Date 02 Mar 2018

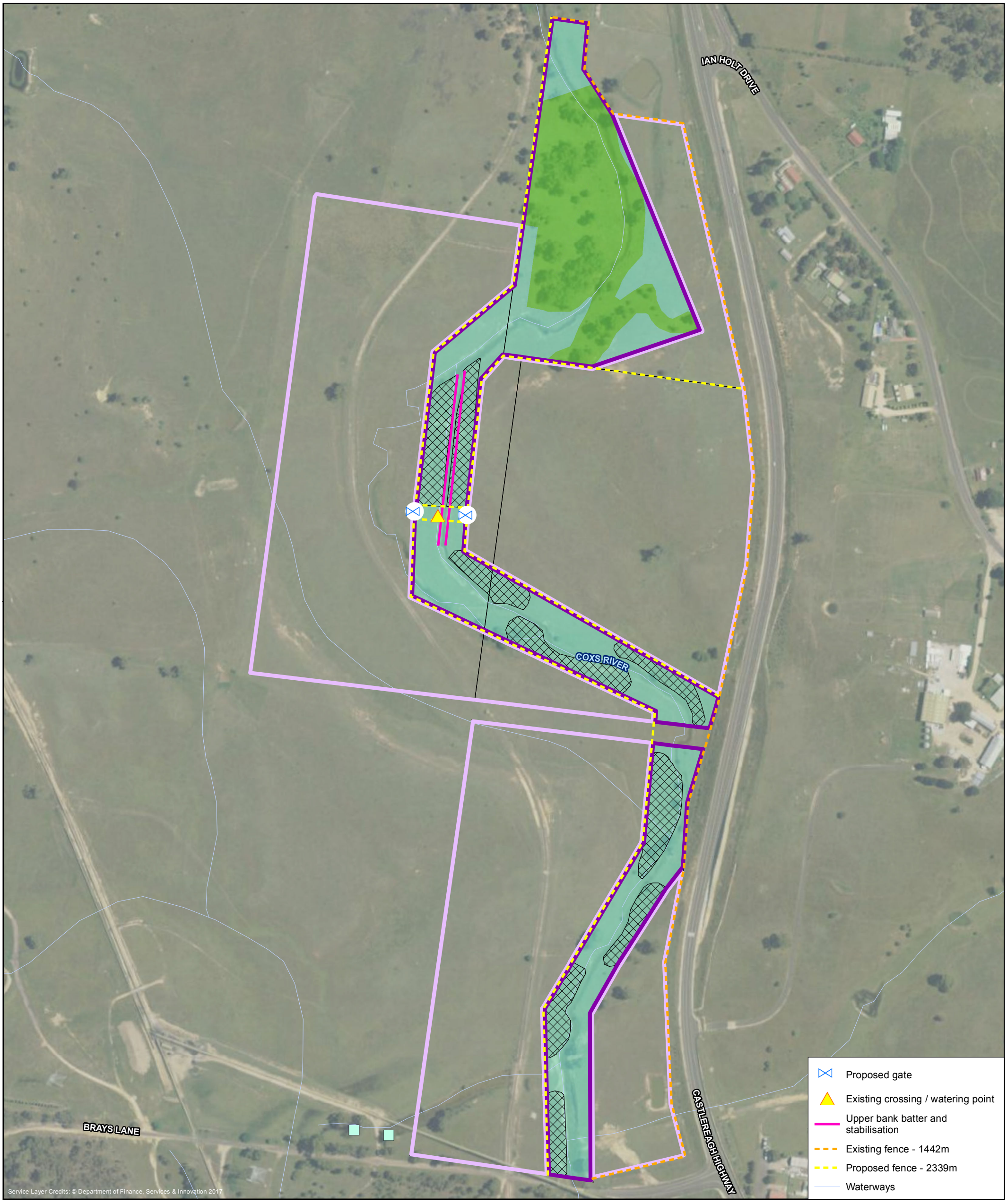
Threatened Species Records (CILMP Central)

Figure F1.4

N:\AU\Sydney\Projects\22\19098\GIS\Maps\Deliverables\22_19098_CoxsRiverCILMP_Z006_ThreatenedSpecies.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

Data source: General topo - NSW LPI DTDB 2015 & 2012, Aerial imagery - SIXmaps 2017, Vegetation mapping & Coxs River Lots - Centennial Coal; Atlas records - OEH 2018. Created by:jrprice



LEGEND

- Riparian Management Area
- Land Management Area
- Centennial Owned Lots
- Revegetation: shrub/canopy mid-upper banks

Native Vegetation (RPS 2017)

- 15 Derived Tableland Hollows Black Gum - Black Sally Open Forest
- 15 Tableland Hollows Black Gum - Black Sally Open Forest (EEC)

Threatened Flora Atlas Records (non-sensitive species)

- *Eucalyptus aggregata* (2)

Paper Size A3

0 25 50 100

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 56

N

Centennial Coal Pty Ltd
Cox's River RHCIP

Job Number 22-19098
Revision A
Date 02 Mar 2018

Threatened Species Records (CILMP South)

Figure F1.5

N:\AU\Sydney\Projects\22\19098\GIS\Maps\Deliverables\22_19098_CoxsRiverCILMP_Z006_ThreatenedSpecies.mxd

Level 15, 133 Castlereagh Street Sydney NSW 2000 **T** 61 2 9239 7100 **F** 61 2 9239 7199 **E** sydmail@ghd.com.au **W** www.ghd.com.au

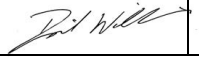
Data source: General topo - NSW LPI DTDB 2015 & 2012, Aerial imagery - SIXmaps 2017, Vegetation mapping & Coxs River Lots - Centennial Coal; Atlas records - OEH 2018. Created by:jrprice

GHD

Level 3, GHD Tower
24 Honeysuckle Drive
T: 61 2 4979 9999 F: 61 2 4979 9988 E: ntlmail@ghd.com

https://projects.ghd.com/OC/Newcastle/coxsriverriparianimp/Delivery/Documents/2219098-REP-3_Coxs River CILMP.docx

Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	D Whaite	D Williams		K Baker		22/09/2017
1	D Whaite	D Williams		K Baker		23/10/2017
2	D Whaite	D Williams		K Baker		25/10/2017
3	J McDonough	D Williams		D Williams		16/02/2017
4	J McDonough	D Williams		S Gray		02/03/2018

www.ghd.com