



DONALDSON COAL MINE AND ABEL UNDERGROUND COAL MINE

TETRATHECA JUNCEA MANAGEMENT PLAN

CARE AND MAINTENANCE

Version 2

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1. INTRODUCTION

1.1 Background

The Abel underground and Donaldson open cut coal mines are located in close proximity to each other and are managed as an amalgamated mining complex. Donaldson is in a Mine Closure phase whilst Abel is in 'care and maintenance' with restricted activities occurring across the mining complex. Activities that currently occur include water management, rehabilitation works, land management, maintenance of mining infrastructure and environmental monitoring activities.

This Tetratheca juncea Management Plan (TjMP) serves to meet the requirements of the Donaldson Development Consent. It is applicable whilst Abel is in Care and Maintenance and Donaldson in Mine Closure. A review and update to this TjMP will be undertaken prior to mining operations recommencing at Abel.

This is the first review of this Management Plan since it was originally compiled in November 2000 by Gunninah Environmental Consultants and is relevant for Care and Maintenance period only. This review does not contain the full biological detail contained in the original TjMP and will focus on management of Tetratheca juncea. For full biological information on Tetratheca juncea, refer to the original [2000 TjMP](#).

2. PROJECT LOCATION AND DESCRIPTION

Donaldson mine and Abel underground mine are located approximately 23km west of Newcastle. Other nearby towns include Beresfield, located 2km north-east, and Maitland located approximately 5km north east. The mines access, entries and primary surface facilities are located off John Renshaw Drive, Blackhill. Donaldson Coal Mine has been rehabilitated whilst the Abel coal mine has been in 'Care and Maintenance' since 2016.

Both mines now use the Abel surface facilities to operate administrative and care and maintenance activities.

Whilst in Care and Maintenance, the operation has minimal employees and is staffed 5 days a week on day shift only. The Abel operation continues to use the opencut voids known as the Est Pit and Square Pit. The Tetratheca juncea Conservation Area is adjacent to and north-west of the Square Pit. Figures 3.1 and 3.2 show the boundary of the Tetratheca juncea Conservation Area that was surveyed in 2000 (Gunninah, 2000).

3. STATUTORY REQUIREMENTS

This Tetratheca juncea Management Plan (TjMP) has been compiled to meet the requirements of Donaldson Coal Development Approvals (DA 98/01173 and DA 118/698/22).

The Donaldson Development Approval DA 98/01173 lodged with Maitland Council and DA 118/698/22 lodged with Cessnock Council was originally granted by the Minister on the 14th October 1999 and subsequently modified on two occasions for an extension of the pit limits and extension to the mine life. This TjMP is a requirement of the Donaldson Development Consent in Schedule 2, Condition 69 that states;

"The Applicant shall prepare a Management Plan for the Tetratheca juncea Conservation Area in consultation with OEH and to the satisfaction of the Director-General, prior to commencement of construction. The Plan shall be consistent with the Flora and Fauna Management Plan (Conditions 76-79); and include measures for fire management. The Applicant shall clearly mark the boundary of the Conservation Area and make provision for signage which specify that no dumping, clearing or other works are permitted in the Conservation Area. Such signage shall be replaced as required. The Applicant shall make copies of the Tetratheca juncea Management Plan available to OEH, Councils and the Community Consultative Committee within 14 days of approval by the Director General."

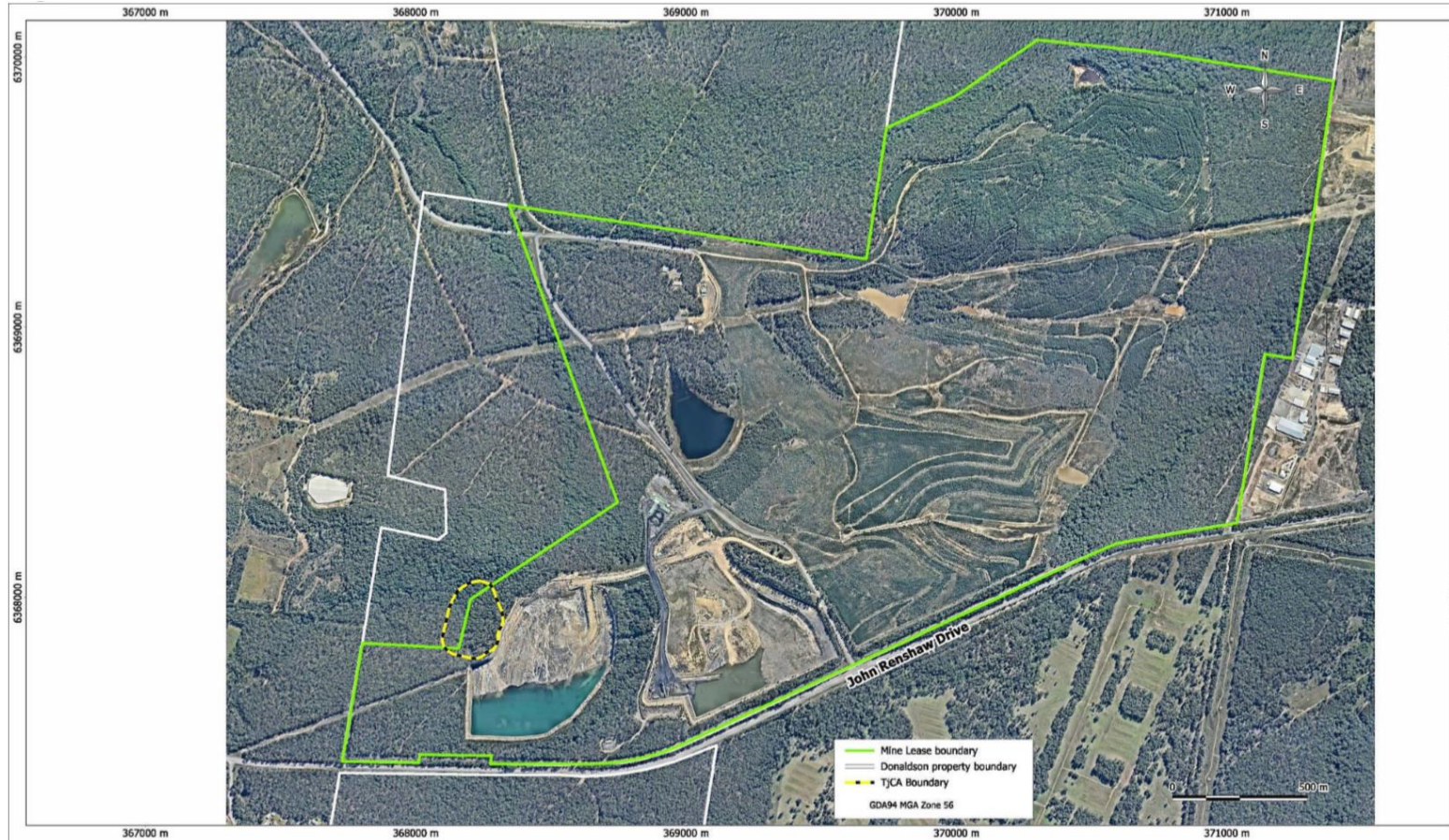


Figure 3-1 Locality Map of Tetratheca juncea Conservation Area at Donaldson (Source: Kleinfelder 2017)

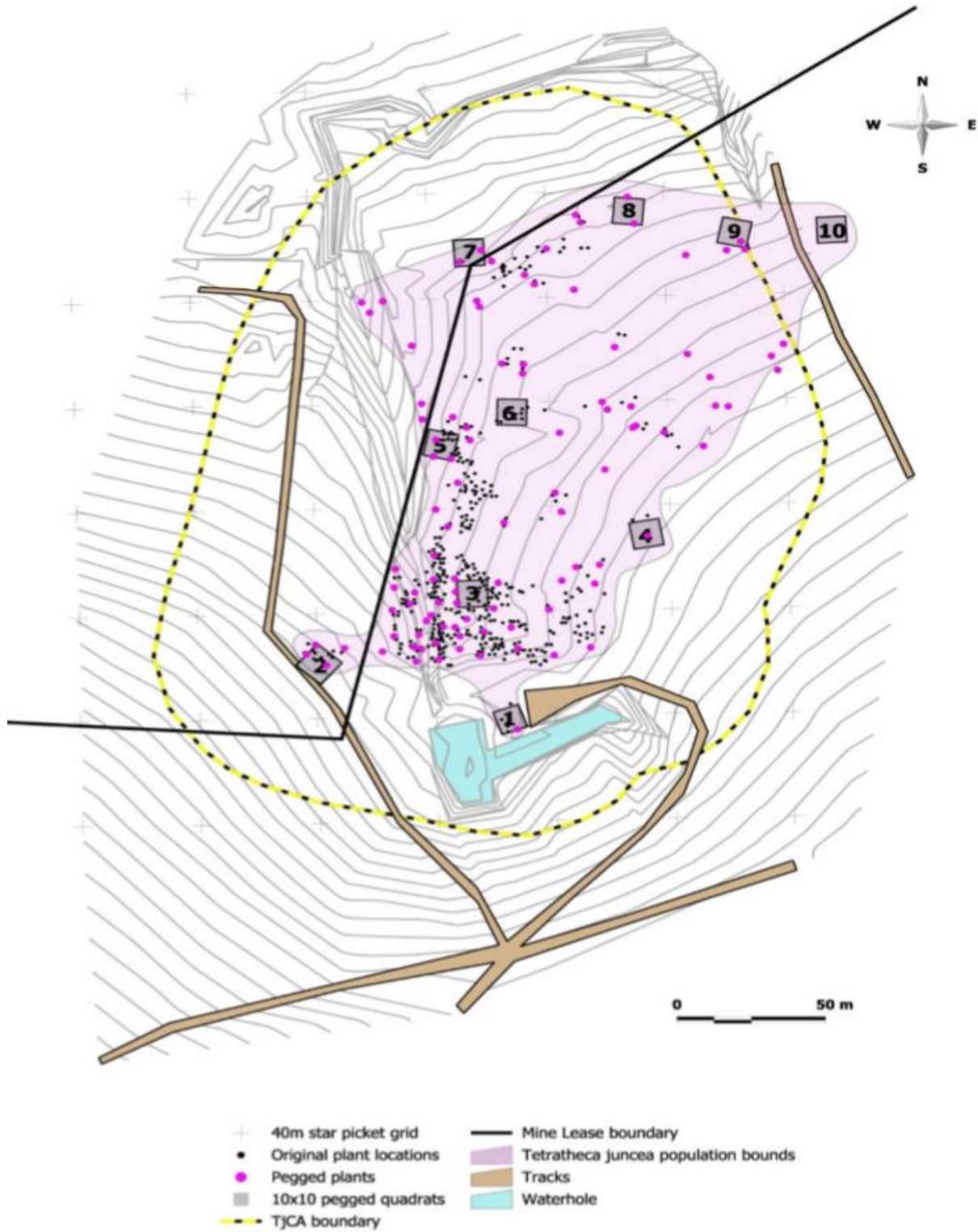


Figure 3-2 Tetratheca juncea Conservation Area (Source Kleinfelder 2017)

4. SPECIES DESCRIPTION & HABITAT REQUIREMENTS

4.1 Species Description

Tetratheca juncea is a threatened plant listed as ‘vulnerable’ on Schedule 2 of the NSW Threatened Species Conservation Act 1995 (TSC Act). It is also listed as a vulnerable species by the Commonwealth Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act).

Tetratheca juncea is a prostrate shrub, with sparse wiry stems to one metre in length, which grows as sparse stems entangled in surrounding understorey vegetation. The narrow wings on the plant’s leafless stems distinguish it readily from other *Tetratheca* species. Deep lilac-pink flowers are borne singly or in pairs along the stem. They typically flower from July to December with historical observations at Donaldson indicating September being the most prevalent time for flowering.

Tetratheca juncea generally grows in sandy, moist heath and in dry sclerophyll forest on pH neutral soils and typically between 0 and 200m in altitude. The Donaldson *Tetratheca juncea* population occurs in the ‘Shamrock Hill’ soil landscape, which ranges from sandy loam to medium clay ranging from pH 5.0 to pH 6.0. At Donaldson, the *Tetratheca juncea* Conservation Area is in a protected gully that faces the north west.

5. MANAGEMENT ISSUES

5.1 Mining Operations

The mining operations at the Donaldson site commenced in January 2001 and finished in April 2013. Mining activities at Donaldson were in close vicinity of the TjCA during the final year of mining the Square Pit. The Abel Underground Mine went into care and maintenance in 2016 and the recommencement of mining is yet to be scheduled. This Management Plan focuses on the management of the buffer between mining activity and the *Tetratheca juncea* population in the southwestern corner of the subject site and also focuses on the management of the TjCA.

Throughout mining activities, there was some potential for mining activities to affect the *Tetratheca juncea* population within the TjCA, during the period when mining operations were located in the Square Pit in the immediate vicinity of the TjCA. The Square pit is yet to be rehabilitated and is approved as a storage facility for coal waste from the Abel underground mine. Rehabilitation of the Square Pit will occur once a final determination of the void is known. Rehabilitation activities will be required adjacent to the TjCA.

Potential theoretical negative impacts during rehabilitation works may include:

- the spread of weed propagules into the TjCA;
- unauthorised access by mine workers into the TjCA;
- erosion from the ‘mine disturbance area’ (particularly from the bund) resulting in erosion and sediment deposition in the TjCA;
- the dumping or stockpiling of materials within the TjCA;

- the disturbance or clearing of land within the TjCA;
- possible pollution and contamination events; and
- alterations to the drainage patterns and soil water conditions around the TjCA.

This TjMP has been prepared to address the management of these potential impacts during care and maintenance.

6. MANAGEMENT ACTIONS

This plan provides a program for the maintenance of the population of *Tetratheca juncea* in the TjCA, located in the southwestern portion of the Donaldson Project site. Specific management measures to be implemented during care and maintenance include:

- maintenance of the existing *Tetratheca juncea* population, including:
- the retention of potential pollinators and potential pollinator habitat;
- application of an appropriate fire regime;
- protection of the population from indirect effects (such as weed invasions, native plant competition and possible pollution events); and
- prevention of the potential spread of Phytophthora;
- control of soil disturbance in the vicinity of the population through prevention of direct or indirect mining impacts; and
- monitoring and the collection of relevant and useful data on the population.

6.1 Adaptive Management

The management measures contained in this Management Plan are intended to be flexible to respond to new information regarding *Tetratheca juncea*. Ongoing research may provide new biological information about *Tetratheca juncea* in general or evidence of a site-specific issue relevant to the Donaldson population (identified during the ongoing monitoring program) on the site.

Corrective actions (to be implemented in the event of detrimental changes to the *Tetratheca juncea* population) have been incorporated into this Management Plan. However, the ongoing monitoring and management of the Bushland Conservation Area and the *Tetratheca juncea* population at Donaldson (or at other sites in the region) may reveal other (currently unexpected) situations which will require supplementary management measures, to be determined by the Environment and Community Superintendent (E&CS) in consultation with a Biologist.

6.2 Pre-mining Protocol

Mining activities in the vicinity of the TjCA started in 2010, and a substantial baseline of information on the species and the population was obtained prior to this period. The ten-year timeframe allowed for the development of adaptive management measures to be devised and implemented in response to research outcomes and monitoring activities.

The *Pre-mining Protocol* focused largely on the establishment of monitoring sites and on the implementation of the monitoring surveys, and on implementing measures to protect the population prior to mining in the vicinity. The *Pre-mining Protocol* resulted in the location of a boundary around the population to indicate the limits of the TjCA (in accordance with Condition No. 69 of the Conditions of Consent for the Project) and the implementation of general environmental management measures (such as weed control, restriction of access and the installation of erosion and sediment controls, as required).

The surveys were implemented as part of the *Pre-mining Protocol* aimed to collect information regarding:

- the likely response of the population to previous fires;
- an appropriate fire regime, including definition of the appropriate season, intensity and duration;
- identification of the pollinator(s) of *Tetratheca juncea*, if possible; and
- the identification of pollinator habitat (following determination of certain or likely pollinators).

6.21 Establishment of Monitoring Protocol & Initial Field Observations

Prior to the introduction of the prescribed fire regime or other management activities in the TjCA, the 'site monitoring program' was established, which includes:

- random tagging of 25% of the population with fire-proof metal tags to enable demographic monitoring; and
- establishment of ten permanent quadrats within the population to allow measurement of pre- and post-fire seedling recruitment, flowering and seed-production, as well as other relevant variables.

6.22 Fire Management

The management of fire within the TjCA is an important requirement to ensure the long-term sustainability of the Donaldson *Tetratheca juncea* population. The prescribed fire management regime is intended to ensure:

- the avoidance of overly frequent fires within the TjCA;
- prevention of the entire population being burnt in any one year (insofar as is possible);
- the minimisation of competition from native plant species (such as Blady Grass, Kangaroo Grass and Bracken);
- the management of fuel loads to prevent very intense wildfires which result in high mortalities in *Tetratheca juncea* populations;
- the avoidance of burning during the larval period of primary pollinators (if known and if possible);
- the avoidance of burning during the flowering and seed-set period of the plant; and
- the encouragement of seedling germination and establishment within the TjCA.

6.221 Fire Frequency

A fire frequency of less than every three years is likely to be detrimental for *Tetratheca juncea*, since existing evidence from other populations suggests that regenerating plants or seedlings do not flower reliably during the first year following fire. More frequent fires may increase the risk of the population declining.

The limits for the fire frequency regime are to be determined by the E&CS and in consultation with a Biologist and giving proper consideration to:

- the need for hazard reduction burns;
- fire history;
- existing fuel loads;
- changes in the abundance of purported native competitors; and
- changes in the fecundity, vigour or abundance of *Tetratheca juncea*.

It is suggested that the required fire frequency may be 6-12 years between fires, which provides a regenerating plant or seedling with several years in which to produce flowers.

The original TjMP recommended the TjCA be broken into 3 management areas with various fire frequencies including one area that is not subject to burning. This will be reviewed after the two other areas have been burnt and monitoring results indicate the response to fire.

6.222 Fire Management Units

Given the lack of certainty regarding the optimum fire regime for *Tetratheca juncea*, and the inherent variability in natural circumstances, the population in the TjCA will be divided into three separate sections for the purposes of fire management. The precise boundaries of the three Fire Management Units (FMUs) will be determined on-site by the E&CS in consultation with a Biologist and on the basis of safety, geography, the distribution of fuel loads and other practical considerations. In order to conduct a prescribed burn in these areas, small containment lines will be required to safely contain the fire.

Since the commencement of mining in 2001, there has been no fire within the TjCA. This has been identified as a possible cause of a downward trend in the numbers of identified *Tetratheca juncea*.

The FMUs within the TjCA will not be burned within the same year, insofar as that is possible. The suggested fire regime is to burn FMU1 every six years, FMU2 every eight years and to leave FMU3 unburnt (Table 1). The FMUs can be delineated with a fire break (such as a rake-hoe or mineral earth fire break), but it is recommended that such a fire break be established in the presence of a qualified botanist to prevent accidental death of inconspicuous *Tetratheca juncea* clumps.

Characteristics	FMU1	FMU2	FMU3
Burn Frequency	Every 6 years	Every 8 years	No scheduled burning
Burn Intensity	Moderate	Moderate	Subject to monitoring results.
Burn Timing			
First Burn	Autumn 2020	Autumn 2021	
Second Burn	Autumn 2026	Autumn 2029	

Table 6.1 Recommended fire regime within the TjCA in care and maintenance

6.223 Fire Season

Managed fires will not be conducted in the TjCA during plant flowering period, or fruit set. Although these phenomena will vary between years, it is suggested that the suitable season for managed fires is autumn. This will be subject to change based on season and monitoring results and will be in consultation with a biologist.

6.224 Fire Intensity & Duration

It is suggested that a moderate intensity fire is appropriate, as slow cool fires and too frequent fires are detrimental to *Tetratheca juncea* populations. To assist in the maintenance of the appropriate fire intensity, attention will be given to fuel loads within the TjCA prior to any burn.

The burning regime is designed to provide a variety of circumstances, and of regeneration conditions. The burning regime will be modified, doubtless, by unplanned bushfires.

6.23 Weed Control and Eradication

It is noted that the current weed intensities in the vicinity of the *Tetratheca juncea* population is generally low. Weeds will be removed from within the TjCA (and also from other parts of the BCA) to improve the quality of the bushland in these areas. Weed removal within the TjCA will be conducted using hand removal techniques.

The timing of weed control and eradication measures will be dependent on the weeds encountered within the TjCA. However, the most important aspect of weed removal and control within the TjCA is to ensure that the *Tetratheca juncea* population remains unharmed by any control activities. The timing of weed control activities within the TjCA will be determined by the E&CS in consultation with a Biologist.

6.24 Access Restriction

Unauthorised access to the land surrounding the TjCA poses a risk of arson burns, direct destruction of plants or habitat and (potentially) the introduction of weed seeds and Phytophthora spores. Access to the TjCA will be blocked to unauthorised personnel. Potential access controls include establishment of vehicle-proof barriers (such as a fence, large rocks, bollards or a gate) and the installation of a boundary fence along John Renshaw Drive.

In accordance with Condition No. 69 of the Conditions of Consent signage has been installed along the TjCA boundary, that specifies “no dumping, clearing or other works are permitted in the Conservation Area”. Signage will be replaced as necessary.

6.25 Erosion & Sediment Control

The *Erosion & Sediment Control Plan* (ESCP) for the Abel/Donaldson complex indicates the location of erosion and sediment control features across the mine site. A drain is located alongside the boundary fence to draw off any eroding material from the bund around the ‘mine disturbance area’ to a sediment pond located beyond the limit of the TjCA.

Drainage lines installed within, or adjacent to, the TjCA need to be maintained regularly, and monitored to ensure their continued effectiveness.

6.26 Pre-mining Protocol

A summary of the measures listed above is presented in Table 6.2.

Action	Specific Action	Responsibility	Status
Establish Monitoring Locations	Tag 25% of the population	In consultation with a Biologist	Complete
	Establish ten permanent quadrats		Complete
	Collection of monitoring data (baseline and subsequent monitoring events)		Complete
Monitoring	Monitoring of tagged clumps and permanent quadrats	Project Environmental Officer (PEO)	Ongoing annual monitoring
Protection of Pollinator, Pollinator Habitat & Plant Rootstock	Restriction of access to TjCA (including the erection of signage)	Project Environmental Officer (PEO) in consultation with a Biologist	Ongoing
	Induction of staff working within the TjCA		As required
Fire Management	Determine boundaries of Fire Management Units	Project Environmental Officer (PEO) in consultation with a Biologist	As required
	Implement the recommended fire regime (Table 1)		Ongoing
Weed Control & Eradication	Determine intensity & location of weeds	Project Environmental Officer (PEO) in consultation with a Biologist	Ongoing annual monitoring
	Determine timing of weed removal	Project Environmental Officer (PEO) in consultation with a Biologist	As required
	Removal of weeds	Project Environmental Officer (PEO) in consultation with a Biologist	Ongoing
	Disposal of removed weed material	Project Environmental Officer (PEO) in consultation with a Biologist	As required
	Restriction of access	Project Environmental Officer (PEO) in consultation with a Biologist	Ongoing
Access Restriction	Install boundary fence along John Renshaw Drive	PEO	Complete
	Indicate boundary of TjCA	Project Environmental Officer (PEO) in consultation with a Biologist	Complete

	Erect signage restricting access to the TjCA (Condition No.69)	Project Environmental Officer (PEO) in consultation with a Biologist	Complete
	Induction of site staff regarding the significance of the TjCA	PEO	As required
Erosion & Sediment Control	Implement the <i>Erosion & Sediment Control Plan</i>	Project Environmental Officer (PEO)	Ongoing
Dumping or Stockpiling of Material	Restriction of access, including the erection of signage	PEO	Complete
	Induction of site staff regarding the significance of the TjCA	PEO	As required
Pollution & Contamination Events	Restriction of access, including the erection of signage	PEO	Ongoing
	Induction of site staff regarding the significance of the TjCA	PEO	As required
Alteration of Drainage Patterns	Implement the <i>Erosion & Sediment Control Plan</i>	PEO	Ongoing

Table 6.2 Pre Mining Protocol Summary

6.3 Post-mining Protocol

Post-mining activities will include:

- implementing adaptive management based on the findings of the monitoring surveys (Chapter 8);
- the continued monitoring of the *Tetratheca juncea* population for a variety of information, including the population's response to fire, survivorship and absence or presence of seedlings (Chapter 6), incorporating any adapted management requirements;
- continued protection of pollinators and pollinator habitat, unless the ongoing monitoring provides additional information regarding *Tetratheca juncea* pollination;
- continued protection of the plant rootstock by the restriction of access and induction of staff entering the TjCA. Staff will be inducted regarding the conservation significance of the area and the importance of the protection of the rootstock;
- implementation of appropriate fire regime (Table 1) that considers both the survival of the *Tetratheca juncea* population and the need for hazard reduction burning and the consideration of further information gained from implementation of the fire regime within the TjCA (Chapter 6.22);
- continuation of weed control and eradication activities, should any weeds remain by that time (Chapter 6.23);
- restriction of access to the area for construction workers and their vehicles (Chapter 6.24) to prevent the possibility of spread of weed seed, stockpiling of materials and to reduce the risk of pollution or contamination events within the TjCA; and
- the maintenance of erosion and sediment controls installed to protect the TjCA (Chapter 6.25) in accordance with the ESCP, by monitoring the boundary between the TjCA and the 'mine disturbance area';
- prevention of the dumping or stockpiling of material by restriction of access to the TjCA and the induction of site personnel;
- reduction of the risk of pollution and contamination events by the restriction of access to the TjCA; and
- the protection of the TjCA from altered drainage by the implementation of the ESCP at an appropriate time prior to mining in the vicinity of the TjCA,

6.4 Risk Assessment, Emergency Response & Incident Management

There is some potential risk that mining operations will affect the *Tetratheca juncea* population within the TjCA, particularly during the rehabilitation of the Square Pit when remediation works occur in the immediate vicinity of the TjCA. Potential negative impacts include:

- changes to drainage patterns within the TjCA;
- erosion from around the 'mine disturbance area', resulting in erosion and sedimentation into the TjCA;
- unauthorised access by mine workers (or others) into the TjCA;
- the spread of weed propagules into the TjCA;
- the dumping or stockpiling of materials within the TjCA; and
- possible pollution and contamination events as a result of an accidental spill.

Where unforeseen incidents occur, the emergency response will be to contact the Project Environmental Officer (PEO), who will then contact a Biologist who will provide advice regarding the appropriate response. The Donaldson Mine Internal Incident Report will be used. Dependent on the nature of the incident, the sites Pollution Incident Response Management Plan may be activated. In most instances, the appropriate response will initially involve:

- termination of the activity or its modification to prevent further adverse impacts;
- containment of the problem;
- implementation of an incident report, to determine the precise cause of the incident and the measures necessary to rectify any impacts; and
- implementation of any appropriate impact amelioration or remediation measures.

6.5 Other Measures

Other indirect measures of protecting the *Tetratheca juncea* population that will be implemented by this Management Plan will include:

- collection and storage of seeds, where possible; and
- germination and propagation from seeds, where possible.

The effectiveness of these measures to re-establish *Tetratheca juncea* populations outside of the conservation area will be reviewed as required throughout the care and maintenance and mine closure phases of the operation.

7. MONITORING SURVEYS & REPORTING

The aim of the TjMP is to maintain the population of *Tetratheca juncea* within the TjCA. Whilst populations are expected to fluctuate naturally, consistent downward trends may indicate a risk of extinction of the local population. Considering that the species appears to rarely produce seeds and to have poor seedling survival, the maintenance of adult clumps may be crucial to survival of the population. Throughout the life of the project, annual monitoring of the TjCA will occur to assess the status and trends of the *Tetratheca juncea* population.

7.1 Monitoring Schedule

7.1.1 Demographic Monitoring of *Tetratheca juncea*

Simple counts of individuals are often used to determine population trends, but this approach is not regarded as appropriate for *Tetratheca juncea* for several reasons:

- the species is inconspicuous when not in bloom;
- individuals are generally difficult to discern;
- individuals appear to be sporadic in producing flowers;
- the species could have a dormant seed bank present in the soil; and
- the species may be clonal.

A simple demographic study (in which a percentage of the population is tagged with fire-proof numbered tags and continuously monitored) will provide information on the fate of clumps and of the population. The study will also be used to monitor the response of the species to fire, along with data from permanent quadrats.

To monitor the population and its vitality, approximately 25% of the population has been selected at random and tagged. Demographic monitoring will primarily occur in the latter half of the peak flowering period of plants annually. In addition, data collected will include information regarding plant survivorship, new growth of plants, budding or flowering and seed production (Table 3).

DATA	MEASURES	PURPOSE
Survivorship	Alive/Dead	Some plants may be expected to die in any population each year by chance or old age. Conversely, the population may increase following fire. Dramatic increases in frequency of death could also indicate disease or other crisis.
New Growth	Yes/No	It is understood that sprouting plants produce a distinctive growth form. Re-sprouting plants could be assumed to be 'healthy' because re-sprouting requires stored carbohydrates, and is an indicator of succession following fires.
Budding or Flowering	Yes/No	Plants appear to require at least a year (and possible two) following fires to begin flowering. Additionally, some plants may flower consistently across years, whilst others do not flower.

Seed Production	Yes/No	Seed production may be difficult to detect because seeds are not retained for a long period on the plant. One alternative can be to bag part of several plants which have already produced flowers or unripe pods.
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Table 7.1 Data to be collected in demographic census of the *Tetratheca juncea* population

Care will be required to ensure that intertwined clumps are not confused, by tracing stems to the base of the plant. As the growth form of the plant may lead to confusion in subsequent surveys, tags will also be placed at the base of each stem, using stiff wire rods (1-2m long) to aid the subsequent location of tagged stems.

Results of the demographic study will be analysed each year to determine fluctuations in the population, although it should be noted that these parameters would be expected to fluctuate naturally. These data may also be useful to the preparation of a Recovery Plan for the species.

7.12 Monitoring Response of *Tetratheca juncea* to Fire

The population parameters (Table 7.1) will be collected in annual surveys following fires in each of the Fire Management Units (FMUs) of the population (Chapter 6.222). Approximately 30 clumps should presumably fall into each FMU.

In addition to the baseline demographic data (Table 6.2), permanent 10m by 10m monitoring quadrats have been established within the population to provide an even geographic coverage. These are monitored during annual censuses and during post-fire monitoring for *Tetratheca juncea* seedlings. Each quadrat will be carefully examined for the presence or absence of seedlings, with any seedlings present being measured (total stem length) and tagged for subsequent measurements.

Current monitoring suggest that seedling densities are low. If no seedlings are recorded in the quadrats following a fire event, the whole of the site will be carefully surveyed for seedlings. If seedlings are located, they are to be tagged and monitored (as detailed above).

7.13 Native Pollinator Habitat

Regardless of the uncertainty of the pollination mechanisms of *Tetratheca juncea* and given the theory that native sonicating bees may pollinate *Tetratheca juncea* (although there is no evidence available to prove this theory), grass trees (potential sonicating bee habitat) located within the *Tetratheca juncea* population in the TjCA will be protected and managed by this Management Plan.

7.14 Monitoring Changes in Native Competitors

The presence or absence, and the relative abundance, of potential native plant competitors (such as Blady Grass, Kangaroo Grass and Bracken) will be recorded in each annual census for each of the survey quadrats. A standardised survey approach will be implemented for repeatability, involving counting of the total number of blades or fronds in each quadrat.

The presence or absence of each of these species in the survey quadrats will provide an indication of the spatial extent of these species in the TjCA. Given their growth form (eg; rhizomes for Bracken) and their seed dispersal (dropping) mechanisms, these 'competitor' species could potentially spread gradually through the *Tetratheca juncea* population under suitable conditions.

The relative cover of the ‘competitor’ species generally increases under a frequent fire regime. The rate of any increase would provide another measure (along with a decrease in the appearance of new shoots of *Tetratheca juncea*) of fire frequencies.

7.2 Reporting

Annual biological reporting required for the TjCA is carried out by suitably qualified ecologist or biologist. The pre-mining baseline information forms the comparison basis for annual monitoring surveys undertaken throughout the operation of the mine. This baseline report provides comments regarding the condition of the *Tetratheca juncea* population within the TjCA and refers to pre-mining information previously collected regarding this population. The baseline monitoring report also details the condition of the *Tetratheca juncea* population and the grass trees located within it.

7.3 Timeline for Monitoring Surveys

The main annual survey will occur during the flowering period of *Tetratheca juncea*, which is most commonly between October and November, although the flowering period for this plant does vary each year, depending on climatic circumstances.

Following an ecological burn within the population (Table 3), quarterly surveys will be conducted to monitor the recovery of the plants, with ecological burns occurring during autumn. Burning during autumn avoids the flowering and seeding time of *Tetratheca juncea*.

8. INDUCTION & AWARENESS TRAINING

Condition 8(iv) of the Conditions of Consent for the project requires the appointed Project Environmental Officer (PEO) to conduct an induction and training program for field staff working at the Donaldson Coal Mine. With regard to the management of the Donaldson *Tetratheca juncea* population, the Donaldson induction and awareness training will include reference to:

- the occurrence of the *Tetratheca juncea* population in the southwestern portion of the site;
- the restriction of access to the *Tetratheca juncea* Conservation Area, at all times, with the exception of staff members employed to manage the area (ie; the PEO, the Project Biologist and qualified bush regenerators);
- weed management issues, including relevant measures to control the spread of weed propagules; and
- general construction issues in respect to the TjCA, including the reporting of spillages or other incidents in the vicinity of the TjCA.

9. DOCUMENT REVIEW

The performance of this TjMP will be reviewed after a *Tetratheca juncea* incident or as requested by the Secretary. The review will include:

- A review of the results of the annual monitoring data;
- Identification of any failure to meet compliance with the conditions of the project approval, and a description of what actions were (or are being) taken to ensure these are met; and,
- A description of what measures will be implemented in the future to maintain the conservation values of the *Tetratheca juncea* Conservation Management Plan.

Any major amendments to the TjMP that affect its application will be undertaken in consultation with the appropriate regulatory authorities and stakeholders. Minor changes such as formatting edits will be made with version control.

The TjMP will also be revised due to:

- Deficiencies being identified;
- Introduction of additional mitigation measures or controls;
- Results from the monitoring and review program;
- Recommendations resulting from the monitoring and review program;
- Changing environmental requirements;
- Improvements in knowledge or technology becoming available;
- Changes in legislation; or
- Identification of a requirement to alter the TjMP following a risk assessment.

Prior to the Abel operation changing from 'care and maintenance' to 'operational', this plan will be reviewed and updated in consultation with the Secretary.

10. REFERENCES

References below include those from the [original TjMP](#) by Gunninah Environmental Consultants and provided the basis for baseline research into *Tetratheca juncea*.

- Australian Network for Plant Conservation. 1997. Guidelines for the Translocation of Threatened Plants in Australia. ANPC, Canberra.
- Barker P. 1996. Selecting viable populations of threatened plants for conservation management. A report to Forestry Tasmania and the Australian Nature Conservation Council (cited in Payne 1998).
- Barth F. 1996. Insects and Flowers: A Story of A Partnership. Princeton Scientific Press, Princeton, New Jersey.
- Boesewinkel FD. 1999. Ovules and seeds of Tremandraceae. Australian Journal of Botany 47(5): 769-781.
- Cropper S. 1993. Management of Endangered Plants. CSIRO, Canberra.
- Cunningham S. 2000. Effects of habitat fragmentation on the reproductive ecology of four plant species in mallee woodland. Conservation Biology 14(3): 758-768.
- Davis GE. 1993. Design elements of monitoring programs: the necessary ingredients for success. Environmental Monitoring and Assessment 26: 99-105.
- Dixon KW, Roche S and Pate JS. 1995. The promotive effect of smoke derived from burnt native vegetation on seed germination of Western Australian plants. Oecologia 101: 185-192 (cited in Payne 1998).
- Fairley A and Moore P. 1989. Native Plants of the Sydney District. Kangaroo Press, Sydney.
- Freedman B. 1992. Environmental Stress and the Management of Protected Areas. In Willison JHM, Bondrup-Nielsen S, Drysdale C, Heran TB, Munro NWP and Pollock TL (eds). Science and the Management of Protected Areas: Proceedings of an International Conference Held at Acadia University, Nova Scotia, Canada, 14-19 May 1991. Elsevier, Amsterdam.
- Gilpin ME and Soule ME. 1986. Minimum viable populations: processes of species extinction. In ME Soule (ed). Conservation Biology: the Science of Scarcity & Diversity. Sinauer Associates Inc, Sunderland.
- Global. 2000a. Donaldson Coal Mine Erosion & Sediment Control Plan. Global Soil Systems, Maitland.
- Gunninah. 1997a. Flora & Fauna Assessment for the Upgrade of the Pacific Highway at Karuah. Gunninah Environmental Consultants, Crows Nest.
- Gunninah. 1997b. Flora & Fauna Assessment of a Proposed Hard Rock Quarry at Karuah. Gunninah Environmental Consultants. Crows Nest.
- Gunninah. 1998a. Proposed Donaldson Open-cut Coal mine Threatened Species Issues: Supplementary Information and Section 5A Assessments of Significance. Gunninah Environmental Consultants, Crows Nest.

- Gunninah. 1998b. Donaldson Proposed Open-cut Coal Mine. Supplementary Species Impact Statement Black-eyed Susan *Tetratheca juncea*. Gunninah Environmental Consultants, Crows Nest.
- Gunninah. 1999. Review and Comments on the Lake Macquarie *Tetratheca juncea* Conservation Management Plan Interim Report. Gunninah Environmental Consultants, Crows Nest.
- Gunninah. 2000a. Donaldson Open-cut Coal Mine. *Tetratheca juncea* Survey Report & Conservation Area Identification. Gunninah Environmental Consultants, Crows Nest.
- Gunninah. 2000b. Donaldson Coal Mine. Flora & Fauna Management Plan. Gunninah Environmental Consultants, Crows Nest.
- Gunninah. 2000c. Donaldson Coal Mine. Bushland Conservation Area Identification Report. Gunninah Environmental Consultants, Crows Nest.
- Gunninah. 2000d. Donaldson Open-cut Coal Mine. Bushland Conservation Area Management Plan. Gunninah Environmental Consultants, Crows Nest.
- Harden G (ed). 1992. Flora of New South Wales. Volume 3. University Press, Kensington.
- Harper J. 1977. Population Biology of Plants. Academic Press. New York.
- Hurst PS, Gray S, Schwarz MP, Tilly JA, Foran AC and Adams M. 1997. Increased nest confounding and high intra-colony relatedness in the bee *Exoneura bicolor* (Hymenoptera: Apidae). Results from an experimental situation. Australian Journal of Ecology 22: 419-424.
- Kleinfelder, 2016. Annual Survey of the *Tetratheca juncea* Conservation Area 2016
- Kleinfelder, 2017. Annual Survey of the *Tetratheca juncea* Conservation Area 2017
- Lamont BB, Sanboroug, PW and Ward D. 2000. Plant size and season of burn affect flowering and fruiting of the grasstree *Xanthorrhoea preissii*. Austral Ecology 25(3): 268-273.
- Leigh JH and Briggs JD. 1992. Threatened Australian Plants. Overview and Case Studies. Australian National Parks & Wildlife Service, Canberra.
- Matthei LE. 1995. Soil Landscapes of the Newcastle 1:100000 Sheet. Department of Land & Water Conservation.
- Montalvo AM, Williams S, Rice K, Buchmann S, Cory C, Handel S, Nabhan G, Primack R and Robichaux R. 1997. Restoration biology: a population biology perspective. Restoration Ecology 5(4) 277-290.
- Norton AE. 1994. Field Observations into *Tetratheca juncea*. Fire Regeneration and its Distribution within Lake Macquarie City. BHP Steel, NSW.
- Pavlik B. 1994. Demographic monitoring and the recovery of endangered plant populations. In Bowles ML & CJ Whelan (eds). Restoration of Endangered Species. Conceptual Issues, Planning and Implementation. Cambridge University Press, Cambridge, England.

- Payne R. 1993. Prediction of the habitat for *Tetratheca juncea* in the Munmorah Area, near Wyong, New South Wales. *Cunninghamia* 3(1): 147-154.
- Payne R. 1998. *Tetratheca juncea* Smith: Conservation Management Plan, City of Lake Macquarie. Interim Report. Robert Payne Ecological Surveys & Management, Umina Beach.
- Payne R. 2000. *Tetratheca juncea* Smith: Conservation Management Plan, City of Lake Macquarie. Interim Report. Robert Payne Ecological Surveys & Management, Umina Beach.
- PPK. 1998. Donaldson Coal Mine Environmental Impact Statement. PPK Environment & Infrastructure, Brisbane.
- Scott J, Marshall A and Auld TD. 1995. Draft Conservation Research Statement and Recovery Plan for *Grevillea caleyi*. NSW National Parks & Wildlife Service, Hurstville.
- Stephenson AG. When does outcrossing occur in a mass-flowering plant? *Evolution* 36(4): 762-767.
- Whelan R. 1995. *The Ecology of Fire*. Cambridge University Press. Cambridge, England.

APPENDIX 1 Consultation Correspondence



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ABN 87 073 088 945

30th April 2019

Manager Planning & Aboriginal Heritage
Office of Environment and Heritage
PO Box 488G
Newcastle NSW 2300

via email: *OEH ROD Hunter Central Coast Mailbox (rog.hcc@environment.nsw.gov.au)*

Dear Sir/Madam,

Re: Donaldson / Abel Draft Management Plan Submission

Donaldson Coal Pty Limited have recently reviewed a number of environmental management plans for the Donaldson Open Cut Mine and Abel Underground coal mines. Donaldson coal mine ceased mining operations in 2013 and Abel coal mine has been in care and maintenance since 2016, with limited activities now occurring across either site.

Several Management Plans required under both PA 05_0136 (Abel Underground Mine) and DAs 118/698/22 and 98/01173 (Donaldson Open Cut) have been integrated as relevant management actions and mitigation measures are consistent across both projects.

As the risk associated with operational mining has now been minimised, management plans have been updated to reflect the current non-operational status of the sites.

Donaldson Coal are seeking comments from OEH for the following management plans (attached):

- Flora and Fauna Management Plan
- Noise Management Plan
- *Tetratheca juncea* Management Plan
- Aboriginal Management Plan
- Waste Management Plan
- Rehabilitation Management Plan
- Water Management Plan

We would appreciate the provision of comments and feedback on these management plans by the 31st May 2019 to meet statutory reporting requirements under project approvals.

If you have any questions or would like to discuss these management plans, please don't hesitate to contact the undersigned on 0439 909 952.

Yours sincerely,



Phillip Brown
Environment & Community Relations Superintendent
Donaldson Coal Pty Ltd

Enc: management plans

Phillip Brown

From: Steven Cox <Steven.Cox@environment.nsw.gov.au>
Sent: Thursday, 2 May 2019 2:54 PM
To: Phillip Brown
Cc: Robert Gibson
Subject: RE: Management Plan Review
Attachments: Donaldson Coal - Abel Underground mine and Donaldson Open Cut Coal mine - Management Plan Review.tr5

Hi Phillip,

Thank you for providing OEH with the opportunity to comment on the various Able Underground Mine and Donaldson Open Cut Coal Mine management plans. However, OEH is currently unable to provide comment on the plans.

Please provide copies of the plans to the Department of Planning and Environment without comment from OEH.

Regards
Steven

Steven Cox
Senior Team Leader Planning
Hunter Central Coast Branch
Conservation and Regional Delivery Division
Office of Environment & Heritage
Level 4/26 Honeysuckle Drive Newcastle NSW 2300
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T 02 4927 3140
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The OEH Hunter Central Coast Branch Planning Team has a group email address: rog.hcc@environment.nsw.gov.au. Please address all further email correspondence in relation to Planning and Aboriginal cultural heritage regulation matters to this address. If appropriate, emails can be marked to the attention of your usual contact in the team.

From: Phillip Brown <Phillip.Brown@yancoal.com.au>
Sent: Tuesday, 30 April 2019 2:27 PM
To: OEH ROD Hunter Central Coast Mailbox <rog.hcc@environment.nsw.gov.au>
Cc: James Benson <James.Benson@yancoal.com.au>
Subject: Management Plan Review

Please find enclosed correspondence relating to the above.

Phillip Brown | ENVIRONMENT & COMMUNITY RELATIONS SUPERINTENDENT

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