CULLEN VALLEY MINE

FLORA AND FAUNA MANAGEMENT PLAN

Shoalhaven Coal Pty Ltd

4 December 2025

DOCUMENT CONTROL

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1. INTRODUCTION

1.1 BACKGROUND

Cullen Valley Mine (CVM) is located near Cullen Bullen in the Western Coalfields of NSW, approximately 30 km north-west of Lithgow (see **Figure** 1). Underground mining commenced at CVM (formerly Tyldesley Colliery) around 1904 and continued up until the 1960s when the workings were abandoned. Early open cut operations were conducted on the site between 1948 and 1953.

The current development consent for CVM (DA 200-5-2003) was granted by the Department of Infrastructure and Planning (now the Department of Planning, Housing and Infrastructure (DPHI)) in August 2004 for a period of 21 years. The conditions of DA 200-5-2003 were subsequently modified in December 2004 to allow for the transportation of product coal from CVM to domestic destinations other than Mount Piper Power Station. The conceptual layout of the site as approved under DA 200-5-2003 is shown on **Figure** 2.

Mining of coal at CVM under DA 200-5-2003 commenced in May 2000 using open cut methods following a four-month construction phase and continued until the site was placed in Care and Maintenance in early 2013.

Shoalhaven Coal Pty Ltd (trading as Castlereagh Coal Pty Ltd (Castlereagh Coal)) purchased CVM in May 2015 and has operated the mine under Care and Maintenance since that time. Castlereagh Coal recommenced open cut coal mining operations at CVM in early 2022 within the existing disturbance area approved under DA 200-5-2003, in order to collect remnant coal reserves. The site returned to care and maintenance in July 2023. Under a new modification issued in August 2025, Castlereagh Coal intends to recover the remaining coal reserves, with a scope to recommence mining operations in 2026.

1.2 DOCUMENT PURPOSE AND SCOPE

This Flora and Fauna Management Plan (FFMP) document has been prepared to describe the operational management of ecological aspects, impacts and performance at CVM. This revision of the FFMP has been prepared in accordance with the requirements of DA 200-5-2003 for use by Castlereagh Coal during the recommencement of mining operations on site.

Other management documents that should be read in conjunction with this FFMP include:

- CVM Environmental Management Strategy; and
- CVM Environmental Monitoring Program (EMP).

1.3 DOCUMENT OBJECTIVES

The objectives of this document are to provide:

- An overview of flora and fauna management procedures and measures at CVM;
- An overview and management measures for the Compensatory Habitat Areas (CHA);
- A summary of the vegetation clearance, topsoil stripping and ecological monitoring programs undertaken at CVM;
- A summary of weed identification and management strategies; and
- Outline procedures for communication with external CVM stakeholders in relation to ecological aspects and impacts.

Statutory requirements from DA 200-5-2003 that relate to this FFMP and where they are addressed in this document are provided in **Table 1**.

Table 1 FFMP Requirements

DA 200-5-2003 Condition	Requirement	Where Addressed
Schedule 4, Condition 29.	Within the limits of best practice flora and fauna management, the Applicant must conserve, manage and maintain at least 50 hectares of land on or adjacent to the site to the satisfaction of the Planning Secretary to compensate for the vegetation that would be removed by the development, in general accordance with the proposal contained in the Applicant's correspondence to the Department dated 20 May 2004 (see Appendix 2).	**Section 2**
Schedule 4, Condition 30.	Within 12 months of the date of this consent, the Applicant must prepare, and then implement, a Flora and Fauna Management Plan for the development, in consultation with CPHR and to the satisfaction of the Planning Secretary. The plan must include:.	**Sections 2, 3, 4** and **5**, CVM EMP, **Appendix A**
	(a) Compensatory Habitat Plan;	**Section 2**
	(b) Vegetation Clearance Protocol;	**Section 3**
	(c) Weed Management Strategy;	**Section 4**
	(d) Ecological Monitoring Program; and	**5**, CVM EMP
	(e) description of who would be responsible for monitoring, reviewing, and implementing the plan.	**Section 7**
Schedule 4, Condition 31.	The Compensatory Habitat Plan must: (a) describe the immediate and long-term compensatory habitat proposal, and demonstrate how this proposal would be integrated with the proposed rehabilitation of the site and surrounding areas of remnant vegetation;	**Section 2.1, 2.2**
	(b) identify strategies to protect areas excluded from open cut mining from disturbance during mining operations;	**Section 2.2**
	(c) identify options for the permanent protection of areas of compensatory habitat;	**Section 2.2**
	(d) provide baseline data on the existing flora and fauna in the proposed compensatory habitat areas;	**Section 2.2**
	(e) describe how the compensatory habitat proposal would be implemented; and	**Section 2.2**
	(f) set completion criteria for the compensatory habitat proposal.	**Section 2.3**
Schedule 4, Condition 32.	The Vegetation Clearance Protocol must include: (a) plans showing the vegetation communities in the area, highlighting important fauna habitat areas and threatened species locations; the areas to be cleared; and the proposed clearing program;	**Section 3**
Schedule 4, Condition 32.	(b) procedures for progressive vegetation clearing and soil management;	**Section 3.1 - 3.4**
	(c) strategies for minimising vegetation clearance within the development area and protection of vegetated areas outside that area;	**Section 3.2**
	(d) identification of fauna management strategies;	**Section 3.1**
	(e) collection of seed from the local area;	**Section 3.1**

DA 200-5-2003 Condition	Requirement	Where Addressed
	(f) salvage and reuse of material from the site;	**Section 3.1, 3.4**
	(g) a habitat tree management program, including fauna recovery procedures;	**Section 3.1**
	(h) potential for relocation of hollow bearing trees, compensatory management measures (such as replacement of lost hollows with nesting boxes); and	**Section 3.1**
	(i) where possible, strategies for re-using individuals or populations of any threatened plant species that would otherwise be destroyed by the development in rehabilitation works.	**Section 3.3**
Schedule 4, Condition 33.	The Weed Management Strategy must include: (a) weed identification;	**Section 4.4**
	(b) weed eradication methods and protocols for the use of herbicides; and	**Section 4.5**
	(c) methods to treat and re-use weed infested topsoil.	**Section 3.4, 4.5**
Schedule 4, Condition 34.	The Ecological Monitoring Program must include: a program to monitor revegetation of disturbance areas	**Section 5,** CVM EMP
	(a) Visual monitoring to determine the need for maintenance and/or contingency measures;	
	(b) monitoring of the quality of rehabilitation using a systems-based approach through the assessment of landscape function, vegetation dynamics and habitat complexity; and	
	(c) a program to monitor the effectiveness of rehabilitation.	
Schedule 4, Condition 35.	The Applicant must: review the performance of the Flora and Fauna Management Plan annually; and	**Section 8**
	(a) revise the document as necessary to take into account any recommendations from the annual review, to the satisfaction of the Planning Secretary.	
Schedule 4, Condition 36.	Within two years of the date of this consent, and every three years thereafter, unless the Planning Secretary directs otherwise, the Applicant must commission, and pay the full cost of, an Independent Audit of the compensatory habitat proposal	**Section 8.2**
	(a) be conducted by a suitably qualified, experienced, and independent person whose appointment has been approved by the Planning Secretary;	
	(b) assess the performance of the compensatory habitat proposal;	
	(c) review the adequacy of the Flora and Fauna Management Plan; and, if necessary	
	(d) recommend actions or measures to improve the performance of the compensatory habitat proposal, and the adequacy of the Fauna and Flora Management Plan.	

1.4 DOCUMENT STRUCTURE

The document is structured as follows:

- **Section 1** introduces CVM and outlines the purpose, scope and objectives of this FFMP;
- **Section 2** outlines the management of the CVM CHAs;
- **Section 3** provides the procedure to be implemented for vegetation clearing on site;
- **Section 4** describes the weed management strategy for CVM;
- **Section 5** summarises the objectives of the ecological monitoring program;
- **Section 6** outlines stakeholder engagement completed in the preparation of this FFMP and procedures for the response to air quality incidents and complaints;
- **Section 7** provides an overview of the roles and responsibilities of CVM personnel in relation to ecological management;
- **Section 8** outlines the reporting requirements for this FFMP; and outlines the reporting requirements for this AQMP; and
- **Sections 9** and **10** provide a list of refence documents and abbreviations used in this FFMP.

Figure 1 Regional Locality

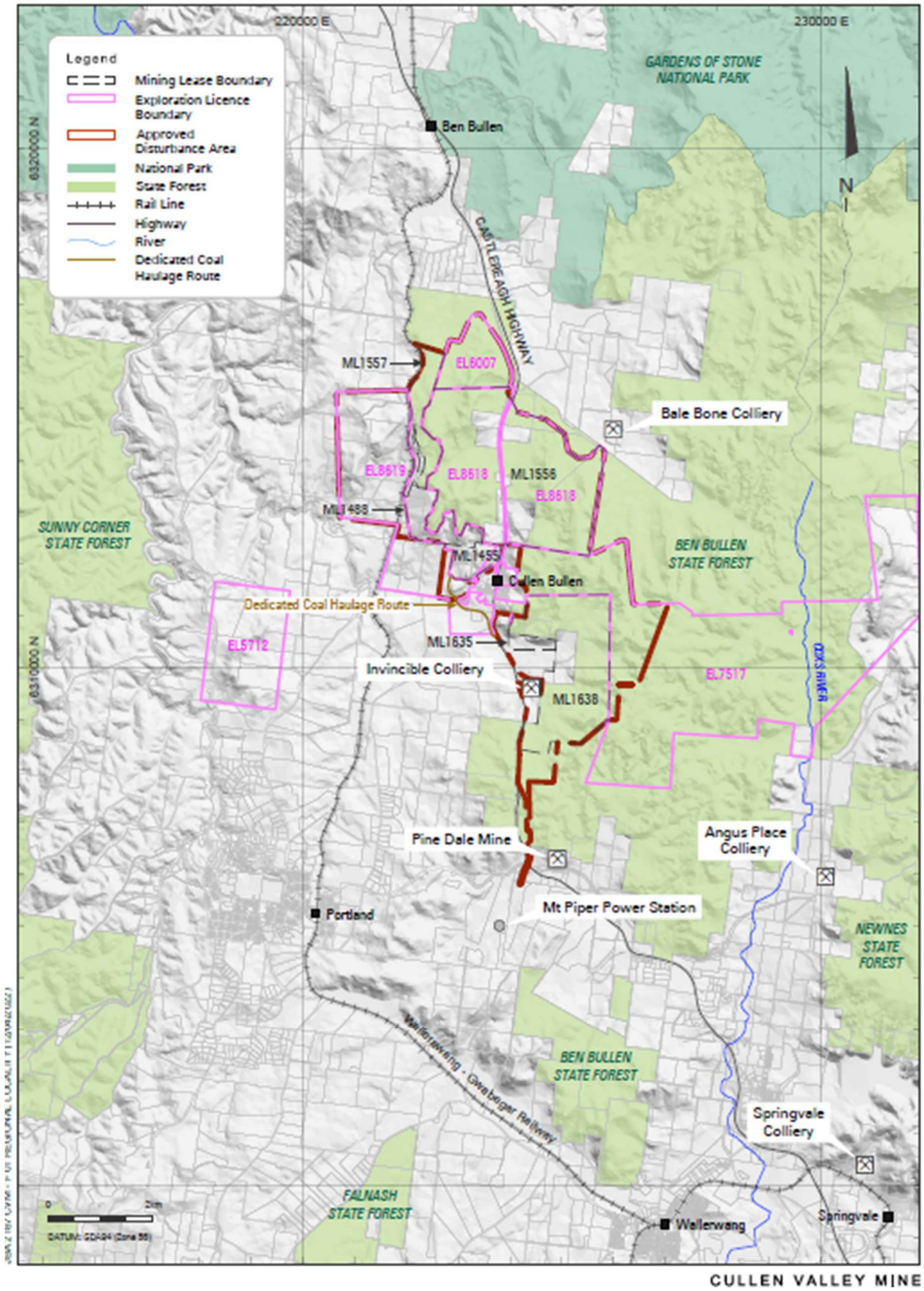
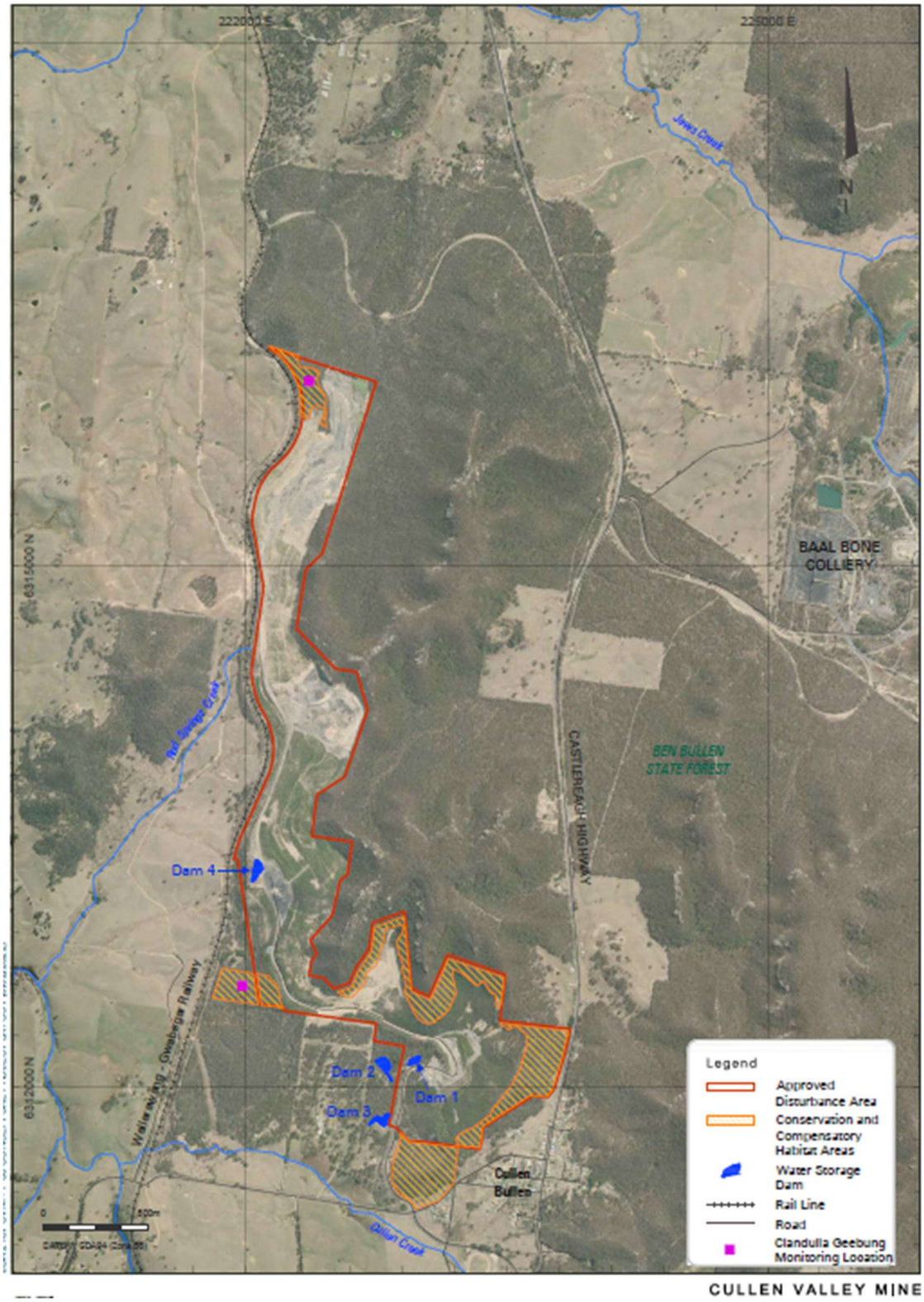


Figure 2 Conceptual Project Layout



2. COMPENSATORY HABITAT AREAS MANAGEMENT

2.1 OVERVIEW

2.1.1 Principles of Compensatory Habitat

Throughout the planning process of the CVM, one of the main aims was to reduce the impact on the natural environment, including native flora, fauna and their habitat. Where impacts cannot be avoided, the preferred option will be that which represents the least possible impact with mitigation measures employed. To mitigate the potential impacts of vegetation removal from mining activities, a number of CHAs were established, as shown on **Figure** 2.

Compensatory habitat is a means of "balancing" the implications for existing habitat as a result of development. Where it is found that impact and degradation of habitat cannot reasonably be avoided or sufficiently mitigated as in this case, compensation for the loss that would occur can be made by acquiring or permanently protecting other areas of habitat to be protected, in exchange for the loss, thus resulting in "no net loss".

There are a number of basic principles surrounding CHA, which are described below.

Habitat Values

CHA should reflect the habitat values that will be impacted. This will assist in providing alternative habitat for displaced fauna, as well as conserving unique habitat features in the local area. For CVM, the habitat occurring within the CHA is similar in value to the vegetation that will be disturbed due to mining.

Location

Parcels of land chosen for CHA should be located in close proximity to the area where habitat will be disturbed. This will allow for relocation of displaced fauna and the conservation of local species. For this reason, the CVM CHA is located immediately adjacent to the area approved to be disturbed under DA 200-5-2003. It is also ideally situated adjacent to Gardens of Stone State Conservation Area, forming a continuous tract of vegetation that provides greater opportunity for faunal movement.

Ongoing Management

The land selected as compensatory habitat must be practical to manage with no excessive costs for establishment or ongoing management. These principles have been applied in the selection of the CHA for CVM.

2.2 COMPENSATORY HABITAT MANAGEMENT

To compensate for the habitat that will be temporarily disturbed by approved open cut mining, CHAs have been established at the locations shown on **Figure** 2. DA 200-5-2003 requires that Castlereagh Coal, as landowner, to conserve and manage the land in the CHAs, and to permanently protect the land, including the exclusion from open cut mining.

A separate Conservation Area for the Clandulla Geebung (*Persoonia marginata*) has also been established in the north-west of the CVM approval boundary. Procedures for the management of this Conservation Area are described in a separate Species Management Plan which is provided in **Appendix B**.

2.2.1 CHA Location

The area of compensatory habitat surrounds the CVM mining lease holding, as shown on **Figure** 2. This area is adjacent to both rehabilitated mine land and the neighbouring Gardens of Stone State Conservation Area, on land owned by Castlereagh Coal.

This allows for connectivity with a larger, continuous band of vegetation and habitat areas than currently exists in the area. In addition, the location of the woodland and forests in the CHA directly adjacent to the rehabilitating areas will provide a long-term source of native seed, with the potential for self-germination of existing vegetation communities in CVM rehabilitation areas.

2.2.2 CHA Description

Vegetation Communities

The CHA is over 50 ha in size, and contains a mixture of Sandstone Dry Ridgetop Woodland, Tablelands Sheltered Valley Forest, and Tablelands Dry Woodland (see **Figure** 3). The habitat value of each of the areas was described in detail as part of the Cullen Valley Mine Lease Extension Project (IEC, 2003) (EIS) process, and are used as the baseline data for the existing habitat. Threatened flora and fauna which have recently been identified at CVM are illustrated on **Figure** 4. A description of each vegetation community is provided below.

Sandstone Dry Ridgetop Woodland

This vegetation type occurs on hills of Narrabeen Sandstone in the area. It is found along the western fringes of the sandstone country of the Blue Mountains with extensive areas in Wollemi National Park and occurs within Gardens of Stone National Park (see **Figure** 1).

Dominant species include Inland Scribbly Gum (*Eucalyptus rossii*) and Sandstone Stringybark (*E. sparsifolia*). Other tree species may be locally frequent, including Silvertop Ash (*E. sieberi*), Blaxland's Stringybark (*E. blaxlandii*) and Sydney Peppermint (*E. pipertia*).

The understorey includes a shrub layer of medium density and a ground layer of low density. Exposed, rocky areas support open heath vegetation. However, these areas are quite small and not extensive enough to identify as a separate community at the mapping scale used in the EIS.

Common shrub species include *Acacia ulicifolia*, *Dillwynia phylicoides*, *Persoonia linearis*, *Acacia terminalis*, *Leucopogon muticus*, *Platysace lanceolata*, *Phyllanthus hertellus* and *Monotoca scoparia*.

Ground layer species include Purple Flag Iris (*Patersonia longifolia*), Redanther Wallaby Grass (*Joycea pallida*), *Platysace lanceolata*, Wiry Panic (*Entolasia stricta*l), *Lomandra confertifolia var. rubiginosa* and Rock Fern (*Cheilanthes seeberi*).

There is only 0.4 ha of this woodland included within the CHA, due to the topography and geology available for inclusion.

Tablelands Sheltered Valley Forest

This vegetation type occurs in sheltered gullies with deeper soils. Tree height may exceed 20 m, with the canopy dominated by Mountain Gum (E. dalrympleana). Associated tree species include Sydney Peppermint (*E. piperita*), Red Stringybark (*E. macrorhyncha*), Apple Box (*E. bridgesiana*) and Narrow-leaved Peppermint (*E. radiata*).

There may also be a small tree layer of low density dominated by *Acacia falciformis*. The shrub layer is of medium density. Common shrub species include Chinese Scrub (*Cassinia arcuata*), *Acacia buxifolia*, and Yellow Tea Tree (*Leptospermum polygalifoium*).

Figure 3 Compensatory Habitat Management Areas

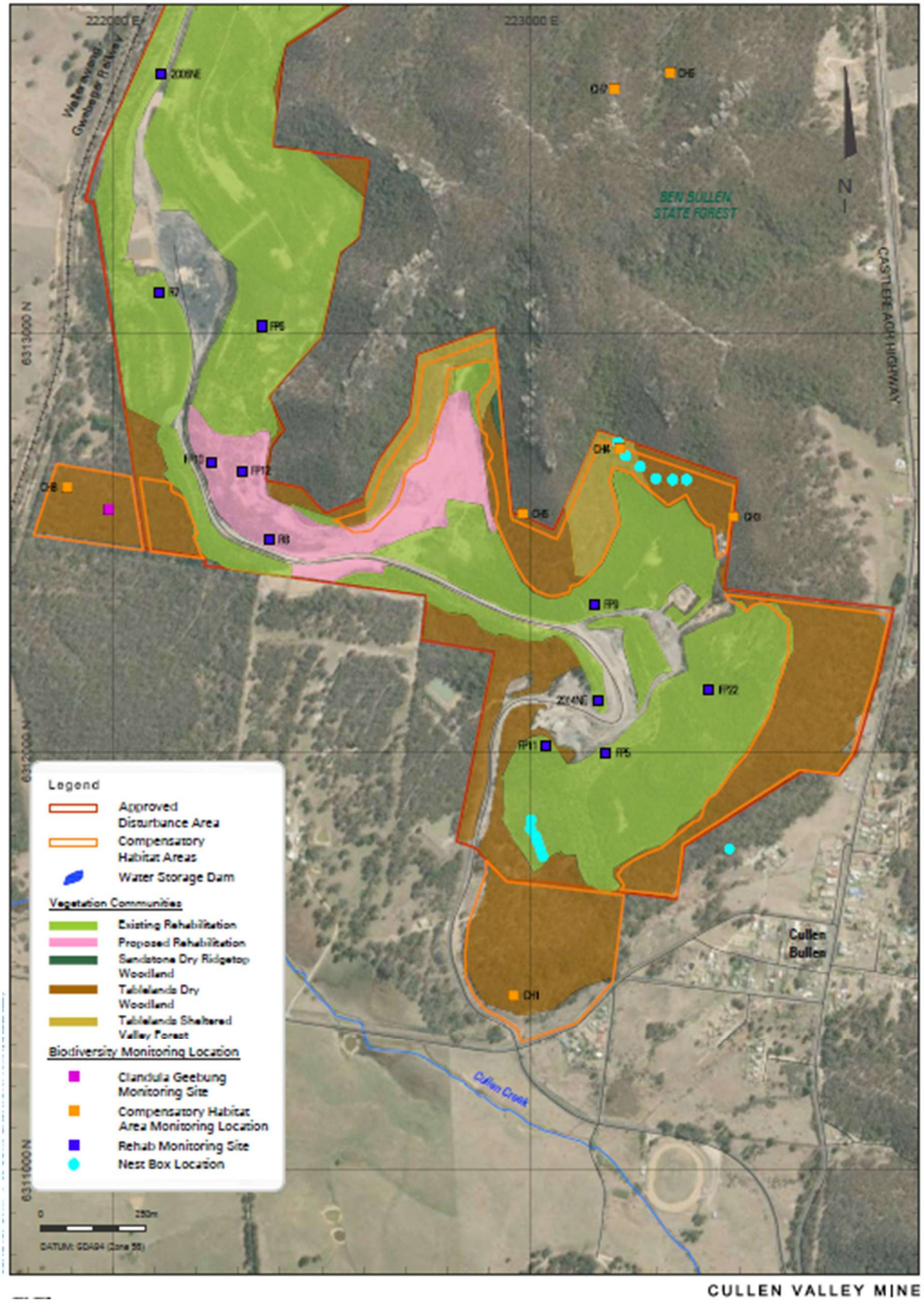
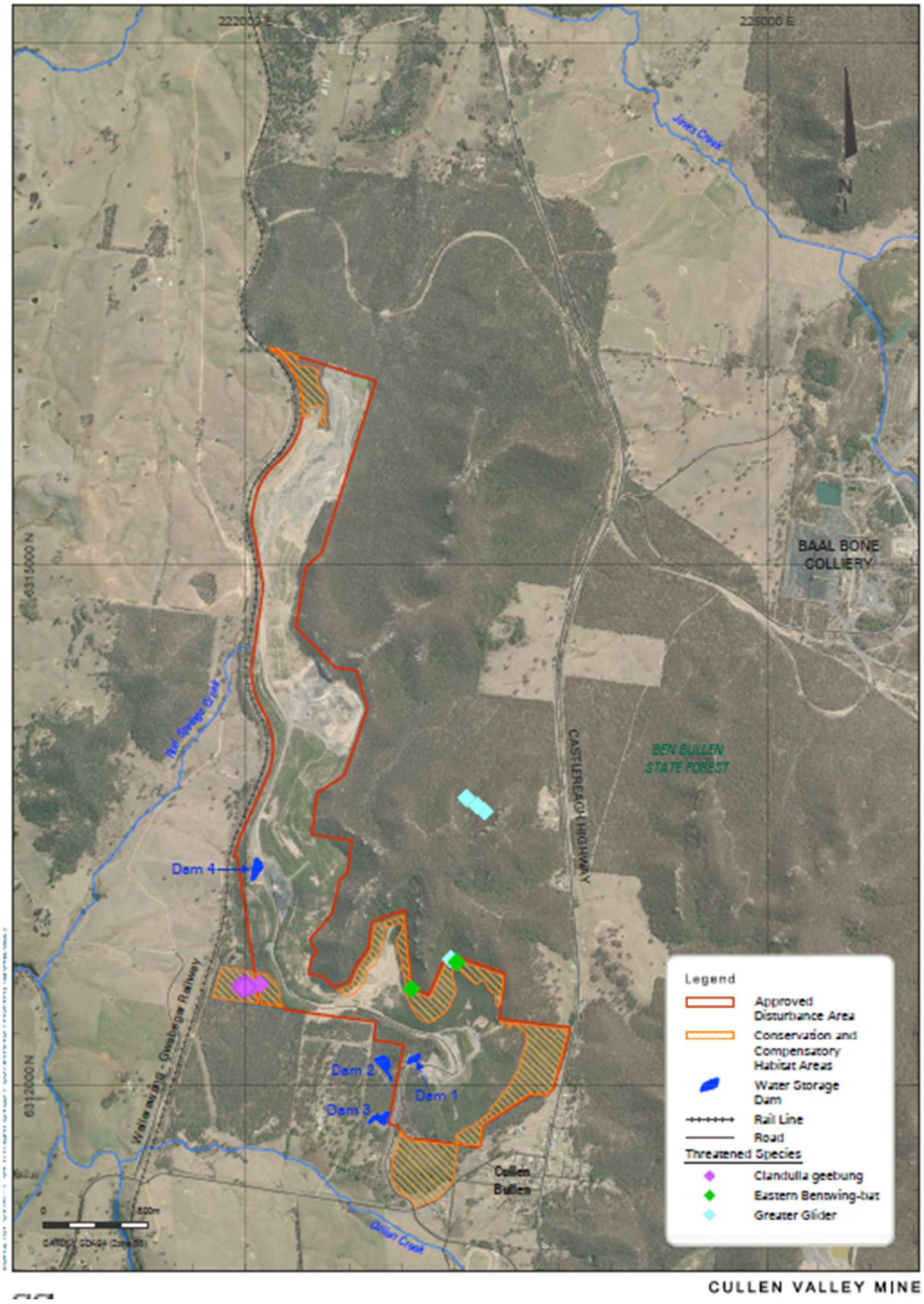


Figure 4 Threatened Flora and Fauna Records



The ground layer is of medium density and dominated by grasses and ferns. Common ground layer species include Wallaby Grass (*Danthonia racemosa*), Snow Grass (*Poa sieberiana ssp. sieberiana*), Bracken Fern (Pteridium esculentum), Viola betonicifolia, Weeping Meadow Grass (*Microlaena stipoides*), *Lomandra filiformis var. coriacea*, *Senecio* sp., *Geranium solanderi* and *Veronica plebeia*.

There are two patches of this vegetation unit within the CHA, with a total are of 5.5 ha.

Tablelands Dry Woodland

Tablelands Dry Woodland occurs in areas underlain by Permian Illawarra Group geology on more exposed aspects and drier, more shallow soils than areas which support Tablelands Sheltered Valley Forest.

The dominant species are Red Stringybark (*E. macrorhyncha*), Broad-leaved Peppermint (*E. dives*), Brittle Gum (*E. mannifera*) and Inland Scribbly Gum (*E. rossii*). Associated tree species include Long-leaved Box (*E. goniocalyx*) and Silvertop Ash (*E. sieberi*).

The shrub layer is generally of low density, with medium density patches on sheltered slopes. Shrub species present include Silver Wattle (*Acacia dealbata*), *Persoonia linearis*, *Pultenaea microphylla*, *Hibbertia obtusifolia*, Mountain Holly (*Podolobium ilicifolium*), *Brachyloma daphnoides*, *Monotoca scoparia* and *Acacia buxifolia*.

The ground layer is grassy and of low to medium density. Typical species include Wallaby Grass (*Danthonia racemosa*), Redanther Wallaby Grass (*Joycea pallida*), Rock Fern (*Cheilanthes sieberi*), Blue-leaved Snow Grass (*Poa sieberiana ssp. cyanophylla*), *Goodenia hederacea*, *Gonocarpus tetragynus*, *Dianella revolute* and Bluebell (*Wahlenbergia gracilis*). The shrub and ground layer is more dominant in a small disturbed area to the south of the mine office. This area represents naturally regenerating Tablelands Dry woodland.

Tablelands Dry Woodland is the most widespread community in the CHA, covering over 45 ha.

Fauna Habitat

Three different fauna habitat types exist within the CHA, each of which is described below.

Open Forest

Open forest habitat occurs in sheltered locations on valley floors, with two separate patches located within the Compensation Habitat Area. The main trees are *Eucalyptus dalrympleana*, *E. macrorhyncha* and *E. piperita* which have a foliage cover of 45% and reach up to 30m. Open forest is also present in south-facing gullies where the main trees are *E. piperita* and *E. macrorhyncha* and with similar height and foliage cover to the preceding.

Open forest areas have large numbers of tree hollows of various sizes and hollow logs and other fallen timber are abundant. Rock habitats are generally scarce, except where the open forest occurs in an upper gully or in the shelter of a south-facing cliff, as is the case with both patches of forest.

Woodland

Woodland habitats occur on upper and lower slopes with tree heights up to 15-20 m and foliage cover from 20-30%. The main tree on lower slopes are *E. rossii* and *E. macrorhyncha* whereas *E.sieberi* tends to dominate on exposed upper slopes near cliff lines.

Tree hollows are common but tend to be of a much smaller diameter than those in open forest. Hollow logs and other ground timber are present but not common and rock habitats are scarce.

Woodland comprises the majority of habitat encompassed by the CHAs.

Cleared

A few small patches exist which have been largely cleared of native vegetation and mostly comprise introduced grasses and other herbs. Native vegetation persists in some areas in the form of scattered trees.

Whilst scattered trees in cleared lands may provide nesting sites for bird species, they are of little value to less mobile species due to their isolated nature.

Rehabilitation of adjacent areas where mining has been undertaken has been completed. In time, the vegetation in the CHA and rehabilitated areas will merge into a continuous vegetated area. Animals already have unimpeded access across the boundary. When the rehabilitated areas vegetation matures the two types of area will in effect merge.

2.2.3 CHA Completion Criteria

The CHA performance and completion criteria are outlined in **Table 2** and align with the land management objectives for these areas. Annual monitoring of the CHA (as discussed within **Section 2.3**) will be undertaken against these performance and completion criteria.

Table 2 CHA Performance and Completion Criteria

CHA Objective	Performance Indicators	Completion Criteria
Self-sustaining	Species composition	Composition at each CHA monitoring location is consistent with vegetation communities occurring within analogue monitoring sites.
	Weed establishment	Weed species make up less than 5% of species composition. Weed species make up less than 5% of the cover in each stratum within each CHA monitoring plot.
	Fauna habitat	Habitat includes a range of structural habitats, e.g. eucalypts, shrubs, groundcover and a developing litter layer. Habitat values are generally consistent with analogue monitoring sites.
	Fauna species	Vertebrate surveys within the CHA demonstrate that bird, mammal, reptile and frog communities are representative of analogue monitoring sites.
	Biodiversity monitoring	Annual biodiversity monitoring indicates the CHA areas are generally consistent with the values recorded in analogue monitoring sites.

2.2.4 CHA Management Actions

The long-term objective of the CHA management actions is to achieve the completion criteria outlined in **Section 2.2.3**. In order to ensure that the areas set aside as CHAs will provide ongoing habitat for native flora and fauna, all potential disturbances must be minimised. However, management techniques will be implemented to improve the existing quality of the CHAs, where practical. These management measures are described in the following sections.

Access and Identification

In order to minimise unnecessary disturbance to the CHA, unauthorised access by CVM personnel will be strictly prohibited. This will be achieved by appropriate signage at all likely access points, identifying the sensitivity of the area and prohibited access by unauthorised personnel.

Fencing where public access and trespassing is unlikely has been considered inappropriate, as this would hinder the movement of fauna through the area and create additional disturbance, which is contradictory to the aims of the CHA.

All relevant staff, contractors and visitors to CVM will be made aware of the location and sensitivity of the CHA, and it is considered that access controls proposed will be sufficient, given that active mining operations are no longer occurring adjacent to these areas.

Maintenance

It is anticipated that maintenance required in the habitat compensation area will be minimal, particularly in the areas where a good cover of native vegetation exists. However, annual inspections will be carried out to assess the status of the CHA, and identify any areas where active maintenance work is required, such as weed control, erosion, or any other remedial work that may be necessary.

Weed Management

CVM undertakes regular weed control around the mine site, involving annual spraying of weeds such as blackberries, St Johns Wart and Patterson's Curse. During inspections of the CHA, evidence of weed invasion will be noted and the area included in the weed control program for the site. Details of CVM weed control activities are reported annually in the Annual Review.

Feral Animal Control

Feral animals have not been identified as an issue for the CHA to date. However, if the presence of feral animals within the CHA does become an issue during CVM operations, then a plan of management will be developed in consultation with relevant regulatory agencies.

Mining-related Activities

Restriction of mining related activities cannot be absolute and will need to include the following:

- CVM underground mining can proceed below the CHA, provided that the required additional regulatory are received prior;
- Access will be maintained for bushfire control and ecological monitoring; and
- Some minor disturbance may be necessary for subsidence monitoring (if underground mining commences) and geological evaluations.

Underground extraction has occurred within the adjacent Gardens of Stone State Conservation Area for many years. Given there are no drainage sensitive ecosystems present, then the potential for any future underground mining to adversely affect vegetation communities within the CHA is considered remote.

2.2.5 CHA Permanent Protection

The CHAs are located on land which is owned by Castlereagh Coal. Two options which are expected to be available for the long-term permanent protection of the CHAs, including:

- A Biodiversity Stewardship Agreements (BSA) under Part 5, Division 2 of the *Biodiversity Conservation Act 2016* (BC Act); or
- A Conservation Agreement under Part 5, Division 3 of the BC Act.

These options for permanent protection of the CHAs will be reviewed by Castlereagh Coal to identify the most appropriate permanent protection pathway to be implemented. Castlereagh Coal will consult with the Biodiversity, Conservation and Science Directorate (BCS) of the DPHI during the conduct of this review to ensure that the requirements of this long-term conservation mechanism is appropriate.

2.3 COMPENSATORY HABITAT AREA MONITORING

2.3.1 Objectives

Monitoring of the CHA are carried out on an annual basis. The objective of the monitoring is to determine whether the management techniques being employed in the area are successful in providing consistent or improved habitat for native flora and fauna, using the assessment methods listed in **Section 2.3.2**. Through an assessment of the monitoring results, any changes or additions to the CHA Management Plan can be determined and implemented.

Objectives for the CHAs and rehabilitation communities at CVM are detailed in the site Mining Operations Plan / Rehabilitation Management Plan.

2.3.2 Survey Methodology

In order to determine the success or otherwise of management practices covering the CHAs, survey data can be compared through time, using the results from the EIS (IEC, 2004) as baseline information. However, the health of a patch of vegetation is often far more dependent on natural conditions such as rainfall and temperature, and therefore it may not be possible to directly correlate the success of the CHAs to the human management of the area. Therefore, annual surveys of similar vegetation communities outside of the CHAs (i.e. control sites) are required to provide some indication as to the influence of natural phenomena. The surveys will seek to assess the health and vigour, structure, floristics and habitat value over time. The assessments completed as part of these annual surveys will be measured against the performance and completion criteria specified within **Section 2.2.3**.

Timing

Flora and fauna surveys will be undertaken on an annual basis during the spring/summer months. This time is when fauna is generally most active and provides the greatest opportunity for their detection.

Location

Flora and fauna surveys will be carried out in each vegetation type of the CHAs, at the monitoring locations (CH1 to CH8) shown on **Figure** 3. Further to these monitoring locations, monitoring of two known populations of Clandulla Geebung (*Persoonia marginata*) within the designated Conservation Area (within the north western portion of CVM, see **Figure** 2) and within a CHA (adjacent to CH8, as shown on **Figure** 3) and within the are monitored to monitor the natural trends (i.e. given they are not anticipated to be affected by CVM activities) in these populations over time.

Flora Methodology

Monitoring of the CVM CHA requires floristic and habitat surveys at fixed monitoring plots as identified on **Figure** 3. Flora monitoring is conducted generally by conducting a plot-based floristic survey at each monitoring location utilising the methodology described within Section 4.2.1 of the Biodiversity Assessment Method 2020. The following information is to be gathered for each fixed monitoring plot (20 m x 20 m):

- General floristic description, including growth form for each recorded native species;
- Species of interest (i.e. key functional or structural, protected/vulnerable or noxious weeds);
- Number of flora species (diversity);
- Number of trees >1.6 m in height;
- Diameter at Breast Height (DBH) of trees >1.6 m, to a maximum of 10 for any one species;
- Estimated foliage cover of each native and exotic species within the plot;
- Canopy cover over the 20 m centreline when trees are of sufficient height;

- Tree health and percentage of health of non-health trees; and
- New plant species and declared noxious weeds.

Each fixed monitoring plot is photographed along the centreline at each end looking inwards.

Threatened Flora Monitoring – Clandulla Geebung

Monitoring at the two Clandulla Geebung monitoring sites is conducted by mapping the distribution of individual plants at a single monitoring point at each site (i.e. CGC Area and the Cullen Valley CHAs, proximate to CH8). All Clandulla Geebung plants within a 20 m radius of the metal star picket located at each site are recorded with a handheld GPS. The bearing (º) and distance (m) from the star-picket is used to map the location of each individual plant. Bearings are measured using a compass and distance is determined using a tape measure attached to the star picket. For all plants identified within the survey area, the following information is recorded:

- Plant number;
- Distance of the plant to the centre star-picket;
- Bearing of the plant to the centre star-picket;
- The diameter of the plant (cm);
- Presence or absence of flowers; and
- Presence or absence of fruit.

Additionally, a photo point is taken of the site to assess any major changes in the overall vegetation structure within the two areas. The information recorded at each site is then compared over time and over time to determine the natural trends in the two populations.

Fauna Methodology

Given the diversity of native fauna known from the area, a number of sampling techniques will be employed to maximise the detection of fauna species. Survey techniques for each fauna group are described below and have been developed utilising the same methodology as undertaken for the EIS as well as incorporating the relevant survey methods as outlined within the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (working draft) (DEC, 2004). Although the fauna surveys will be undertaken for all fauna species, targeted searches will also be carried out for threatened species known, or considered likely to occur in the area.

Birds

An area search technique will be used whereby all birds detected over a thirty-minute period within a two-hectare area surrounding each floristic based monitoring plot will be identified. All bird species observed and heard calling during the survey period will be recorded. Incidental bird sightings while undertaking other fieldwork will also be recorded. This bird monitoring will be completed annually in conjunction with the flora surveys.

Nocturnal bird surveys will be conducted concurrently with arboreal mammal surveys, which will be undertaken during spotlighting searches throughout the study area for a total of three hours over three nights.

Mammals

Microbats

Micro-bat species will be recorded during echolocation call recording devices installed at each CHA monitoring site for the duration of the spotlight surveys. Calls will then be later analysed to determine micro-bat species observed during the surveys. Surveys for micro-bat species will be undertaken every second year.

Small and Medium Sized Mammals

Whilst hair funnels will be deployed at each fauna site during the surveys, no trapping is proposed to be undertaken during the surveys. This survey method is unlikely to be beneficial considering that no non-flying threatened mammal species are considered likely to occur. The previous survey by Wildsearch (1996) only resulted in one Brown Antechinus (*Antechinus stuartii*) and one Bush Rat (*Rattus fuscipes*) being recorded in 360 trap nights including the use of small and medium Elliot live traps and cage traps. Repeated bi-annual trapping in similar habitat at Mount Airly has also resulted in only these two species being recorded, albeit with greater success (AES, 1998-2000).

Indirect evidence of small to medium sized mammals, such as holes, droppings and burrows etc will be recorded during the annual surveys.

Arboreal Mammals

As part of the targeted large owl and microchiropteran surveys, spotlighting will be undertaken throughout the study area for a total of three hours over three nights. All mammal species detected will be recorded.

Large Mammals

The study area will be traversed in an attempt to detect large mammals by direct observation. A search will also be made for indirect evidence of large mammal presence such as droppings, burrows, tracks, diggings and bones.

Particular effort will be given to detection of brush-tailed rock wallabies (*Petrogale penicillata*) in rock outcrops in the immediate area. This will involve observation of cliffs, caves and overhangs from vantage points using binoculars.

Reptiles

A targeted search for reptiles will be carried out and include looking under bark, fallen timber, rocks, leaf litter and man-made debris.

Frogs

No threatened frogs have been identified as being likely to occur from the literature and database review. Nevertheless, ten-minute listening periods will be undertaken adjacent to ephemeral creeks when wet to identify the presence of any frog species.

2.3.3 Air Photo Interpretation

Aerial photographs will be reviewed every five years and compared to those taken prior to the commencement of mining. Aerial photography is an effective tool in indicating areas of disturbance to surrounding vegetation and subsequently fauna habitation, such as patterns of fallen or dying trees. Such effects can readily be seen through aerial photographs.

Aerial photographs are also useful in providing a view of the health of an area of vegetation, which cannot be seen from the ground, where only a finite number of trees can be seen and compared at any one time.

Photographs will include similar vegetation types outside of the potential effect caused by mining, to allow for natural variations in vegetation health such as stresses caused by drought. These areas existing within nearby Gardens of Stone State Conservation Area. Where it is indicated that a change in the vegetation may be a result of mining activities, site visits will be conducted for that area to determine, and record any such effects, and remediation works proposed.

2.3.4 Reporting

Following the annual surveys, a monitoring report will be prepared and summarised in the Annual Review. The report will provide details of the methodology employed, a summary and full species list of all flora and fauna found to be present, an assessment of the health of flora and fauna habitat areas against the performance and completion criteria specified within **Section 2.2.3**, and a vegetation map showing the location of known threatened species. The report will have an emphasis on the assessment of the management techniques being employed within the CHA, and any further recommendations to improve the value of this area.

3. VEGETATION CLEARANCE PROTOCOL

This section provides a Vegetation Clearing Protocol for CVM, as required Schedule 4, Condition 32 of DA 200-5-2003.

Works involving vegetation clearance outside of the existing approved disturbance areas, such as exploration activities and/or installation of boreholes will require approval from the relevant government agency prior to the commencement of any clearing activities. Such clearing activities will be undertaken in accordance with the specific approval documents and are therefore outside the scope of this FFMP.

The CVM has been under Care and Maintenance since 2023 and previous mining operations have cleared most of the vegetation within the approved disturbance area at the CVM. The proposed mining operations to recover an addition 450,000 tonnes of coal (as described within **Section 1.1**) will be undertaken within areas previously disturbed (and rehabilitated) areas, meaning that no new clearing of previously undisturbed native vegetation is proposed to be undertaken. Notwithstanding, other disturbance activities which may be required to be undertaken will potentially include:

- Remediation of subsurface heating issues;
- Installation, maintenance and/or repair of erosion and sediment control structures; and
- Access road maintenance and repair to provide access for mining operations, environmental monitoring and bushfire control purposes.

3.1 CLEARING OF VEGETATION

There is no proposed clearing associated with the mining of remnant coal at CVM. Nevertheless, should clearing be proposed in the future, it will be undertaken in accordance with the following. Clearing will be undertaken according to detailed mine plans/work plans which have been prepared by suitably experienced personnel and which identify the disturbance areas required to achieve the work plan. The areas to be cleared will be communicated to operational staff, surveyed and clearly marked on the ground to ensure that the operational staff are aware of the approved disturbance areas. Clearing activities will be undertaken under the supervision of suitably qualified and experienced operational staff.

Certain clearing activities (should they be required) will require the disturbance of vegetation on rehabilitated mining areas. Based on the findings from annual monitoring of the rehabilitation areas, rehabilitation which has been in place for less than a decade is considered to contain vegetation which is not of a maturity to support habitat features (such as tree hollows, etc). Accordingly, any disturbance of rehabilitation areas which were established less than 10 years ago will not require a pre-clearing survey. Notwithstanding, the following measures will be implemented to the clearing of rehabilitation less than 10 years or younger to limit the impact of clearing within the approved disturbance footprint on flora and fauna:

- Mine/work plans will be developed to restrict vegetation clearance to the smallest area possible and ensure that this disturbance remains within the approved boundary of disturbance;
- Collection of native seeds from the vegetation to be cleared, where practical;
- Salvage and collection of vegetation from clearing works where practical; and
- Existing roads and tracks will be utilised to provide access wherever practical to minimise the need to clear additional vegetation.

Whilst no new disturbance to previously undisturbed native vegetation is required during the operations covered by this FFMP, vegetation clearing is typically necessary to enable approved open cut mining operations to proceed (as shown on **Figure** 2). The following measures will be employed to limit the impact of the disturbance:

- Progressive clearing of vegetation, with trees being removed in advance of mining, as required. This will ensure that vegetation remains for the maximum length of time possible;
- Mine plans/work plans are developed to identify the clearing areas required for the works to proceed;
- Mine planning undertaken to identify and assess alternative options to minimise clearing of native vegetation;
- Collection of native seeds from the vegetation to be cleared, where practical; and
- Use of existing internal roads and tracks for access to minimise the need to clear additional trees.

Where clearing of trees is unavoidable, the following procedures will take place:

- Pre-clearing approval will be required to be granted by the Mine Manager;
- The pre-clearing proforma is to be completed by the Mining Supervisor and signed by the Environmental Officer and General Manager prior to any clearing activities. This is to ensure that all measures are in place the implement the necessary measures as identified below;
- Prior to vegetation clearing, all personnel involved will be informed of work boundaries by supervisors based on mine plans including the operational areas surveyed and the delineated non-disturbance areas;
- All vegetation clearing will occur only under the direction of Mining Supervisors (or delegate);
- Careful felling of hollow-bearing trees (see **Section 3.1.2**); and
- Vegetation of reasonable size will be collected upon clearance and either mulched at the time of clearing or stockpiled for placement back on rehabilitated areas of the site as habitat resources.

3.1.1 Fauna Recovery Procedure

In the case that any fauna may be present during vegetation clearance, CVM will undertake the following actions:

- Pre-clearing survey of individual trees which require removal, specifically directed towards detecting any fauna present. Investigation of trees should be conducted on the day that they are to be felled, to detect any individual animals present at the time;
- Where arboreal species are detected in a tree, that tree and a 10-metre buffer around it are to be left uncleared, and the animal left to vacate the tree overnight;
- Checking of tree-hollows to locate any wildlife after felling;
- Inspection of any accessible tree-hollows, particularly in large old trees, prior to their being felled, where possible;
- Collection of any wildlife located during clearing activities after all the above mitigation measures have been undertaken, and its immediate release into adjacent bushland; and
- If an animal is found injured during clearing works, the local WIRES organisation will be contacted for assistance.

3.1.2 Hollow-bearing Tree Management Program

Tree-hollows are an important resource for many native fauna species and are vital for some species. The retention and protection of hollow-bearing trees is an important element in the maintenance of biodiversity and in the execution of an environmentally sound development. To this end, specific protocols relating to hollow-bearing trees are to be implemented in the development, including:

- Hollows from trees removed from the open cut will be attached to standing trees in the Habitat Compensation Area that do not contain hollows, or placed on the ground or used in rehabilitation works around the site; and
- If hollow bearing trees are to be felled, a controlled felling technique will be used (described below in **Section 3.1.3**).

3.1.3 Controlled Felling of Trees

In the case where a tree with hollows has to be felled, the tree is assumed to provide habitat for fauna. To minimise the risk of harm to any animal that may inhabit the tree, the following procedure shall be followed:

1. Nudge the tree with equipment to induce any fauna to vacate the tree. Then thump the tree two or three times sufficiently to cause vibration and sudden movement of small branches;
2. Watch and wait for fauna to vacate the tree (five minutes or more may be required for slow moving fauna). Repeat if necessary;
3. Select the preferred direction of fall and any alternative directions;
4. Extend the plant to push the tree at a good height above ground. Push the tree in the preferred direction of fall. If the tree is too strong for the mechanical pusher, try another preferred direction;
5. If the tree is too strong to be pushed with all roots intact, excavate and cut some of the roots on the restraining side;
6. Push the tree over (as in step 3 above), or repeat steps 3 and 4 until the tree can be successfully pushed over.

Using this method, the tree falls gently to the ground, restrained by the remaining root system. Fauna are generally not harmed. Note that a large excavator can serve as a tree pusher and enables the tree to be felled very accurately.

In these situations, as for tree pushing, the tree should be bumped to induce fauna to vacate it, albeit with an axe or other handheld tool. Some reduction in the speed of fall of a tree is achievable by well-designed cutting of the tree. The appropriate design addresses the locations of the cuts and the size and shape of the wedge removed in the direction of fall. In cases where several adjacent trees have to be cut, it may be possible to create a bed of vegetation to break the fall of the most significant habitat tree.

If felling is required, suitably qualified ecologists will be employed to assess the habitat that remains within the locality, and to identify appropriate measures to be implemented (such as installation of nest boxes) to reduce impacts on local fauna.

3.2 VEGETATION PROTECTION

Loss of native vegetation will be kept to a minimum by only removing areas that are essential, and no alternative to their removal exists. To ensure that no unnecessary clearing occurs, all machinery operators will be made aware of areas to remain undisturbed. Where necessary, these areas will be fenced to restrict vehicular access.

Prior to any requirement for vegetation clearance at CVM, the area to be disturbed will be accurately surveyed and delineated on the ground and assessed in relation to proximity of the approved mine disturbance boundaries. Where vegetation disturbance is proximate with the approved mine disturbance boundary, the on the ground survey and delineation will clearly mark this boundary to ensure no clearing activities are undertaken beyond this boundary. Communications will be provided to the operational and supervising staff to ensure clearing boundaries are known. A visual assessment will be made including photographic evidence prior to the commencement of clearing operations. A similar assessment of the vegetation will be made post vegetation clearing (including photographic evidence) demonstrate that no vegetation disturbance has occurred.

3.3 THREATENED SPECIES

In the event that a threatened species is detected in an area scheduled for clearing, a Species Management Plan will be prepared. The aim of such a plan will be to prevent the loss of that species as far as possible. This may be achieved through attempts to transplant individual plants into rehabilitation areas that would otherwise be destroyed through clearing, collection of seed prior to clearing, and attempts to grow the species from seed collected. Techniques will be developed specifically for each threatened species encountered and will be based on existing knowledge of the biology and habitat of the plant.

Individual Capertee Stringybark trees have been recorded from within open cut mining areas. During the clearing process, available seeds will be collected from the trees to be used in the rehabilitation and revegetation of the site. It is not feasible to attempt to relocated mature trees of this species, however in the event that juvenile seedlings are encountered, they will be carefully removed and replanted in the CHA.

3.4 TOPSOIL MANAGEMENT

Careful stripping, stockpiling and reuse of available topsoil will provide maximum potential for successful revegetation of the site through the rehabilitation program, which will ultimately enhance the value of the area for native flora and fauna.

Methods to be employed for management of topsoil on site are described in the sections below.

3.4.1 Topsoil Stripping

Since topsoil can be degraded or lost in the stripping process, careful management is required. Particular care will be given to the following matters:

- Vegetation clearing will avoid contamination of the topsoil with large quantities of green material as this promotes biological degradation (composting) of runners, roots and seeds, which would otherwise be a source of regrowth when topsoil is respread;
- Timber, logs, rubbish and other vegetative matter which will interfere with respreading applications or surface stability will be removed prior to stripping;
- Available topsoil will be stripped in accordance with soil mapping depths. It is noted that stripping depths are only indicative as there may be areas with deeper or shallower soils depending on local topography;
- Equipment operators involved in topsoil stripping will be instructed on topsoil identification to maximise recovery and to avoid contamination of the target material with subsurface clays;
- Since the subsoil clays are dispersive, the topsoil stripping phase will avoid their removal. However, an A2 horizon exists to a depth of up to 30 cm. This material will be stripped where available and stockpiled separately; and
- Topsoil is to be loaded into trucks and either transported directly to areas being rehabilitated or to the stockpile area.

3.4.2 Topsoil Stockpile Management

Topsoil stockpiles will be no higher than two metres with a side slope of 3:1 (H:V). The length of each stockpile will vary according to volume. These dimensions will reduce the incidence of anaerobic decomposition of organic matter and subsequent loss of viable seeds.

Topsoil stockpiles will be sown with a cover crop where the stored material is not able to be placed on rehabilitation areas within three months.

4. WEED MANAGEMENT STRATEGY

This Weed Management Strategy has been prepared in accordance with Condition 33 of Schedule 4 of DA 200-5-2003.

4.1 Weed Definition

A weed can be defined in management terms as a plant growing in the wrong place, or in biological terms, as an aggressive plant that thrives when natural environments are disturbed or inappropriately managed.

Statutory provisions for the management of weeds in NSW are included under the *Biosecurity Act 2015* (Biosecurity Act).

4.2 Weed Invasion

Invasion of a weed species most commonly occurs following disturbance to existing established vegetation communities. Generally, the more disturbed the site the more likely weed invasion will be. Most weed species have strong reproductive systems and are highly competitive, which makes them perfectly suited to the mesic conditions (plenty of light, water and nutrients) often associated with cropping and pasture situations. Weeds may be spread through an area by a number of mechanisms, including movement of stock, birds, water, wind and vehicles.

4.3 Impacts

While weed invasion does not pose a threat to mining activities, they aggressively compete with local plant species, which is undesirable during revegetation of rehabilitated land. Once established, weeds prevent the regeneration of indigenous species and the development of rehabilitation communities.

Some weed species may degrade local habitat to such an extent that they have a major impact on native animals. Once weeds are established, they generate a different nutrient cycle, changing soil structures, leading to the degradation and ultimate collapse of the plant communities they have invaded. As weeds replace native plants, the vegetation community loses its capacity to provide food and shelter for native animals. Often the introduced pest plant will be better suited as a food source for introduced (exotic) animal species, further degrading the original vegetation community as pollinating insects and birds are lost.

Furthermore, colonies of weed species on site, if left unchecked, have the potential to spread to neighbouring properties where they may pose a threat to agricultural production.

4.4 Weed Identification

Annual monitoring of weeds across the CVM site and CHAs has identified a number of weed species present in low to moderate abundance. These weed species are listed within **Table 3**. Weed distribution and abundance will continue to be monitored and necessary control activities will be identified as part of the annual reporting undertaken for the site.

Table 3 Weed Species at CVM

Scientific Name	Common Name	CVM Rehabilitation Areas	CHAs
Hypochaeris radicata	Catsear	Recorded	Recorded

Scientific Name	Common Name	CVM Rehabilitation Areas	CHAs
Hypericum perforatum	St John's wort	Recorded	Recorded
Cotoneaster glaucophyllus	Cotoneaster	Not recorded	Recorded
Crataegus monogyna	Hawthorn	Not recorded	Recorded
Echium plantagineum	Paterson's curse	Recorded	Recorded
Rubus fruticosus spp. aggregate	Blackberry	Recorded	Recorded
Senecio madagascarensis	Fireweed	Recorded	Not recorded

Early recognition and identification are important in combating the spread of weeds. A Weed Identification Kit has been prepared to assist on-site personnel in identifying noxious weeds at CVM and is included as **Appendix C**. Copies of this kit are held on site, to allow easy use in the field. The kit has been prepared to include all weeds listed in the local area, and provides photographs, detailed descriptions, actions required and legal obligations for each. Accurate identification is important in ensuring that the most effective control strategy is implemented, to control the target weed species and minimise unnecessary impacts to non-target vegetation.

4.5 Weed Management

4.5.1 Legal Obligations

The Biosecurity Act provides a framework for the state wide control of listed weeds. Legally, weeds must be controlled or removed, depending on the category of the weed.

Under the Biosecurity Act, land owners and/or occupiers of land have responsibility for controlling weeds on the land they occupy. This obligation applies to both private and public occupiers of land, and can be enforced by the issue of weed control notices by local control authorities.

4.5.2 Weed Prevention

The most effective method of controlling weed infestation is by preventing weeds from becoming established. A number of different practices can be used to prevent the spread and establishment of weeds on CVM, as described below.

Isolating Contaminated Material

Prior to clearing of vegetation (see **Section 3**), any areas where heavy weed infestation is evident will be treated to remove the weeds prior to stripping of topsoil. This will minimise the volume of weed matter being collected in the topsoil that may regenerate in rehabilitation or topsoil stockpile areas. A residual herbicide will also be applied to sterilise the topsoil, if required. Treated topsoil material will be stockpiled separately and remain unused for at least two growing seasons to ensure that there is no viable weed material remaining. Once it has been verified that the material is not going to provide a source of weeds, it can be used for rehabilitation purposes.

Preventing Dispersal

The most effective method of preventing dispersal of a weed species is by preventing the existing plants to set seed. This may be done by killing or removing the plant prior to flowering, or removing flower heads as soon as they appear.

Seeds and propagules may also be spread by attaching to animals, clothing or tyres that cross weed infested areas. By being aware of this and thoroughly cleaning equipment prior to entering "clean areas", the spread of a weed can be further prevented.

Maintaining Ground Cover

By maintaining a healthy ground cover of desirable species, the opportunity for weeds to germinate and establish are significantly reduced. This will be of greatest importance following clearing of the site. Progressive rehabilitation will therefore be undertaken as soon as is practicable with a seed mix that is weed-free.

Where there are large areas of exposed ground, regular inspections and monitoring will be carried out to identify weeds and schedule treatment actions.

4.5.3 Treatment Strategies

In many cases the occurrence of weeds is usually a symptom of another problem, such as inadequate vegetative cover, heavy infestation on neighbouring properties, dumping of contaminated material, etc. The first step in treating a weed problem is to identify the source and rectify it, so the potential for reinfestation is reduced.

Weed control takes many forms, including cultivation, herbicide application, removal by hand, grazing, slashing and burning. The type of equipment and control method chosen for weed control depends on the size of infestation, type of weed, topography, access, potential environmental and health hazards and the susceptibility or suitability of a certain weed to a particular treatment method.

Herbicide

For application to operate effectively, the weather, soil conditions and time available for spraying must be considered. Suitable weather conditions are essential if herbicides are to be applied safely and effectively. Weather conditions will be assessed and monitored prior to and throughout an application to reduce the risk of drift and subsequent off-target damage.

Herbicides can be applied using different methods including foliar spray, wiper, injection, cut stump, drill-and-fill, frilling, basal bark, and bark strip-and-paint. For safety and legal reasons, herbicides will be handled and applied strictly as specified in the product Safety Data Sheet.

An Herbicide Application Protocol has been developed for the use of herbicides at CVM, and is included as **Appendix D**. The protocol outlines the safety measures and correct procedures for handling and use of herbicides and will be provided to all personnel undertaking weed control on site.

Physical

Physically removing the weed can be effective for the treatment of some species. It can be done by manually digging out or pulling individual plants, or by using machinery such as tractors, slashers and backhoes. The success will depend on the type of plant. Bulldozing and slashing will leave the root system intact, providing an opportunity for the weed to regrow, however will prevent further spreading of seed from flowering plants.

4.5.4 Monitoring

Regular inspections will be carried out around the site to identify any areas of weed infestation. These will be concentrated on areas of disturbance, with particular emphasis on rehabilitation areas to allow early detection and treatment of weeds. Weed control activities will be reported annually in the Annual Review.

The principle criteria for weed management at the CVM is to ensure that there are minimal weed infestations onsite, such that they do not comprise a significant proportion of species in any stratum. A range of management actions will be undertaken for weed management at the CVM in the rehabilitation areas and within the CHA, which will include:

- Emerging threatening weeds will be identified and targeted by control programs;
- Monitoring of weed occurrences and effectiveness of management programs will be undertaken during annual biodiversity monitoring, and during regular rehabilitation and environmental inspections of the site;
- Weed control methods will be implemented and undertaken in consultation with suitably qualified experts, as required, and may include hand removal, mechanical removal and application of approved herbicides, when favourable conditions prevail; and
- Ongoing consultation with the relevant authorities regarding weed listings, weed occurrence and management technologies.

Table 4 Weed Management Performance Criteria and Completion Criteria

Description of Management Approach	Performance Criteria	Completion Criteria
Weed extent and density mapping	GIS Database regularly maintained illustrating the occurrence of weeds and areas of control	N/A – Ongoing Management Required
Monitoring inspections of weeds mapping occurrence and success of Weed Control Programs	Annual weed inspections to be undertaken to identify the occurrence of weeds and required control programs	Annual Reporting to be completed confirming outcomes of inspections
On-ground Weed Control Programs	Weed Control Programs conducted during appropriate seasons and as identified during the Annual Weed Inspections	Emergent weeds effectively controlled and significant infestations reduced in size and contained

5. ECOLOGICAL MONITORING PROGRAM

The Ecological Monitoring Program has been implemented to allow the success of CVM ecological management strategies to be evaluated. Through the monitoring program, areas where additional work is required can be detected to ensure that the potential ecological attributes are maintained at the highest level possible.

A brief outline of the Ecological Monitoring Program is provided below with further details described in the CVM EMP. A summary of the monitoring results provided in each Annual Review.

5.1 Introduction

The aim of the Ecological Monitoring Program is to evaluate the success of rehabilitation and revegetation works established at the CVM. Areas where additional work is required can be detected by the monitoring program at an early stage to ensure that the potential ecological attributes are maintained and that rehabilitation areas are progressing toward approved rehabilitation outcomes.

5.2 Rehabilitation Monitoring

Rehabilitation of disturbed land is an integral part of the mining process at CVM. Ongoing monitoring of rehabilitation areas is required to determine the need for maintenance, and to assess the performance of rehabilitation and revegetation works.

The rehabilitation monitoring program involves monthly inspections of the rehabilitation areas to identify the need for maintenance or additional rehabilitation works with priority given to:

- Signs of erosion, particularly after periods of heavy rainfall;
- Weed infestation;
- Signs of plant stress, which could indicate a water or mineral deficiency and general soil conditions; and
- Any areas that require maintenance (i.e. reseeding or land treatment).

To determine the success of the rehabilitation and revegetation works in recreating vegetation and habitat areas suitable for use by native fauna, annual monitoring is undertaken to assess:

- Landscape function – refers to the ability of the landform to meet the desired purpose and use for the site. In the case of CVM, the landscape function is to provide a stable, non-polluting unit capable of supporting native vegetation and providing potential habitat areas;
- Vegetation dynamics – assesses the structure and diversity of species present; and
- Habitat complexity – largely related to the vegetation structure, but also refers to the types of vegetation and the variability of habitat created. Habitat complexity assessment considers the availability of ecological resources such as suitable nesting sites and food sources for small birds and mammals.

The annual ecological monitoring program is undertaken by a qualified ecologist and the results are reported in the Annual Review.

5.3 Habitat Compensation Area Monitoring

Monitoring is also undertaken for the Habitat Compensation Areas (HCAs) to determine the success or otherwise of management practices at these sites and compare them to similar vegetation communities in surrounding lands. These surveys are generally undertaken in the summer months when fauna species are most active.

Prior to each survey, a search of the NSW Bionet database will be carried out to determine if there are any additional listed species have recently been detected in the area. In the event that a species of conservation significance is known to occur in the area, targeted searches will be carried out for the species to determine its presence within the HCAs.

To assess the status of the vegetation communities in the areas assessed, traverses of each site will be made on foot, with classification and recording of all species observed. A description of the structural characteristics of the vegetation will also be noted, along with the current level of disturbance. This will further facilitate a landscape function analysis and assessment of habitat complexity and vegetation dynamics.

Given the diversity of native fauna known from the area, a number of sampling techniques will be employed to maximise detection of fauna species. Survey techniques also consider the survey methods as outlined within the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* (working draft) (DEC, 2004). Survey techniques for each fauna group are described below:

- Birds – An area search technique will be used whereby all birds detected over a thirty-minute period within a two-hectare area will be identified. Incidental bird sightings while undertaking monitoring fieldwork will also be recorded;
- Mammals – Each monitoring site will be traversed in an attempt to detect mammals by direct observation. A search will also be made for indirect evidence of large mammal presence such as droppings, burrows, tracks, diggings and bones. Particular effort will be given to detection of brush-tailed rock wallabies (*Petrogale penicillata*) in rock outcrops in the immediate area. This will involve observation of cliffs, caves and overhangs from vantage points using binoculars.
- Spotlighting will be undertaken throughout the study sites for a total of three hours over three nights to detect any nocturnal mammals;
- Reptiles – A targeted search for reptiles will be carried out and include looking under bark, fallen timber, rocks, leaf litter and man-made debris; and
- Frogs – No threatened frogs have been identified as being likely to occur in the area from literature and database reviews. Nevertheless, ten-minute listening periods will be undertaken adjacent to ephemeral creeks when wet to assess the presence of any threatened frogs.

6. STAKEHOLDER ENGAGEMENT

6.1 FFMP Consultation

Correspondence with regulatory agencies relating to this revision of the FFMP included as **Appendix A**.

6.2 External Communications

6.2.1 Community Complaints

All community complaints received by CVM are recorded in the Castlereagh Coal Complaints Register. The register is regularly maintained and published on the Castlereagh Coal website to document a summary of all complaints received and follow-up actions taken by CVM personnel in response.

Further detail on the management of community complaints is provided within Section 6.1.3 of the CVM EMS.

6.2.2 Incidents and Non-Compliances

Schedule 6, Condition 10 of DA 200-5-2003 requires CVM to notify the Department within 24 hours of becoming aware of an incident. The notification must be made in writing via the NSW Planning Portal (Major Projects) and address details of the incident including:

- Date, time and location;
- A brief description of what occurred and why it has been classified as an incident;
- A description of what immediate steps were taken in relation to the incident; and
- Identifying a contact person for further communication regarding the incident.

Schedule 6,Condition 11 of DA 200-5-2003 requires CVM to provide the Department with a subsequent incident report in accordance with Appendix 7 of DA 200-5-2003. The subsequent incident report must:

- Identify how the incident was detected;
- Identify when the Applicant became aware of the incident;
- Identify any actual or potential non-compliance with conditions of consent;
- Identify further action(s) that will be taken in relation to the incident; and
- Provide a summary of the incident;
- Provide outcomes of an incident investigation, including identification of the cause of the incident;
- Provide details of the corrective and preventative actions that have been, or will be, implemented to address the incident and prevent recurrence, including the period for implementing any corrective and/or preventative actions; and
- Provide details of any communication with other stakeholders regarding the incident.

Schedule 6, Condition 12 of DA 200-5-2003 requires CVM to report any non-compliance against conditions related to this FFMP (refer **Table 1**) to the Department within seven days of becoming aware of the non-compliance and then in the Annual Review. Notification will be submitted in writing via the DPHI Planning Portal (Major Projects), identify the development (including the development application number and name).

Any reporting of a non-compliance with the relevant conditions of DA 200-5-2003 will outline the following:

- Condition of consent that the development is non-compliant with;
- Why it does not comply;
- Reasons for the con-compliance (if known); and
- What actions have been undertaken, or will be undertaken, and when, to address the non-compliance.

7. ROLES & RESPONSIBILITIES

Table 5 outlines the key roles and responsibilities for CVM personnel in relation to this FFMP.

Table 5 FFMP Roles and Responsibilities

Ref	Control Measure	Responsibility	Timing
1.	• Review and approve this FFMP and provide adequate resources for its implementation on site.	Operations Manager	Ongoing
2.	• Co-ordinate the implementation of the Vegetation Clearing Protocol (**Section 3**) for all disturbance; • Implement the protocol for the treatment, stripping and stockpiling of topsoil material; • Assist the Environment Officer with investigations into rehabilitation and land management incidents, non-compliances, and complaints.	Mining Supervisor	Ongoing As required As required
3.	• Manage the implementation of this FFMP during CVM operations. • Investigate any ecological incidents and prepare associated reporting. • Complete regular inspections of active rehabilitation and topsoil areas to identify any required maintenance actions. • Assist in the preparation of the Vegetation Clearing Protocol (**Section 3**) for all disturbance on site. • Respond to ecological and land management complaints and maintain CVM Complaints Register. • Facilitate regular training of CVM personnel in the requirements of this FFMP. • Co-ordinate annual ecological monitoring of the site and include a summary report in the Annual Review	Environment Officer	Ongoing Ongoing Quarterly As required As required Annual Annual
4.	• Comply with the requirements of this FFMP.	All CVM personnel	Ongoing

8. REVIEW & REPORTING

8.1.1 Annual Reporting

In accordance with Schedule 6, Condition 5 of DA 200-5-2003, CVM will continue to submit an Annual Review to DPHI and relevant agencies. Information to be provided in the Annual review will include:

- A detailed summary of the monitoring results on the development during the year;
- A detailed analysis of these monitoring results against the relevant impact assessment criteria, monitoring results from previous years, and predictions made in the EIS;
- Identification of any trends in the monitoring over the life of the development;
- Identification of any non-compliances during the reporting period; and
- A description of what management actions were, or are being taken to ensure compliance with relevant planning criteria.

A copy of each CVM Annual Review is provided to DPHI, NSW Resources – Resources Regulator (RR), EPA, LCC and the representatives of the mine Community Consultative Committee (CCC).

8.1.2 Stakeholder Reporting

In accordance with Schedule 6, Condition 8 of DA 200-5-2003 CVM is required to establish a CCC to oversee the environmental performance of the mine. While in operation, the CCC will meet at least twice a year and will review and provide advice on environmental performance including this document, monitoring results, audit reports or complaints.

8.2 Auditing

In accordance with Schedule 6, Condition 6 of DA 200-5-2003, Castlereagh Coal is required to commission an Independent Environmental Audit within two years of the date of consent, and every five years thereafter, for submission to DPHI, unless otherwise approved. This audit report is required to consider the effectiveness of the FFMP and will provide environmental management advice to ensure its ongoing effectiveness.

8.3 Review

This FFMP will be reviewed on at least a five yearly basis to ensure that it remains consistent with operations at CVM and in accordance with general industry standards and procedures. Reviews will consider the need to modify the FFMP and the management measures in place at CVM to ensure that all practicable measures are in place to minimise ecological impacts from site operations. The FFMP will also be reviewed (and if necessary, updated) in response to:

- Relevant findings from Independent Environmental Audits;
- Findings from investigations of community complaints or monitoring non-compliances relating to ecological impacts or procedures;
- Directions from regulatory agencies; and
- Changes to conditions of consent.

Approval of any major amendments to this FFMP will be sought from the Planning Secretary DPHI and other stakeholders, as required under DA 200-5-2003.

9. REFERENCES

- Castlereagh Coal (2022) *Cullen Valley Mine Environmental Management Strategy*.
- Castlereagh Coal (2022) *Cullen Valley Mine Environmental Monitoring Program*.
- Castlereagh Coal (2022) *Cullen Valley Species Management Plan for the Clandulla Geebung (Persoonia Marginata)*.
- International Environmental Consultants (2003) *Cullen Valley Mine Lease Extension Project*.

10. ABBREVIATIONS

Abbreviation	Meaning
Biosecurity Act	NSW *Biosecurity Act 2015*
BC Act	*Biodiversity Conservation Act 2016*
BSA	Biodiversity Stewardship Agreement
CCC	Community Consultative Committee
CPHR	Conservation Programs, Heritage and Regulation
CVM	Cullen Valley Mine
DPHI	Department of Planning , Housing and Infrastructure
RR	NSW Resources - Resource Regulator
EIS	Environmental Impact Statement
EMP	Environmental Monitoring Program
EPA	Environmental Protection Authority
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
FFMP	Flora and Fauna Management Plan
CHA	Compensatory Habitat Area
LCC	Lithgow City Council

APPENDIX A

STAKEHOLDER ENGAGEMENT

Our ref: DOC22/178119

Cullen Valley Coal - Management Plans

Thank you for your e-mail dated 15 February 2022 to the Biodiversity, Conservation and Science Directorate (BCS) of the Department of Planning and Environment inviting comments on the Flora and Fauna Management Plan (FFMP) and Species Management Plan (SMP) for Cullen Valley Coal.

BCS note that the SMP is a relatively short document and suggest that it may be best provided as an Appendix to the FFMP and may benefit from a title change to Clandulla Geebung Species Management Plan. A change to the document title would provide clarity to external readers that it is specific to one species.

Recommendations relating to the SMP and FFMP are provided in **Attachment A** and BCS's detailed comments are provided in **Attachment B**.

If you require any further information regarding this matter, please contact David Geering, Senior Conservation Planning Officer, via david.geering@environment.nsw.gov.au or (02) 6883 5335.

Yours sincerely

Samantha Wynn

Samantha Wynn
Senior Team Leader Planning, North West
Biodiversity, Conservation and Science Directorate

9 March 2022

Enclosure: Attachments A and B

BCS's recommendations

Cullen Valley Mine Flora and Fauna Management Plan

1.1 A plot-based floristic vegetation survey based on a 20 m × 20 m plot be implemented.

1.2 Fauna surveys should not be restricted to threatened species. BCS recommends that the methodologies provided in the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* be adopted.

2.1 Information about the weed species identified on site and their status is required.

2.2 A monitoring plan containing performance criteria and completion criteria to quantitatively measure success along with appropriate trigger points for corrective action should be developed.

3.1 The ecological monitoring program should be included in the Flora and Fauna Management Plan.

4.1 Figure 3 should include the indictive distribution of the Clandulla Geebung within and around the conservation area.

4.2 A monitoring plan for the Clandulla Geebung, including suitable control sites, is required.

BCS's detailed comments

Cullen Valley Mine - Flora and Fauna Management Plan

1. Flora and fauna monitoring need to be rigorous to fully determine and track habitat values

Environmental monitoring usually relates to what effect (if any) management strategies are having, or will have, on the condition of a natural area, a species or an ecological community.

An effective monitoring program can:

- analyse change over time, such as comparison with baseline or earlier data.
- monitor effects from a particular management action, or measure effects from a specific threat.
- learn about ecological patterns and processes.
- fill in gaps about biological knowledge
- engage stakeholders on a local, state or national level, and help government and the public make informed decisions.

When undertaking monitoring, it is very important that standard techniques or procedures are used, repeated, and documented. The collection of monitoring data allows trends over time to be assessed and analysed. If the data are not collected using standard, repeatable measures, it is often not possible to compare them.

When designing a monitoring project, it is critical that the question proposed to be answered by monitoring is clearly defined. The monitoring procedures need to be tailored to the species, site or community of interest. All existing research and knowledge about the site or species should be taken into consideration.

It is stated in Section 2.3.1 of the Flora and Fauna Management Plan (FFMP) that "*The objective of the monitoring is to determine whether the management techniques being employed in the area are successful in providing consistent or improved habitat for native flora and fauna*". The survey methodologies outlined are not capable of achieving this objective. More rigorous survey methodologies quantifying vegetation condition and the presence and abundance of a range of fauna are required.

BSC recommends that a plot-based floristic vegetation survey based on a 20 m × 20 m plot be used (refer Section 4.2.1 of the Biodiversity Assessment Method 2020 https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-2020-200438.pdf).

Fauna surveys should not be restricted to threatened species. However, BCS recommends that the methodologies provided in the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/draft-threatened-biodiversity-survey-guide.pdf will provide a solid basis for monitoring fauna.

Recommendations

1.1 A plot-based floristic vegetation survey based on a 20 m × 20 m plot be implemented.

1.2 Fauna surveys should not be restricted to threatened species. BCS recommends that the methodologies provided in the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* be adopted.

2. Performance and completion criteria, and associate triggers, are required for targeted weed management

The FFMP includes a Weed Identification Kit as Appendix B. While this kit allocates species to a weed control category and indicates the required action should the weed be identified, there is no indication as to whether these species have been identified on site. Weeds known to occur on site should be identified in the plan and individual strategies outlined. It is important to consider the impact of the weeds, establish whether different outcomes are needed for each weed and to determine priorities to manage the weeds.

Other than indicating that regular inspections will be carried out, no formal monitoring plan is presented. Monitoring should aim to detect any significant changes in the species' weed risk, specifically the spread of the species and review any perceived changes in weed abundance.

Successful management plans include tailored, quantitative performance measures and targets, completion criteria monitoring and trigger points for corrective action which adhere to the SMART principles (specific, measurable, achievable, realistic, timely). Targets within the plan must be measurable and expressed in a manner that assists in the evaluation of progress toward the strategic goals that define the completion criteria.

Recommendations

2.1 Information about the weed species identified on site and their status is required.

2.2 A monitoring plan containing performance criteria and completion criteria to quantitatively measure success along with appropriate trigger points for corrective action should be developed.

3. The Ecological Monitoring Program should form an integral part of and be included in the Flora and Fauna Management Plan

Section 5 of the FFMP indicates that the ecological monitoring program is described in the Cullen Valley Mine Environmental Management Plan (EMP). The ecological monitoring program should form an integral part of the FFMP and should be included in the FFMP to ensure it is a stand-alone document. As the EMP is not available for review the ecological monitoring program has not been assessed.

Recommendation

3.1 The ecological monitoring program should be included in the Flora and Fauna Management Plan.

Cullen Valley Mine – Clandulla Geebung Species Management Plan

4. On-going monitoring is required of the Geebung population within the conservation area, the results of which should guide future management actions

The SMP provides an overview of the ecology of the Clandulla Geebung *Persoonia marginata* but contains little other information that is useful in meeting the stated objectives of the management plan.

The plan would be improved by including an indication of the distribution of the Geebung within and around the conservation area as part of Figure 3.

A monitoring plan that will track Geebung health and distribution over time within the conservation area is also required. Ideally, control sites that are remote from the potential impacts affecting the conservation area should be set up to understand the background conditions that may be affecting the population.

It is noted that the current management of the conservation area is to avoid mining and clearing with no active management actions proposed. BCS suggests that the management plan be adaptive, and results of the monitoring plan suggested by BCS is used to advise whether further active management may be required.

Recommendations

4.1 Figure 3 should include the indicative distribution of the Clandulla Geebung within and around the conservation area.

4.2 A monitoring plan for the Clandulla Geebung, including suitable control sites, is required.

Cullen Valley Mine – Flora and Fauna Management Plan
Post Approval Review

Document: Flora and Fauna Management Plan
Revision: Version 2, dated 1 April 2022
Reviewed: Lincoln de Haas (April 2022)

Site Water Management Plan* - DA 200-5-2003 - *Schedule 4, Condition 30	**Satisfactory (Yes/No/Partial)**	**Comment**	**Action Required**	**Proponent Response**
Within 12 months of the date of this consent, the Applicant shall prepare, and then implement, a Flora and Fauna Management Plan for the development, in consultation with DPI, and to the satisfaction of the Director-General. This plan must include a:				
(a) Compensatory Habitat Plan;	Yes	See below	N/A	
(b) Vegetation Clearance Protocol;	Yes	See below	N/A	
(c) Weed Management Strategy	Yes	See below	N/A	
(d) Ecological Monitoring Program	Yes	See below	N/A	
(e) description of who would be responsible for monitoring, reviewing, and implementing the plan.	Yes	- Section 7 – Table 4 lists actions and personnel responsible for implementing actions under the plan	N/A	
Site Water Management Plan* - DA 200-5-2003 - *Schedule 4, Condition 31	**Satisfactory (Yes/No/Partial)**	**Comment**	**Action Required**	
The Compensatory Habitat Plan shall:				
(a) describe the immediate and long-term compensatory habitat proposal, and demonstrate how this proposal would be integrated with the proposed rehabilitation of the site and surrounding areas of remnant vegetation;	Yes	- Section 2.1 and 2.2 – Describes Compensatory Habitat and how it will be implemented for the site	N/A	
(b) identify strategies to protect areas excluded from open cut mining from disturbance during mining operations;	Yes	- Section 2.2.3 – Describes management actions (under sections: access and identification, maintenance, weed management controls, feral	N/A	

Document: Flora and Fauna Management Plan
Revision: Version 2, dated 1 April 2022
Reviewed: Lincoln de Haas (April 2022)

		animal controls and mine activities) to minimise disturbances - 'However, management techniques will be implemented to improve the existing quality of the CHA, where practical.'		
(c) identify options for the permanent protection of areas of compensatory habitat;	No	- Section 2.2? - Very unclear as to what options are for permanent protection are, if they are included at all	Clearly state what options for permanent protection are	Section 2.2.5 has been updated to identify two options available for the permanent protection of the CHAs.
(d) provide baseline data on the existing flora and fauna in the proposed compensatory habitat areas;	Yes	- Section 2.3.2 – 'In order to determine the success or otherwise of management practices covering the CHA, survey data can be compared through time, using the results from the EIS (IEC, 2004) as baseline information'	N/A	
(e) describe how the compensatory habitat proposal would be implemented; and	Partial/No	- Section 2.3.2 - 'However, management techniques will be implemented to improve the existing quality of the CHA, where practical.' - Section 2.3.1 – States annual review will determine how changes to Compensatory Habitat proposal will be implemented	No clear triggers or plans as to how the proposal is to be implemented	Section 2.2.3 provides performance and completion criteria which will be subject of the annual monitoring and reporting as described within Section 2.3.

Document: Flora and Fauna Management Plan
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Reviewed: Lincoln de Haas (April 2022)

(f) set completion criteria for the compensatory habitat proposal.	No	- Section 2.3? - No set completion criteria stated in document	Please detail the completion criteria for the compensatory habitat.	
Site Water Management Plan* - DA 200-5-2003 - *Schedule 4, Condition 32	**Satisfactory (Yes/No/Partial)**	**Comment**	**Action Required**	
The Vegetation Clearance Protocol shall include:				
(a) plans showing the vegetation communities in the area, highlighting important fauna habitat areas and threatened species locations; the areas to be cleared; and the proposed clearing program;	Partial/No	- Figure 3 – Delineates vegetation communities in the area. Provides nest box location. Disturbance area highlighted - Does not highlight any fauna habitat areas and threatened species locations. Clearing program not defined on plans	Include missing details in already submitted figures or create a new figure.	No clearing program is proposed for the proposed recommencement of mining operations. Figure 4 has been included to illustrate threatened flora and fauna locations from recent monitoring.
(b) procedures for progressive vegetation clearing and soil management;	Yes	- Section 3.1 – Lists measures for vegetation clearing. - Section 3.4.1 – Lists measures to manage topsoil from stripping activities	N/A?	
(c) strategies for minimising vegetation clearance within the development area and protection of vegetated areas outside that area;	Partial	- Section 3.2 – 'Loss of native vegetation will be kept to a minimum by only removing areas that are essential, and no alternative to their removal exists. To ensure that no unnecessary	Provide detailed measures to minimise vegetation clearance and protection of	Section 3.1 has been updated to include detailed measures for minimising vegetation clearance.

Document: Flora and Fauna Management Plan
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Reviewed: Lincoln de Haas (April 2022)

		clearing occurs, all machinery operators will be made aware of areas to remain undisturbed. Where necessary, these areas will be fenced to restrict vehicular access.' - No strategy to minimise vegetation clearance. It is only stated the vegetation clearance will be kept to a minimum - Only states that fencing will be used to protect vegetated areas outside development area	vegetated areas outside the development area	Section 3.2 has been updated to describe further measures to protect vegetated areas outside development area.
(d) identification of fauna management strategies;	Partial	- 3.1.2 – Controlled tree felling is the proposed fauna management strategy. - No other strategies included.	Please include additional measures for the identification of fauna so the project can minimise its impacts to fauna. Is vegetation clearing part of the proposed restarting works?	No previously undisturbed native vegetation is proposed to be cleared as a result of the recommencement of mining operations. Section 3.1.1 has been included to outline a tree felling procedure in regard to Fauna identification and tree felling methods.
(e) collection of seed from the local area;	Yes	- Section 3.1 – States the collection of seed will occur	N/A	

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(f) salvage and reuse of material from the site;	Yes	- Section 3.4 – States that topsoil material will be reused - Section 3.1.1 – 'Hollows from trees to be removed from open cut and attached to trees without hollows in the habitat compensation area. A controlled felling technique to be used in cases where hollows can't be removed'	N/A	
(g) a habitat tree management program, including fauna recovery procedures	Partial/No	- Section 3.1.1 – 'Hollows from trees to be removed from open cut and attached to trees without hollows in the habitat compensation area. A controlled felling technique to be used in cases where hollows can't be removed' - No details about a habitat tree management program - No details beyond tree hollow relocation as a fauna recovery procedure	Provide a Habitat Tree Management Program. Include further details on fauna recovery procedures. Will a suitably qualified ecologist be involved?	Sections 3.1.2 and 3.1.3 has been updated to describe further measures to monitor and manage the tree felling process to minimise the potential for impacts to fauna.
(h) potential for relocation of hollow bearing trees, compensatory management measures (such	Yes	- Section 3.1.1 – 'Hollows from trees to be removed from open cut and attached to trees without hollows in the habitat	N/A	

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Reviewed: Lincoln de Haas (April 2022)

as replacement of lost hollows with nesting boxes); and		compensation area. A controlled felling technique to be used in cases where hollows can't be removed'		
(i) where possible, strategies for re-using individuals or populations of any threatened plant species that would otherwise be destroyed by the development in rehabilitation works.	Yes	- Section 3.3 – Species management plans to be created in the event a threatened plant species identified in an area	N/A	
Site Water Management Plan* - DA 200-5-2003 - *Schedule 4, Condition 33	**Satisfactory (Yes/No/Partial)**	**Comment**	**Action Required**	
The Weed Management Strategy shall include:				
(a) weed identification;	Yes	- Section 4.4 – Table 2, identifies weeds found on site. Annual report will contain details on monitoring of weeds and control measures - Appendix C – Weed identification kit	N/A	
(b) weed eradication methods and protocols for the use of herbicides; and	Yes	- Section 4.5 – Describes isolation of contaminated material, prevention of dispersal and maintenance of ground cover as methods to eradicate weeds - Appendix D – Herbicide application protocol	N/A	
(c) methods to treat and re-use weed infested topsoil.	Yes	- Section 4.5.2 – Herbicide to be used on weed infested topsoil.	N/A	

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Reviewed: Lincoln de Haas (April 2022)

		The material is to be stockpiled separately and after two growing seasons of weed non-occurrence the material will be deemed suitable for rehabilitation purposes		
Site Water Management Plan* - DA 200-5-2003 - *Schedule 4, Condition 34	**Satisfactory (Yes/No/Partial)**	**Comment**	**Action Required**	
The Ecological Monitoring Program shall include:				
(a) a program to monitor revegetation of disturbance areas including: - visual monitoring to determine the need for maintenance and/or contingency measures; - monitoring of the quality of rehabilitation using a systems based approach through the assessment of landscape function, vegetation dynamics and habitat complexity; and	Yes	- Section 5.2 - Monthly visual monitoring for signs of erosion, weed infestation and areas requiring maintenance. - Section 5.2 - Annual monitoring for vegetation and landscape dynamics, and habitat complexity. Section 5.3- Summer month monitoring for habitat compensation areas to measure success of management practices -	N/A	
(b) a program to monitor the effectiveness of rehabilitation.	Yes	b) All section 5	N/A	
Other Comments				

APPENDIX B

SPECIES MANAGEMENT PLAN FOR CLANDULLA GEEBUNG

CULLEN VALLEY MINE

SPECIES MANAGEMENT PLAN FOR CLANDULLA GEEBUNG

Shoalhaven Coal Pty Ltd

4 December 2025

DOCUMENT CONTROL

Document Status

Version	Description	Reviewed by	Approved by	Date issued
01	Update of 2022 SMP	TH		04/12/2025

Document Details

Project Name	Cullen Valley Mine
Document Title	Species Management Plan For Clandulla Geebung
Client	Shoalhaven Coal Pty Ltd
Client Address	Castlereagh Highway, Cullen Bullen, NSW 2790
Author	Taresa Hateley, Environmental Superintendent, Castlereagh Coal
Author Address	Castlereagh Highway, Cullen Bullen
Our Reference	*20250412 Species Management Plan for Clandulla Geebung_Final*

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FIGURES

APPENDICES

1. INTRODUCTION

1.1 BACKGROUND

Cullen Valley Mine (CVM) is located near Cullen Bullen in the Western Coalfields of NSW, approximately 30 km north-west of Lithgow (see **Figure 1**). Underground mining commenced at CVM (formerly Tyldesley Colliery) around 1904 and continued up until the 1960s when the workings were abandoned. Early open cut operations were conducted on the site between 1948 and 1953.

The current development consent for CVM (DA 200-5-2003) was granted by the Department of Infrastructure and Planning (now the Department of Planning, Housing and Infrastructure (DPHI) in August 2004 for a period of 21 years. The conditions of DA 200-5-2003 were subsequently modified in December 2004 to allow for the transportation of product coal from CVM to domestic destinations other than Mount Piper Power Station (MPPS). The conceptual layout of the site as approved under DA 200-5-2003 is shown on **Figure 2**.

Mining of coal at CVM under DA 200-5-2003 commenced in May 2000 using open cut methods following a four-month construction phase and continued until the site was placed in Care and Maintenance in early 2013.

Shoalhaven Coal Pty Ltd (trading as Castlereagh Coal Pty Ltd (Castlereagh Coal)) purchased CVM in May 2015 and has operated the mine under Care and Maintenance since that time. Castlereagh Coal recommenced open cut coal mining operations at CVM in early 2022 within the existing disturbance area approved under DA 200-5-2003, in order to collect remnant coal reserves. The site returned to care and maintenance in July 2023. Under a new modification issued in August 2025, Castlereagh Coal intends to recover the remaining coal reserves, with a scope to recommence mining operations in 2026.

1.2 DOCUMENT PURPOSE & SCOPE

This Species Management Plan (SMP) has been developed to mitigate the impact of open cut mining on the habitat for the Clandulla Geebung (*Persoonia Marginata*) in the north-western extent of the approved open cut mining area of CVM (refer

Figure 3). Clandulla Geebung is listed as a vulnerable species under the *Biodiversity Conservation Act 2016* (BC Act) and the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act).

This SMP has been prepared to ensure the area identified as containing Clandulla Geebung at CVM is protected and not further impacted by CVM activities.

1.3 DOCUMENT OBJECTIVES

The objectives of the SMP are to describe the Clandulla Geebung, the local population identified within the CVM approval boundary and the management measures that will be implemented to minimise potential impacts to the species.

1.4 DOCUMENT STRUCTURE

The document is structured as follows:

- **Section 1** introduces CVM and outlines the purpose, scope and objectives of this SMP; and
- **Section 2** outlines the control measures implemented for the Clandulla Geebung Conservation Area (CGC Area) and management responsibilities for CVM personnel.

1.5 STAKEHOLDER ENGAGEMENT

Correspondence with regulatory agencies relating to this revision of the SMP is included as **Appendix A**.

1.6 ABBREVIATIONS

Table 1 SMP Abbreviations

Abbreviation	Meaning
BC Act	NSW *Biodiversity Conservation Act 2016*
CGC Area	Clandulla Geebung Conservation Area
CVM	Cullen Valley Mine
DA	Development Application
EPBC Act	Commonwealth *Environmental Protection and Biodiversity Conservation Act 1999*
DPHI	NSW Department of Planning, Housing and Infrastructure
EIS	Environmental Impact Statement
ha	hectare

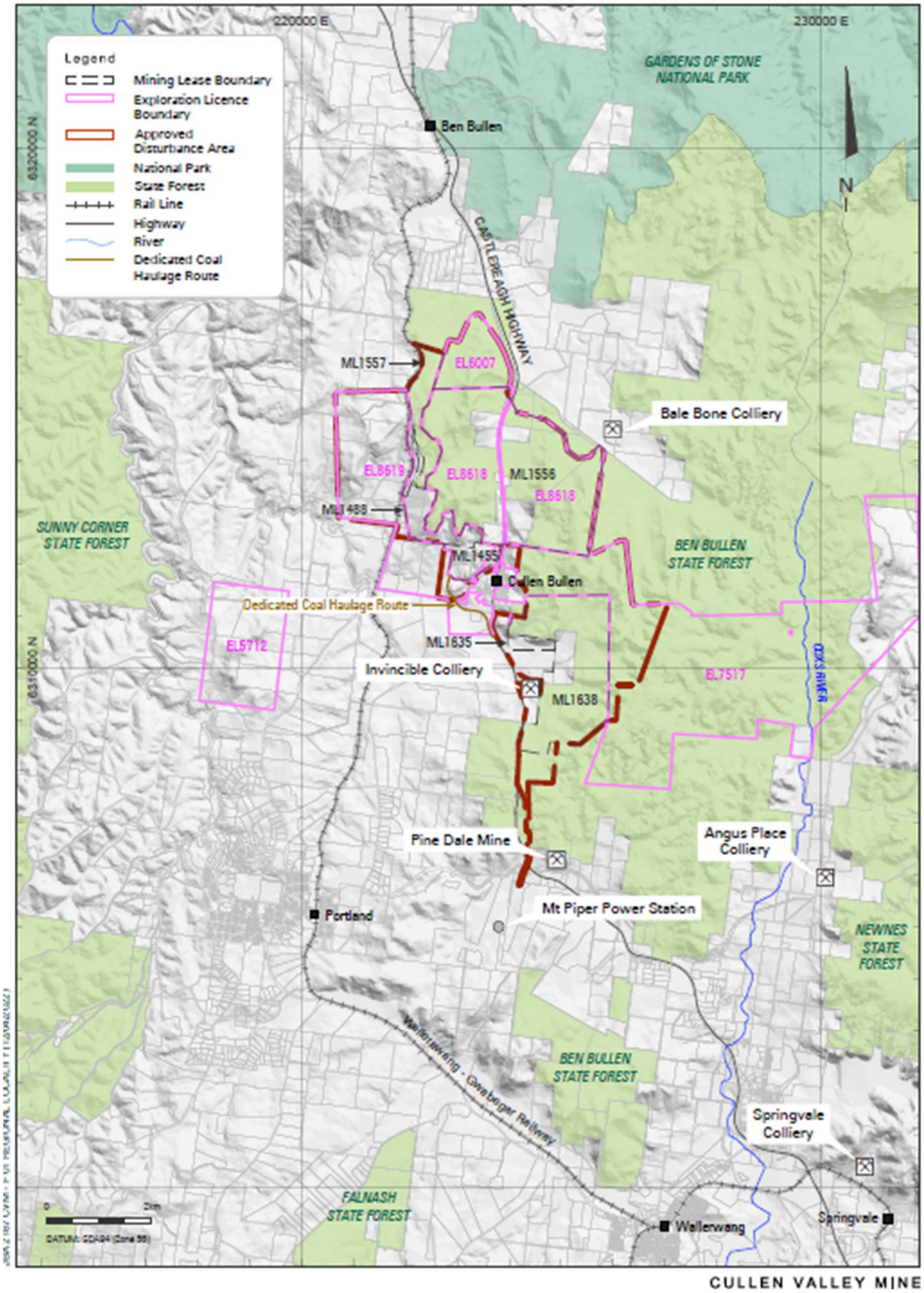


Figure 1 Regional Locality

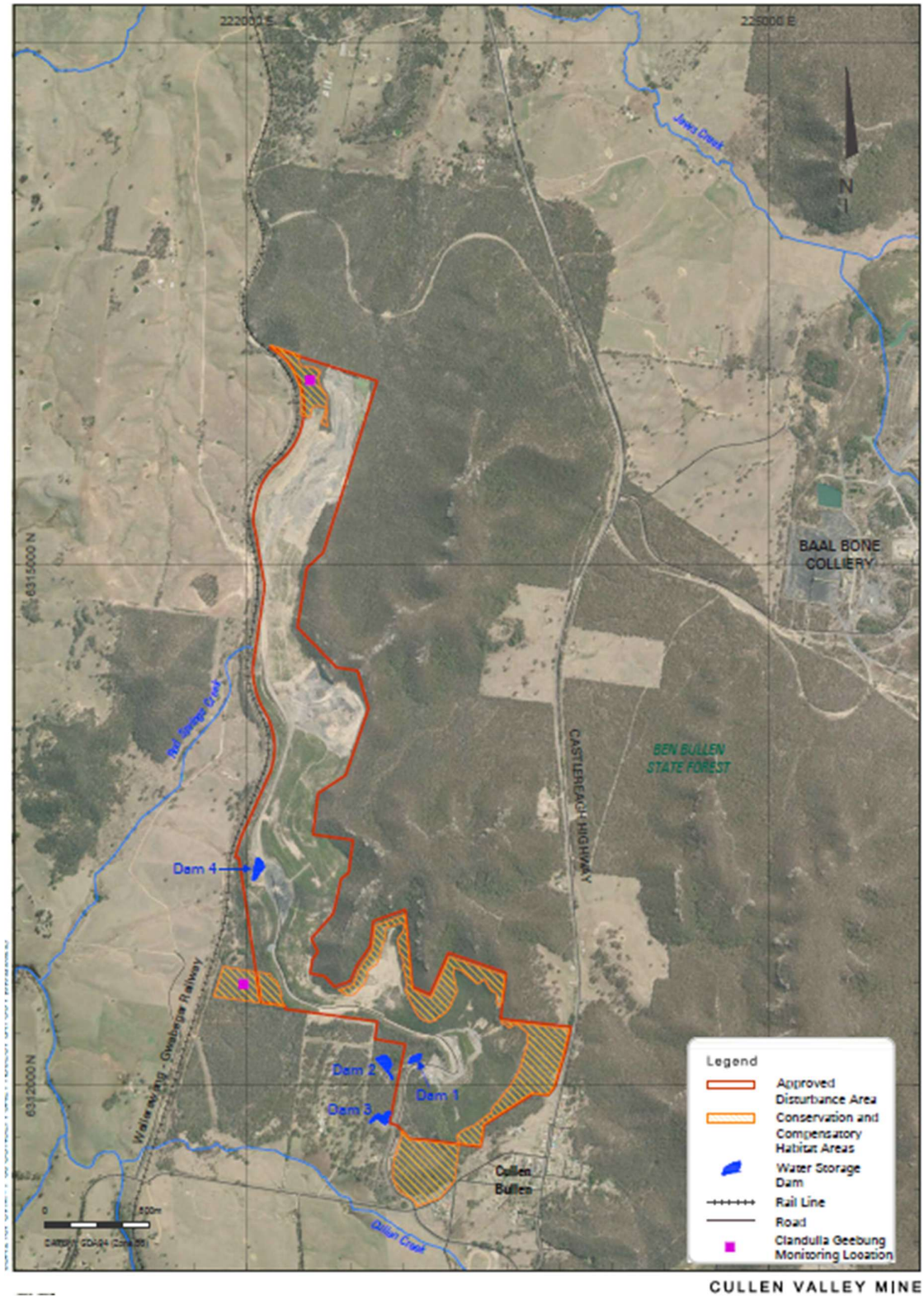


Figure 2 Conceptual Project Layout

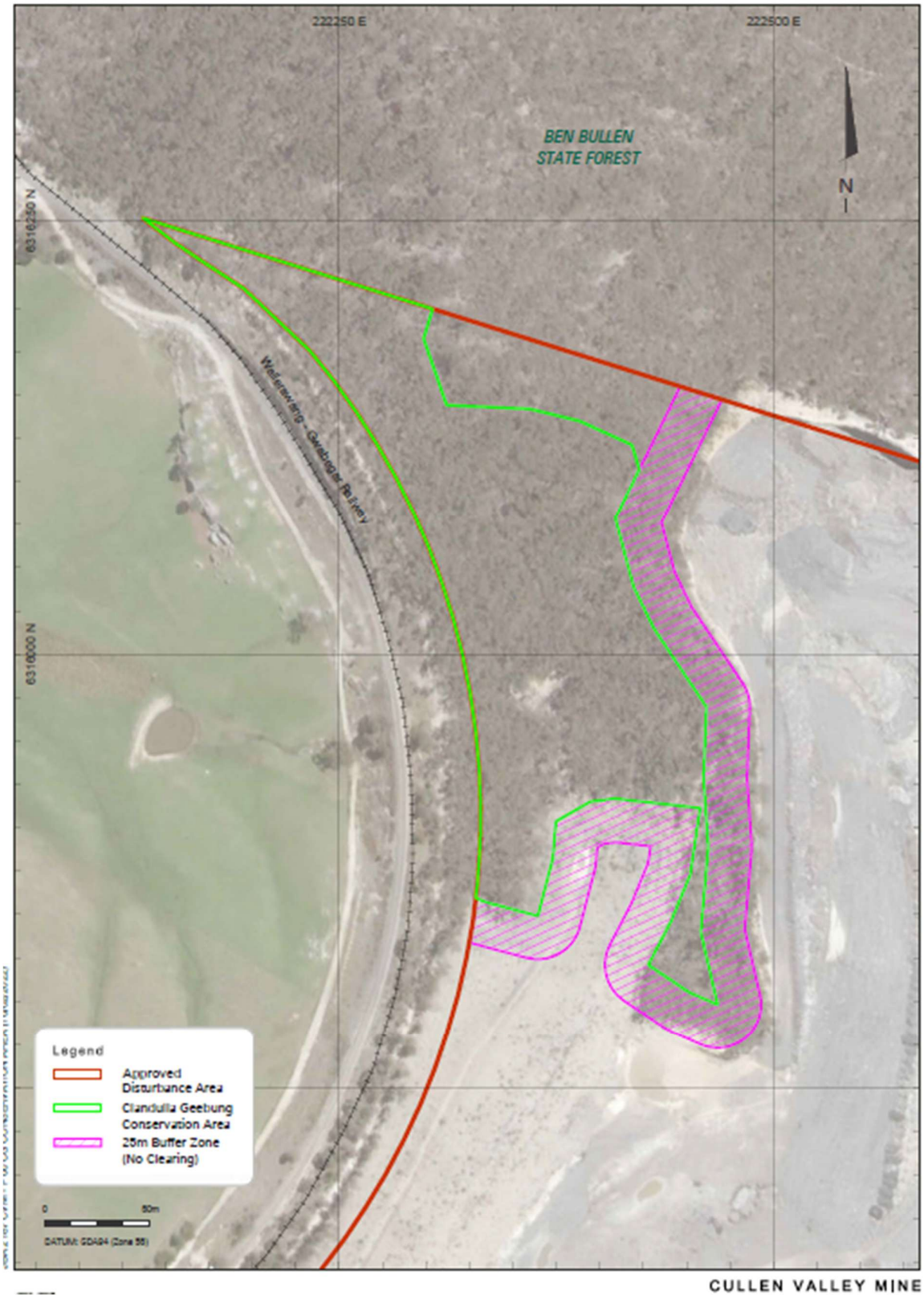


Figure 3 Clandulla Geebung Conservation Area

2. SPECIES MANAGEMENT PLAN

2.1 DESCRIPTION OF SPECIES & HABITAT

2.1.1 Species Description

The Clandulla Geebung is a spreading shrub that grows to 50 cm high and up to 1 m across. Young branches are hairy. Leaves are elliptic to obovate, 20 – 40 mm long and 6 – 23 mm wide, sparsely hairy when young and hairless when mature. Flowers are yellow with brownish hairs; have a densely hairy ovary; and occur on short stalks 2 – 7 mm long (see Error! Reference source not found.).

Figure 4 Clandulla Geebung at Cullen Valley Mine

2.1.2 Species Distribution

Error! Reference source not found. illustrates the sub-regions where the Clandulla Geebung species or community is known or predicted to occur as identified on the Office of Environment and Heritage website. Purple shaded region illustrates the sub-regions where this species is predicted to occur with the pink areas are the sub-regions where the species is known to occur. Error! Reference source not found. illustrates the sightings of the Clandulla Geebung within and surrounding the Cullen Valley Mine (in the north western portion of the Gardens of Stone State Conservation Area, to north west of Cullen Bullen) from the Office of Environment and Heritage website.

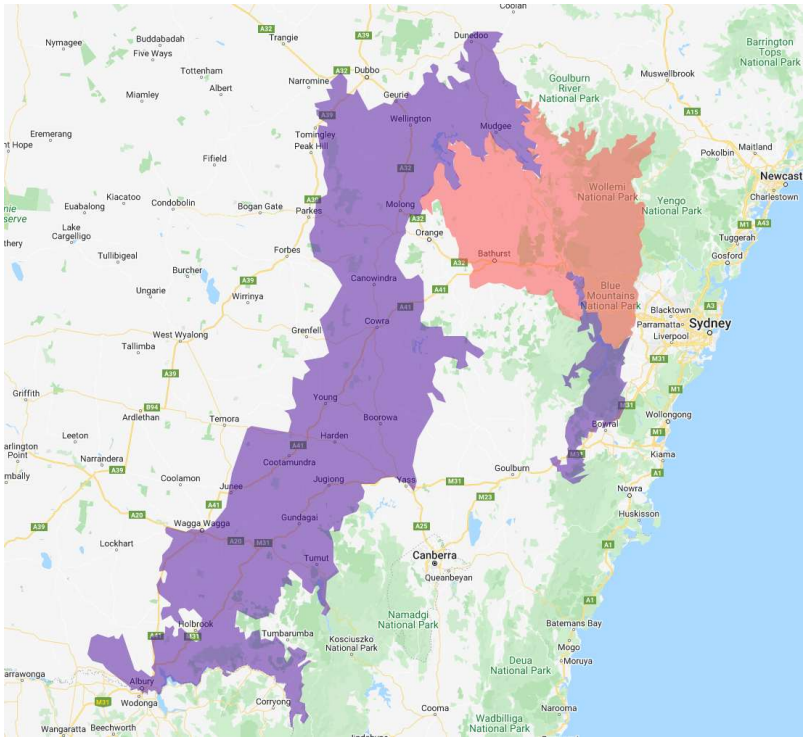


Figure 5 Predicted and Known Occurrence of Clandulla Geebung

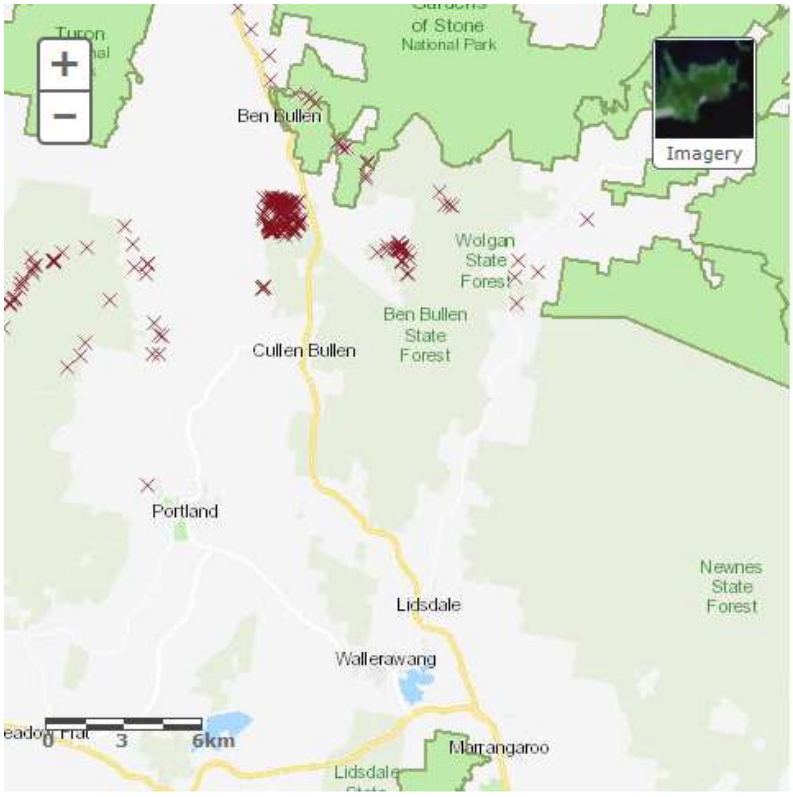


Figure 6 Predicted and Known Occurrence of Clandulla Geebung

The Clandulla Geebung is known from only four disjunctive locations on the Central Tablelands and Central Coast. The core of the species distribution is within Clandulla State Forest, located west of Kandos. Disjunctive populations occur; to the north at Dingo Creek and Mount Dangar within the Wollemi and Goulburn River National Parks; to the south within Gardens of Stone State Conservation Area, south-east of Capertee; and to the south-east at Devils Hole, north of Colo Heights within Parr State Recreation Area.

Targeted species surveys for the Clandulla Geebung were carried out on three separate occasions at CVM by two different suitably qualified ecologists in April and May 2011. The Conservation Area identified as containing Clandulla Geebung is shown in

Figure 3. The average density of the Clandulla Geebung within the mapped area was estimated at 466 individuals per hectare. The total area (including a portion of the adjacent Gardens of Stone State Conservation Area that was identified as containing Clandulla Geebung) was 38 hectares which contains an estimated 17,700 individual plants.

2.1.3 Habitat and Ecology

The Clandulla Geebung grows in dry sclerophyll forest and woodland communities on sandstone. The recorded flowering period varies and includes spring, summer and winter periods. The fruit is probably dispersed by large birds such as Currawongs and large mammals such as kangaroos and possums.

Fire response of adult plants varies with the species sometimes re-sprouting after fire and at other times being killed by fire. The plant has a persistent soil-stored seed bank and it appears to respond well to disturbance, with greater densities found along the edges of tracks and in areas disturbed by forestry activities.

The biology and life cycle of the species is not well known. Its life cycle appears to be particularly susceptible to activities which interfere with maturing of fruit and the survival of seed stored in the soil.

2.2 MITIGATION & IMPLEMENTATION

The primary mitigation measure to reduce the risk of disturbance is to avoid mining and clearing of the area where Clandulla Geebung has been identified (refer

Figure 3). In addition to this area, a 25m buffer zone where no clearing is planned has been adopted; the combined area will be known as the CGC Area. An additional 10m zone separating the open cut highwall crest from the buffer zone will be put in place and will contain:

- An earth bund with a minimum height of approximately 1.5m. The bund will be constructed from the 'mining' side of the bund and will act as a barrier to light vehicles;
- A wire fence with signs delineating the CGC Area will be installed along the internal 'mining' boundary;
- A V notch drain for drainage control will be constructed on the 'mining' side of the bund. The V notch drain will:
  - Drain to the northern area sump;
  - Direct water into the existing dirty water drainage system established to the south of the CBC Area;
  - Be a minimum of 0.5m deep and be constructed so that water does not pond or risk erosion to the bund; and
  - Include silt fences and drainage control structures during construction and maintenance works, as mitigation against these hazards.
- The highwall crest will be located a further 5m towards the 'mining' side of the V notch drain. The crest of the highwall will:

- Be excavated via dozer ripping and trimmed/battered with an excavator to mitigate the risk of fretting; and
- Include design considerations if future blast events are required due to the sensitive nature of the CGC Area.

The CGC Area refers to the distribution area located on ML 1557. The distribution area of the Clandulla Geebung outside ML 1557 is situated in Gardens of Stone State Conservation Area and is therefore outside the control and management responsibility of Castlereagh Coal. Castlereagh Coal will assist NSW National Parks and Wildlife Service in the management of the species, as required.

2.3 INSPECTION, TRAINING & REVIEW

2.3.1 Inspections & Monitoring

The CVM Environment Officer is responsible for this SMP. The CVM Environment Officer is also responsible for the annual monitoring of the Clandulla Geebung population which occurs within the CGC Area. This monitoring is conducted in conjunction with the annual biodiversity monitoring at the CVM site, including the monitoring of the Clandulla Geenbung population which occurs within a Compensatory Habitat Area (CHA) (adjacent to Monitoring Site 8), which is located to the south west of the CVM site. The data recorded from both sites is monitored over time to identify natural trends (i.e. given they are not anticipated to be affected by CVM activities) in these populations over time.

Monitoring at both sites is conducted by mapping the distribution of individual plants at a single monitoring point at each site (i.e. CGC Area and the Cullen Valley CHA, proximate to CH8). All Clandulla Geebung plants within a 20 m radius of the metal star picket located at each site are recorded with a handheld GPS. The bearing (º) and distance (m) from the star-picket is then used to map the location of each individual plant. Bearings are measured using a compass and distance was determined using a tape measure attached to the star picket. For all plants identified within the survey area, the following information is recorded:

- Plant number;
- Distance of the plant to the centre star-picket;
- Bearing of the plant to the centre star-picket;
- The diameter of the plant (cm);
- Presence or absence of flowers; and
- Presence or absence of fruit.

Additionally, a photo point is taken of the site to assess any major changes in the overall vegetation structure within the two areas. Reporting of the results of this monitoring is provided within the Annual Review.

The implementation of the mitigating measures outlined in the previous section is the responsibility of the Operations Manager.

Mining Supervisors are responsible for day-to-day supervision of all persons on the site. This includes the prevention of access into the CGC Area by CVM personnel. This shall be done via regular field checks, carried out in accordance with the Inspection Program as part of the Castlereagh Coal Health and Safety Management System.

All other CVM personnel shall be excluded from the CGC Area, unless carrying out maintenance and monitoring actions undertaken in accordance with this SMP, as directed by the CVM Environment Officer.

2.3.2 Training

All personnel working on the CVM site shall be trained in the particulars of this Management Plan. This training is to be carried out via the Tool Box Talk program to raise awareness of these requirements.

All visitors to the site adjacent to the CGC Area shall be prevented from encroaching into this area.

2.3.3 Ongoing Review

This SMP is subject to a regular audit and review as to its effect and control upon the preservation of the CGC Area. Details of any management actions undertaken for the CGC Area will be summarised in the CVM Annual Review.

Should the operation change substantially due to the introduction of technology or mining method that will have a potentially adverse impact on the CGC Area, then a full risk review will be conducted and amendments to this SMP made accordingly. Any changes to this SMP will be undertaken in consultation with the Environment, Energy and Science Group within DPHI.

APPENDIX A

STAKEHOLDER ENGAGEMENT

Our ref: DOC22/178119

Cullen Valley Coal - Management Plans

Thank you for your e-mail dated 15 February 2022 to the Biodiversity, Conservation and Science Directorate (BCS) of the Department of Planning and Environment inviting comments on the Flora and Fauna Management Plan (FFMP) and Species Management Plan (SMP) for Cullen Valley Coal.

BCS note that the SMP is a relatively short document and suggest that it may be best provided as an Appendix to the FFMP and may benefit from a title change to Clandulla Geebung Species Management Plan. A change to the document title would provide clarity to external readers that it is specific to one species.

Recommendations relating to the SMP and FFMP are provided in **Attachment A** and BCS's detailed comments are provided in **Attachment B**.

If you require any further information regarding this matter, please contact David Geering, Senior Conservation Planning Officer, via david.geering@environment.nsw.gov.au or (02) 6883 5335.

Yours sincerely

Samantha Wynn

Samantha Wynn
Senior Team Leader Planning, North West
Biodiversity, Conservation and Science Directorate

9 March 2022

Enclosure: Attachments A and B

BCS's recommendations

Cullen Valley Mine Flora and Fauna Management Plan

1.1 A plot-based floristic vegetation survey based on a 20 m × 20 m plot be implemented.

1.2 Fauna surveys should not be restricted to threatened species. BCS recommends that the methodologies provided in the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* be adopted.

2.1 Information about the weed species identified on site and their status is required.

2.2 A monitoring plan containing performance criteria and completion criteria to quantitatively measure success along with appropriate trigger points for corrective action should be developed.

3.1 The ecological monitoring program should be included in the Flora and Fauna Management Plan.

4.1 Figure 3 should include the indictive distribution of the Clandulla Geebung within and around the conservation area.

4.2 A monitoring plan for the Clandulla Geebung, including suitable control sites, is required.

BCS's detailed comments

Cullen Valley Mine - Flora and Fauna Management Plan

1. Flora and fauna monitoring need to be rigorous to fully determine and track habitat values

Environmental monitoring usually relates to what effect (if any) management strategies are having, or will have, on the condition of a natural area, a species or an ecological community.

An effective monitoring program can:

- analyse change over time, such as comparison with baseline or earlier data.
- monitor effects from a particular management action, or measure effects from a specific threat.
- learn about ecological patterns and processes.
- fill in gaps about biological knowledge
- engage stakeholders on a local, state or national level, and help government and the public make informed decisions.

When undertaking monitoring, it is very important that standard techniques or procedures are used, repeated, and documented. The collection of monitoring data allows trends over time to be assessed and analysed. If the data are not collected using standard, repeatable measures, it is often not possible to compare them.

When designing a monitoring project, it is critical that the question proposed to be answered by monitoring is clearly defined. The monitoring procedures need to be tailored to the species, site or community of interest. All existing research and knowledge about the site or species should be taken into consideration.

It is stated in Section 2.3.1 of the Flora and Fauna Management Plan (FFMP) that "*The objective of the monitoring is to determine whether the management techniques being employed in the area are successful in providing consistent or improved habitat for native flora and fauna*". The survey methodologies outlined are not capable of achieving this objective. More rigorous survey methodologies quantifying vegetation condition and the presence and abundance of a range of fauna are required.

BSC recommends that a plot-based floristic vegetation survey based on a 20 m × 20 m plot be used (refer Section 4.2.1 of the Biodiversity Assessment Method 2020 https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Biodiversity/biodiversity-assessment-method-2020-200438.pdf).

Fauna surveys should not be restricted to threatened species. However, BCS recommends that the methodologies provided in the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* https://www.environment.nsw.gov.au/-/media/OEH/Corporate-Site/Documents/Animals-and-plants/Threatened-species/draft-threatened-biodiversity-survey-guide.pdf will provide a solid basis for monitoring fauna.

Recommendations

1.1 A plot-based floristic vegetation survey based on a 20 m × 20 m plot be implemented.

1.2 Fauna surveys should not be restricted to threatened species. BCS recommends that the methodologies provided in the *Threatened Biodiversity Survey and Assessment: Guidelines for Developments and Activities* be adopted.

2. Performance and completion criteria, and associate triggers, are required for targeted weed management

The FFMP includes a Weed Identification Kit as Appendix B. While this kit allocates species to a weed control category and indicates the required action should the weed be identified, there is no indication as to whether these species have been identified on site. Weeds known to occur on site should be identified in the plan and individual strategies outlined. It is important to consider the impact of the weeds, establish whether different outcomes are needed for each weed and to determine priorities to manage the weeds.

Other than indicating that regular inspections will be carried out, no formal monitoring plan is presented. Monitoring should aim to detect any significant changes in the species' weed risk, specifically the spread of the species and review any perceived changes in weed abundance.

Successful management plans include tailored, quantitative performance measures and targets, completion criteria monitoring and trigger points for corrective action which adhere to the SMART principles (specific, measurable, achievable, realistic, timely). Targets within the plan must be measurable and expressed in a manner that assists in the evaluation of progress toward the strategic goals that define the completion criteria.

Recommendations

2.1 Information about the weed species identified on site and their status is required.

2.2 A monitoring plan containing performance criteria and completion criteria to quantitatively measure success along with appropriate trigger points for corrective action should be developed.

3. The Ecological Monitoring Program should form an integral part of and be included in the Flora and Fauna Management Plan

Section 5 of the FFMP indicates that the ecological monitoring program is described in the Cullen Valley Mine Environmental Management Plan (EMP). The ecological monitoring program should form an integral part of the FFMP and should be included in the FFMP to ensure it is a stand-alone document. As the EMP is not available for review the ecological monitoring program has not been assessed.

Recommendation

3.1 The ecological monitoring program should be included in the Flora and Fauna Management Plan.

Cullen Valley Mine – Clandulla Geebung Species Management Plan

4. On-going monitoring is required of the Geebung population within the conservation area, the results of which should guide future management actions

The SMP provides an overview of the ecology of the Clandulla Geebung *Persoonia marginata* but contains little other information that is useful in meeting the stated objectives of the management plan.

The plan would be improved by including an indication of the distribution of the Geebung within and around the conservation area as part of Figure 3.

A monitoring plan that will track Geebung health and distribution over time within the conservation area is also required. Ideally, control sites that are remote from the potential impacts affecting the conservation area should be set up to understand the background conditions that may be affecting the population.

It is noted that the current management of the conservation area is to avoid mining and clearing with no active management actions proposed. BCS suggests that the management plan be adaptive, and results of the monitoring plan suggested by BCS is used to advise whether further active management may be required.

Recommendations

4.1 Figure 3 should include the indicative distribution of the Clandulla Geebung within and around the conservation area.

4.2 A monitoring plan for the Clandulla Geebung, including suitable control sites, is required.

APPENDIX C

CVM WEED IDENTIFICATION KIT

African boxthorn

Lycium ferocissimum

Description:

Shrub up to 6 m tall with many branches. Leaves are fleshy, elliptic and up to 4 cm long. Flowers are single or in pairs, white with purplish center and app. 1 cm diameter with 5 petals. Flowers mainly in summer months. Red berry when ripe.

Weed Category:

African boxthorn (*Lycium ferocissimum*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

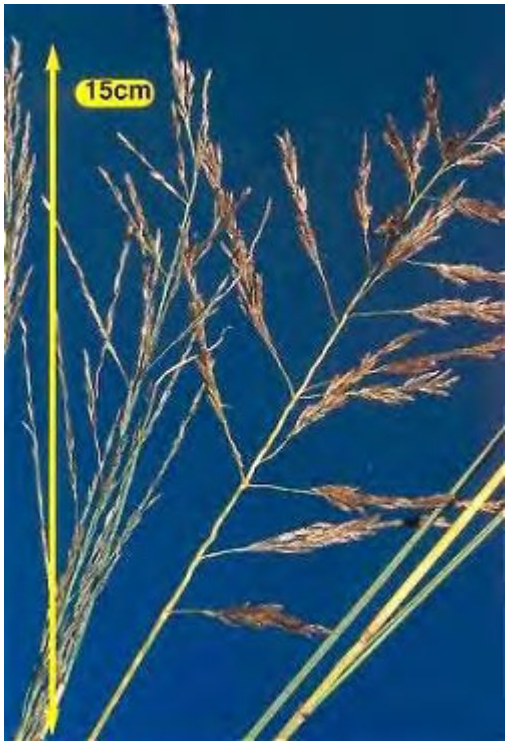
Note: Photographs taken from National Weeds Strategy.

African love grass

Eragrostis curvula

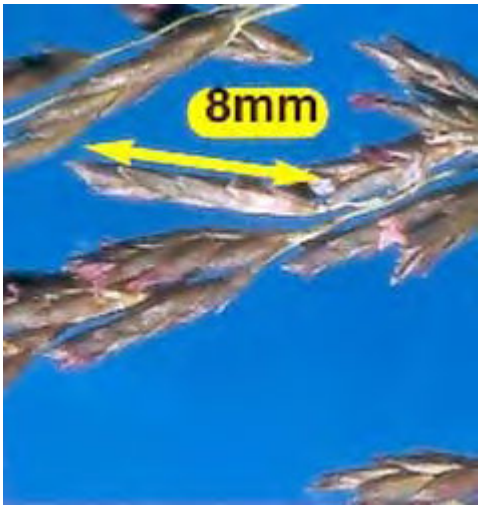
Description:

Tufted grass up to 1.5 m tall. Leaves are hairless or with soft hairs having wart-like bases, leaf blade app. 3 mm wide. Seed heads are up to 30 cm long, and the seeds are cream to brown colour and app. 1 mm long. The grass can be distinguished by erect, open or compact seedhead, that has a lead-grey or grey-green appearance (see photo) and leaf tips that are often curly.



Weed Category:

African love grass (*Eragrostis curvula*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W3.



Required Action:

The weed must be prevented from spreading and its numbers and distribution reduced.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Alligator Weed

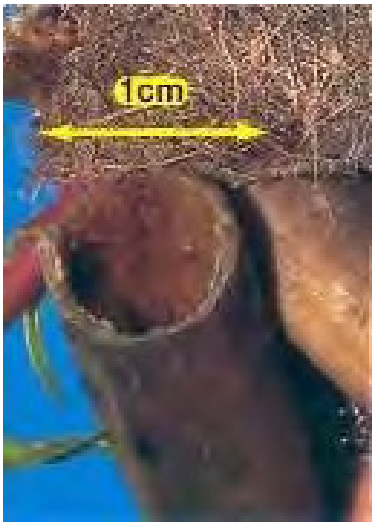
Alternanthera philoxeroides

Description:

This is a water plant, and only potential for growth on site is in dams holding water. Can form dens mats in or around water. Distinguished by white flower heads that are papery to touch, opposite leaves and hollow stems.

Weed Category:

Alligator weed (*Alternanthera philoxeroides*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.



Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Burrs

Xanthium spp.

Description:

Includes Bathurst, Noogoora, Californian and Cockle Burrs. Annual herbs, from 1 m tall (Bathurst) to 2.5 m (Noogoora). Often with sharp spines over entire plant and on burrs.

Weed Category:

Bathurst/Noogoora/Californian/Cockle burrs (*Xanthium spp.*) are declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Noogoora Burr

Bathurst Burr

Bathurst Burr seedling

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

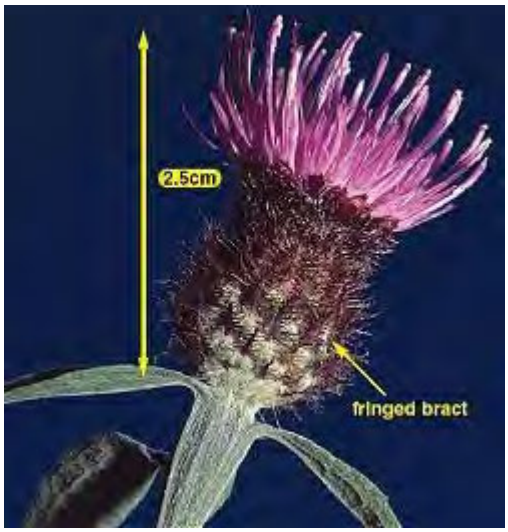
Note: Photographs taken from National Weeds Strategy.

Black Knapweed

Centaurea nigra

Description:

Black Knapweed is an erect perennial herb growing up to 1m tall. Basal leaves are entire to lobed, 6–30 cm long, 0.5–3.5 cm wide, narrowed at base, withering in mature plants. Lower stem leaves are entire to toothed 1–8 cm long, 0.2–1 cm wide. Upper leaves smaller, entire to sparsely toothed, oblong to lanceolate. Flowerheads are mostly 12–18 mm wide.



Weed Category:

Black knapweed (*Centaurea nigra*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.

Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Blackberry

Rubus fruticosus

Description:

Blackberry forms dense thickets up to 2 m high. They have short, sharp thorns and shed most of their leaves in winter. Flowers are white, fruit is red ripening to black.

Weed Category:

Blackberry (*Rubus fruticosus*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W3.

Required Action:

The weed must be prevented from spreading and its numbers and distribution reduced.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Broomrape

Orobanche spp.

Description:

Broomrape is a parasitic plant, growing off other broadleaf plants. It grows up to 20 cm tall with several branches from ground level. Stems have dense, soft woolly hairs, leaves are a few brown scales, flowers are blue.

Weed Category:

Broomrape (*Orobanche spp.*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1

Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Cabomba

Cabomba spp.

Description:

Cabomba is a water plant. The only potential location around Cullen Valley Mine would be in permanent dams. The plant is submerged, with stems up to 5 m long and leaves floating on the water surface. It flowers most of the year with white to pale yellow flowers.

Weed Category:

Cabomba (*Cabomba spp.*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W4g.

Required Action:

The weed must not be sold, propagated or knowingly distributed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Columbus Grass

Sorghum x almum

Description:

Vigorous, short-lived, coarse, perennial, summer growing grass. Spreads from seed and weak rhizomes. Erect, stout stems. Leaves dark green to 50 cm long and 2cm wide. Produces a drooping red-brown pyramid-like head.

Weed Category:

Columbus Grass (*Sorghum x almum*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Dodder

Cuscuta campestris

Description:

Dodder are parasitic plants of broadleaf plants. It has fine twining stems without leaves. Flowers are white, cream or pink, bell shaped, and 3-4 mm in diameter.

Weed Category:

Dodder (*Cuscuta campestris*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Gorse

Ulex europaeus

Description:

Shrub up to 2.5m tall with many branches. The plant is distinguished by spines instead of leaves on mature plants. Flowers may be produced all years round, but mainly late winter to spring.

Weed Category:

Gorse (*Ulex europaeus*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Green cestrum

Cestrum parqui

Description:

Woody perennial shrub up to 3 m high. Leaves are up to 12 cm long, producing an unpleasant odor when crushed. New shoots have minute hairs. Flowers are yellow, fruit is black. Flowers have an unpleasant odor by day and sweet smelling by night.

Weed Category:

Green cestrum (*Cestrum parqui*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Harrisia cactus

Harrisia spp.

Description:

Shrub up to 6 m tall with many branches. Leaves are fleshy, elliptic and up to 4 cm long. Flowers are single or in pairs, white with purplish center and app. 1 cm diameter with 5 petals. Flowers mainly in summer months. Red berry when ripe.

Weed Category:

Harrisia cactus (*Harrisia spp.*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W4f.

Required Action:

The weed must not be sold, propagated or knowingly distributed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Hawkweed

Hieracium spp.

Description:

Hawkweed is a perennial herb with flower stems to 15 (rarely to 40) cm high. Leaves mostly basal up to 15 cm long, both surfaces with coarse stiff long hairs. Flowerheads orange on stalk with long spreading hairs.

Weed Category:

Hawkweed (*Hieracium spp.*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.

Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Hemlock

Conium maculatum

Description:

An erect plant which can reach a height of 2.75 m but normally averages 1-1.5 m. Hemlock has hollow, pale green stems with purplish patches. The plant also has large, pale green leaves, similar to carrot leaves. Broad flower heads are produced in summer, which comprise hundreds of tiny white flowers.

Weed Category:

Hemlock (*Conium maculatum*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

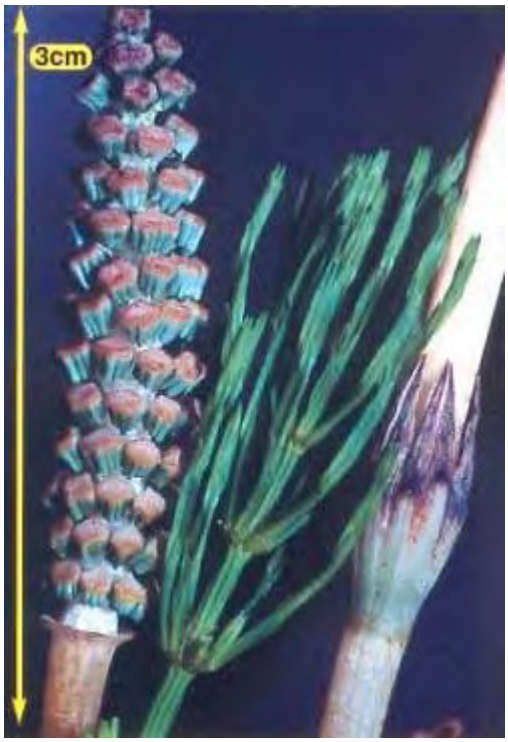
Note: Photographs taken from National Weeds Strategy.

Horsetail

Equisetum spp.

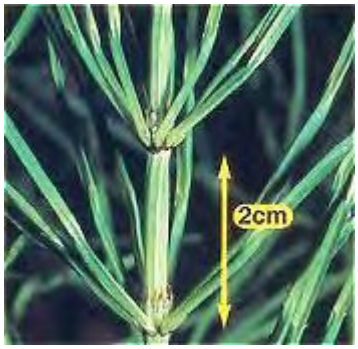
Description:

Perennial fern ally with erect or sprawling stems to 60 cm high. Vegetative stems branched, green, grooved, main stems 1–5 mm wide, lateral branches in whorls of 4–18 produced at joints; main stem arising from extensive and hairy rhizomes that penetrate soil to more than 1 meter.



Weed Category:

Horsetail (*Equisetum spp.*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.



Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Johnson Grass

Sorghum halepense

Description:

Erect summer perennial to 1.5 m high. Creeping stems (rhizomes). Leaves broad, ribbed, hairless. Flower heads reddish, open, finely hairy. Seeds tear shaped, 3mm long, reddish brown.

Weed Category:

Johnson Grass (*Sorghum halepense*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Karroo Thorn

Acacia karroo

Description:

Karroo thorn is a shrub or tree which grows up to 12 m high. It has paired thorns, usually up to 100 mm long although occasionally as long as 250 mm. The tree is usually evergreen but loses its leaves in droughts or in very cold or dry localities.

Weed Category:

Karroo Thorn (*Acacia karroo*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.

Required Action:

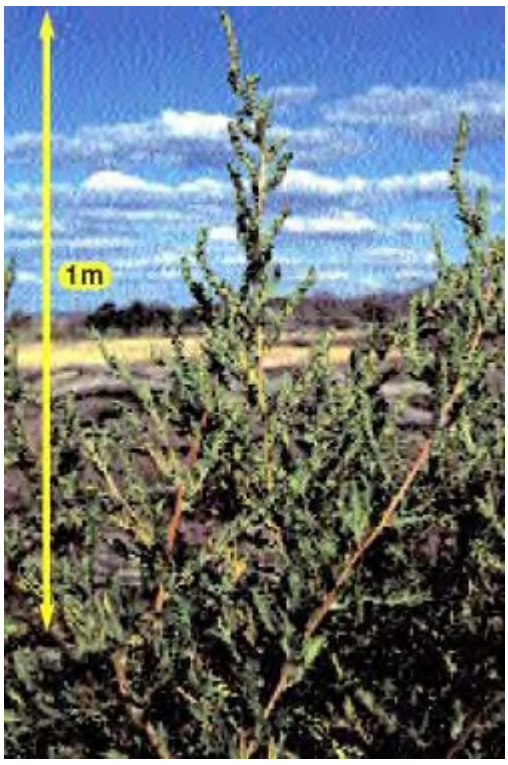
The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Kochia

Kochia scoparia

Description:



Kochia is a very variable plant. Some specimens grow no taller than 30cm, are single stemmed and produce a small number of seeds. Other specimens grow to 2m tall and wide and produce tens of thousands of seeds. Stems and leaves are generally a mid green colour, however they may also be yellow, crimson red or brown (see image below). The leaves are flat and elongated, growing up to 50mm long and 8mm wide. The flowers are small and inconspicuous, being the same colour as the leaves.

Weed Category:

Kochia (*Kochia scoparia*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.

Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Lagarosiphon

Lagarosiphon major

Description:

Lagarosiphon is a fresh water plant, and would only be found on site in permanent dams. Stems are branched and can be many meters in length. Leaf margins are minutely toothed. Leaves are crowded towards the end of the branches, but well spaced at the base.

Weed Category:

Lagarosiphon (*Lagarosiphon major*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.

Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Longstyle Feather Grass

Pennisetum villosum

Description:

Feather grass forms a short dense tussock up to 90 cm tall, but is usually 50-70 cm tall. The leaves are quite narrow, 2-6 mm wide and up to 30 cm long, and are distinctly channelled. The plant produces a white/cream feathery flowerhead, which can be up to 12 cm long and the individual seeds are very fluffy and easily moved around by wind.

Weed Category:

Longstyle Feather Grass (*Pennisetum villosum*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

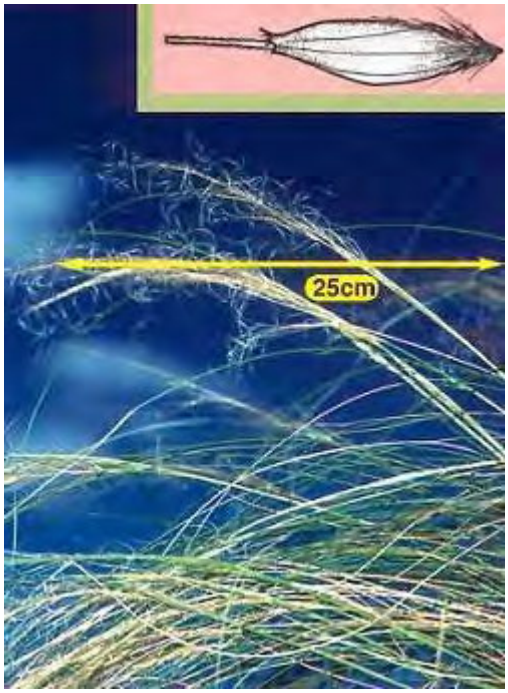
Note: Photographs taken from National Weeds Strategy.

Mexican Feather Grass

Nassella tenuissima syn Stipa tenuissima

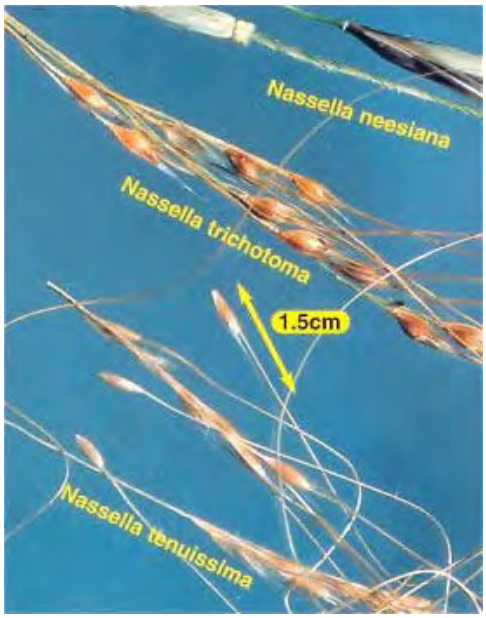
Description:

Perennial grass forming dense tussocks to 0.8 m high. Leaf blades to 0.5 mm wide, tightly rolled and with small serrations that can be felt when fingers are moved downward along the blade.



Weed Category:

Mexican Feather Grass (*Nassella tenuissima syn Stipa tenuissima*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.



Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Miconia

Miconia spp.

Description:

It is easily distinguished by its large leaves, which reach up to three feet long, have three bold veins, and are dark green above and purple beneath. This tree reaches 20-50 feet in height.

Weed Category:

Miconia (*Miconia*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.

Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Nodding Thistle

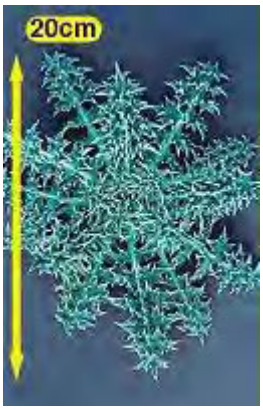
Carduus nutans

Description:

Erect, mostly biennial, thistle with flowering stems to 1.7 (rarely to 2.5) m high. Leaves variable, basal leaves in a rosette, green and often with white mid veins, to 50 cm long, to 10 cm wide. Distinguished by spiny winged stems and leaves.

Weed Category:

Nodding Thistle (*Carduus nutans*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W3.



Required Action:

The weed must be prevented from spreading and its numbers and distribution reduced.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Pampas Grass

Cortaderia spp.

Description:

Tussocky perennial to 4.5 m tall. Leaves to about 2 m long with a prominent midrib and sharp edges of forward facing short teeth. A rim of hairs at the base of the leaf blade (ligule) up to 3 mm long. A large pink to pale purple (fading with age) plume-like seedhead to 0.9 m long.

Weed Category:

Pampas Grass (*Cortaderia spp.*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Parthenium Weed

Parthenium hysterophorus

Description:

Reaching a possible height of two metres, this herb with a deep tap root and erect stem can develop a woody stem and many branches on maturity. Parthenium weed has pale green leaves with soft fine hairs. The flowers are small, creamy white. Each contain 4 to 5 black seeds.

Weed Category:

Parthenium weed (*Parthenium hysterophorus)* is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.

Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

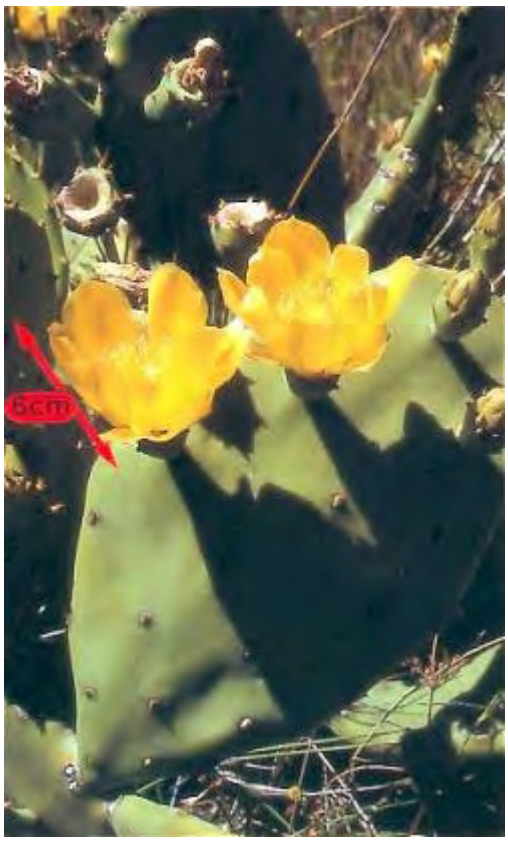
Note: Photographs taken from National Weeds Strategy.

Prickly Pears

Opuntia spp.

Description:

A succulent perennial up to 7 m. The stems are fleshy, jointed into pads, generally flat, some cylindrical. The leaves are mostly reduced to spines surrounded by fine hairs in clumps on the pad surface. It has large, brightly coloured flowers on the pad margins. The fruit is usually fleshy, edible, ruby red to yellow.



Weed Category:

Prickly Pears (*Opuntia spp.*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W4f.

Required Action:

The weed must not be sold, propagated or knowingly distributed. Any biological control or other control program directed by the local control authority must be implemented.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Privet

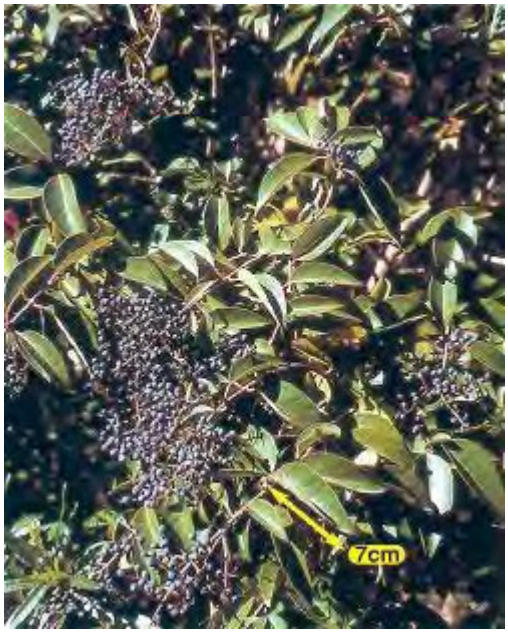
Ligustrum lucidum / Ligustrum sinense

Description:

There are 2 types, narrowleaf and broadleaf. Privet usually occurs as a large shrub but broadleaf privet can become a substantial tree in favourable situations. The leaves are oval-shaped, soft, not strong smelling when crushed and are opposite to each other along the stem. Small-leaf privet has yellow-green to green leaves up to 7 cm long, usually with wavy margins, while broadleaf privet has dark green leaves up to 12 cm long which always have smooth margins. Privet flowers are small and white in large sprays on the ends of or along the branches.

Weed Category:

Privet (*Ligustrum lucidum / Ligustrum sinense*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W4b.



Required Action:

The weed must not be sold, propagated or knowingly distributed and any existing weed must be prevented from flowering and fruiting.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Rhus Tree

Toxicodendron succedaneum

Description:

It is a small, deciduous tree up to 8 m tall. The compound leaves are 20–35 cm long and are divided into 9 to 15 (mostly 11) leaflets arranged in pairs. The leaflets are 4–10 cm long and 2–3 cm wide. They are bright green above and often greyish beneath because of a waxy bloom on the surface. In autumn they change to a brilliant scarlet and crimson before they fall.

Weed Category:

Rhus Tree (*Toxicodendron succedaneum*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Salvinia

Salvinia molesta

Description:

Free-floating, mat-forming aquatic plant. Individual plants 5–30 cm long, with 'leaves' (fronds) in whorls of 3 at each node, consisting of a pair of floating leaves and a submerged modified leaf that looks like and functions as a root. Upper surface of leaves covered with waxy egg-beater-shaped hairs; lower surface of leaves and root-like leaf covered with dark hairs.

Weed Category:

Salvinia (*Salvinia molesta*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.

Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Scotch English Broom

Cytisus scoparius

Description:

Erect, semi-woody branched shrub reaching 2-3 m tall at maturity. The leaves of English broom are deciduous and the stems may be bare of leaves. the flowers are bright yellow, although the lower petals of English broom may be brownish-red.

Weed Category:

Scotch English Broom (*Cytisus scoparius*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Thistles

Onopordum spp.

Description:

Includes Scotch, Illyrian and Stemless thistles. Stemless does not form a flowering stem. Seeds germinate in autumn and form small rosettes of leaves. Rosettes expand to a diameter of 60cm. Leaves are whitish green, with a very woolly surface and deeply divided spiny edges. Clusters of large white to purple flowers are formed close to the ground in the centre of the rosette. Scotch Thistle up to 2 m high with woolly leaves.

Scotch Thistle

Weed Category:

Thistles (*Onopordum spp.*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W3.

Stemless Thistle

Required Action:

The weed must be prevented from spreading and its numbers and distribution reduced.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Senegal Tea Plant

Gymnocoronis spilanthoides

Description:

Senegal tea plant can float on still or very slow-moving fresh water or grow as a bush on wet, marshy soils. Senegal tea plant can grow as an erect, rounded bush up to 1 m tall, but is more commonly found as a scrambling form extending from the edges of waterways. The leaves are dark green, 50–200 mm long and arranged in opposite pairs along the stem. The edges of the spearhead-shaped leaves are serrated. The numerous, white, ball-shaped flowers, 15–20 mm in diameter, occur at the ends of stems.

Weed Category:

Senegal Tea Plant (*Gymnocoronis spilanthoides*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.

Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Serrated Tussock

Nassella trichotoma

Description:

A perennial tussock forming grass that can live for more than 20 years, it has a deep fibrous root system. It grows to a height of 600 mm with a maximum diameter at its base of 150 mm. The leaves are thin (0.5 mm diameter) and tightly rolled, with small easily felt serrations along their length.

Weed Category:

Serrated Tussock (*Nassella trichotoma*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W3.

Required Action:

The weed must be prevented from spreading and its numbers and distribution reduced.

Notify the mine environmental officer of the presence of this species immediately.

Siam Weed

Chromolaena odorata

Description:

Siam weed is an erect or sprawling fast-growing perennial shrub, forming dense tangled thickets from 1.5–5 m high. The growth is soft when young, but becomes hard and woody when mature. Stems have fine longitudinal lines. Branches occur in pairs (opposite) along the main stem. Leaves are almost triangular with a few coarse teeth and three prominent veins. Glands (dots) can be seen when held up to the light. The leaves emit a pungent odour when crushed. Flowers are pale blue-lilac with protruding two-branched stigmas. Siam weed flowers in May and October.

Weed Category:

Siam weed (*Chromolaena odorata*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.

Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

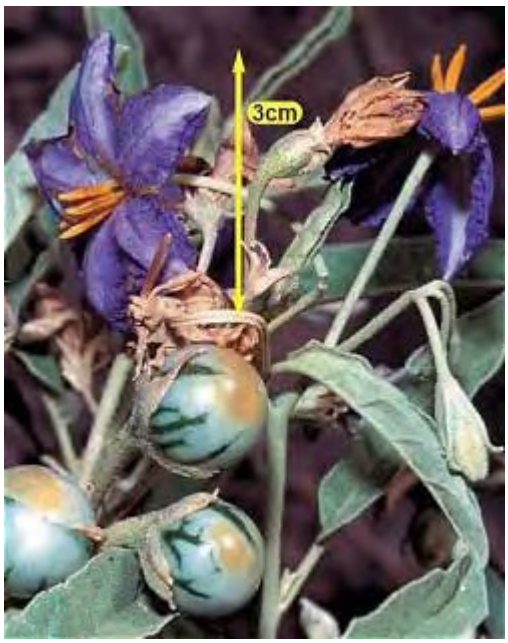
Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Silverleaf Nightshade

Solanum elaeagnifolium

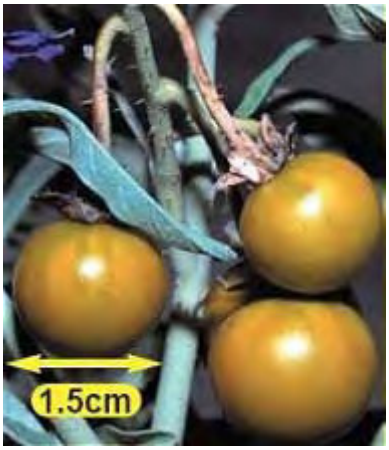
Description:



Silverleaf nightshade is a shrubby perennial herb to 60 cm tall with oblong, silvery-green felted leaves and tiny scattered spines resembling straight needlepoints. The flowers produced in summer are shaped like a fivepointed star up to 2.5 cm across, pale mauve with erect yellow stamens 7-8 mm long. The fruit is a globular golden-yellow berry about 1 cm diameter containing 20-100 seeds.

Weed Category:

Silverleaf Nightshade (*Solanum elaeagnifolium*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.



Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Spiny Burrgrass

Cenchrus incertus / Cenchrus longispinus

Description:

Erect or spreading tufted annual grass to 60 (rarely to 90) cm high. Distinguished by top of the spikelets protruding above the top of the burr (but still shorter than the spines); burrs 5–8 mm long usually with more than 40 spines that are almost circular in cross-section in the upper half and with base of larger spines rarely wider than 1 mm, without ring of smaller bristles around base of burr.

Weed Category:

Spiny Burrgrass (*Cenchrus incertus / Cenchrus longispinus*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Spotted Knapweed

Centaurea maculosa

Description:

A biennial or occasionally perennial that forms a basal rosette during the first year of growth and produces a flowering stem during the second year. Solitary flowers are produced at the ends of branches and are approximately 8 to 15 mm wide. Individual flowers are pink to purple in color

Weed Category:

Spotted Knapweed (*Centaurea maculosa*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.

Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

St John's Wort

Hypericum perforatum

Description:

An erect plant which grows up to 1.2 m in height, averaging 0.6 to 0.9 m. The plant tends to be woody near the base. Leaves are a paler green on the underside and have visible oil glands. The five petalled yellow flowers grow in clusters. Each flower is approximately 15 to 25 mm in diameter and appears to have black dots that are actually glands.

Weed Category:

St John's Wort (*Hypericum perforatum*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W3.

Required Action:

The weed must be prevented from spreading and its numbers and distribution reduced.

Notify the mine environmental officer of the presence of this species immediately.

Star Thistle

Centaurea calcitrapa

Description:

An erect, branched, annual or biennial plant. The stems and leaves are covered with cobwebby hairs often becoming smooth with maturity. The lower leaves are deeply divided and the upper leaves are narrow and undivided. The rosette leaves are deeply divided with a circle of spines in the center. The flower is lavender to deep purple with spine-tipped bracts subtending the flower head.

Weed Category:

Star Thistle (*Centaurea calcitrapa*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Sweet Briar

Rosa rubiginosa

Description:

It forms a deciduous shrub 1 to 3 m high with stems that carry prickles and bristles. Suckering occurs freely from the crown, and bushes often exceed 1 m in diameter at the base. The leaves have five to seven oval leaflets, each with serrated edges. The five-petalled, generally light pink flowers have a pleasant fragrance, while the fruit (hips) are bright red when ripe and often have bristles.

Weed Category:

Sweet Briar (*Rosa rubiginosa*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W3.

Required Action:

The weed must be prevented from spreading and its numbers and distribution reduced.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Tree of Heaven

Ailanthus altissima

Description:

A stout deciduous tree to 25 m with large, pinnately-divided, foul-smelling, sticky leaves, small yellow-green flowers in spring and winged fruits.

Weed Category:

Tree of Heaven (*Ailanthus altissima*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Note: Photographs taken from National Weeds Strategy.

Water Hyacinth

Eichhornia crassipes

Description:

Water hyacinth can form impenetrable mats of floating vegetation. They are floating plants with round to oval, shiny green leaves up-to-ten inches in diameter, although smaller leaves are common. Leaves are held upright so they act like sails. The leaf stalk is thick and spongy and helps to keep the plant buoyant. A mass of fine roots hang in the water underneath the plant. The flowers are large (2-3 inches) and attractive. They are blue-purple or lilac-colored with a yellow spot.

Weed Category:

Water hyacinth (*Eichhornia crassipes*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.

Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Water Lettuce

Pistia stratiotes

Description:

It grows in still and slow flowing water, where it is capable of forming dense mats. Leaves are pale yellow-green, fan shaped, 2.5 to 15 cm long and 8 cm wide. Covered with short white hairs. Flowers are inconspicuous. Fruits are berry-like 5 - 8 mm in diameter.

Weed Category:

Water Lettuce (*Pistia stratiotes*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W1.

Required Action:

The presence of the weed on land must be notified to the local control authority and the weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Wild Radish

Raphanus raphanistrum

Description:

Wild Radish is an erect annual to 1m high, which reproduces by seed. When crushed the basal leaves have a strong turnip-like smell. Stems are bluish green, often red at the base. Flowers have four petals, are white, yellow or pink to mauve and are stalked.

Weed Category:

Wild Raddish (*Raphanus raphanistrum*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W2.

Required Action:

The weed must be fully and continuously suppressed and destroyed.

Notify the mine environmental officer of the presence of this species immediately.

Willows

Salix spp.

Description:

Willows are generally deciduous trees or shrubs, which occur in permanently or seasonally wet, inundated or waterlogged sites. There are a number of different species.

Weed Category:

Willows (*Salix spp.*) is declared noxious in the Upper Macquarie County Council control area. The weed control category is W4g.

Required Action:

The weed must not be sold, propagated or knowingly distributed.

Notify the mine environmental officer of the presence of this species immediately.

APPENDIX D

HERBICIDE APPLICATION PROTOCOL

CULLEN VALLEY MINE FLORA & FAUNA MGT PLAN

APPENDIX D – HERBICIDE APPLICATION PROTOCOL

Introduction

Herbicides are poisonous substances used to control and prevent the growth of weed species. Correct use, handling and storage of these substances is imperative to ensure their effectiveness without compromising the health of the surrounding environment or personnel involved in their use.

The following guidelines for use of herbicides while working on or around Cullen Valley Mine, or under direction from mine site personnel must be strictly adhered to at all times. However, these guidelines in no way surpass the safety directions included on herbicides.

Weed Identification

Prior to use of any herbicides on site, be sure that the target plant has been correctly identified. A Weed Identification Kit is held on site and can assist in this process. Correct identification of the weed will be essential in determining the concentration of herbicide required and application method.

Herbicide Storage

Herbicides should always be stored in the original packaging, with labelling intact and lids tightly secured. Herbicides should be stored in a cool, well-ventilated area when not in use.

Empty containers must be disposed of in accordance with rubbish disposal procedures on site.

Safety

Herbicide Use

Always read and adhere to the safety precautions when handling or using any herbicide products.

Safety precautions are always provided on herbicide packaging, and are specific to each product. The product-specific Safety Data Sheet should also be reviewed for further information, if required.

Ensure that the instructions have been thoroughly read and understood before opening or using the product.

Personal Protective Equipment

Herbicide contact with the skin, eyes, throat and nose can cause irritations and illness and should be avoided at all times. To minimise contact with herbicides during use and handling the following safety clothing must be worn:

- Long pants;
- Closed-in shoes;
- Long sleeved shirt;

- Safety glasses; and
- Heavy duty elbow length PVC gloves.

In the event that herbicide does come in contact with the skin, wash immediately with soap and water. Flush eyes for a minimum of 15 minutes with clean water. If irritation continues seek medical advice.

Do not inhale spray mist.

After each use and before eating, drinking or smoking, wash hands, arms and face thoroughly with soap and water.

After each day's use wash gloves, eyewear and contaminated clothing.

If swallowed or otherwise exposed, seek medical advice or contact the Poisons Information Centre on 13 11 26 immediately.

Application

Climatic Conditions

Climatic conditions play an important role in the effectiveness of herbicide applications. Therefore, proper monitoring of conditions before, during, and after use is critical. During herbicide applications the following key meteorological conditions should be monitored and observed:

- Wind speed – spraying should only be done under calm conditions;
- Temperature – optimum temperatures for spraying water-based herbicide mixtures are less than 28°C. Risks of reduced efficiency and off-target movement increase at greater temperatures;
- Relative humidity – it is preferable to spray in conditions where the relative humidity is greater than 45%;
- Rainfall – do not spray if rainfall is imminent. Rainfall during or within 48 hours after application may reduce the efficiency and or move the herbicide off target.

Be prepared to stop spraying if weather conditions change and become unsuitable.

Location

If weed infestation occurs in an area adjacent to a water body including dams, ponds or creeks, only use herbicides specifically developed to be used in aquatic environments. Alternatively, physical removal of the weed should be considered where practicable.

In the event that weed infestation occurs adjacent to, or in close proximity to a threatened species, extreme care must be taken to ensure that herbicide, mist during application or runoff does not come into contact with the threatened species. Physical removal of the weeds should be considered as an alternative treatment method where possible.

Check with mine management for the known locations of threatened species in the target area prior to undertaking herbicide application work.