

PROPOSED 4WD & QUAD BIKE ACCESS TRACK

OFF BETTS TRACK, 10 KM SOUTH OF WARATAH

VEGETATION SURVEY and ASSESSMENT

FOR JAGUAR MINERALS LTD

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## **1. INTRODUCTION**

### **1.1 Background**

Jaguar Minerals is undertaking mineral exploration in an area off Betts Track 10 km south-west of Waratah and is proposing to undertake track works to facilitate access to the 11 drill sites. Betts Track currently only allows 4WD access for the first 0.80 km from where it starts at the Waratah-Savage River road. Thereafter it is wide enough for quad bikes only. A distance of approximately 1.6 kms needs to be widened. Also proposed is the construction of a 4WD track, branching off Betts Track for 1.8 kms to provide access to the most northern drill site (Jag 5), and the cutting of a thinner track suitable for quad bikes from Jag 5 southwards to link up the remaining drill sites for a distance of about 2.9 kms.

### **1.2 Objectives**

The objective of this survey is to determine the vegetation types, plant communities, and specific flora which occurs naturally in the location and to determine the likely impact of the proposed track route and works environs on those natural values.

A further objective is to determine if there is any evidence of Phytophthora in each of the survey areas.

### **1.3 Study Area**

SURVEY 1: Both sides of Betts Track from a point 0.80 km from the Waratah Savage River road for a distance of 1.6 km.

SURVEY 2: The proposed new 4WD track from Betts Track to the most northern drill site, Drill site 5, a distance of about 1.8 km.

SURVEY 3: An alternative 4WD route across the buttongrass plain from Betts Track to Drill Site 5.

SURVEY 4: The proposed quad bike route linking each of the 11 drill sites, southwards from Drill Site 5, for a distance of 2.9 km.

SURVEY 5: Mount Magnet Gravel Pit. Evidence of Phytophthora only

REF: Map of survey locations attached as an appendix.

## **2. BOTANICAL SURVEY**

### **2.1 Background Research**

The GT Spot data base and Natural Values Atlas (GIS Unit, Parks & Wildlife, DPIW) were accessed for the biological records of the study area and within 1 km of the location.

### **2.2 Survey Methodology**

Betts Track was surveyed on foot.

The proposed 4WD track from Betts Track to Jag 5 was surveyed on foot.

The alternative route over the buttongrass moorland was surveyed on foot.

The proposed quad bike track from Jag 5 southwards to link all drill sites is yet to be surveyed (October 18<sup>th</sup>)

The Mount Magnet gravel pits were also inspected on foot.

The botanical surveys were undertaken on 6<sup>th</sup> and 16<sup>th</sup> of October 2006.

Vascular plant species were recorded, and plant communities were observed and described, and cross referenced with the GT Spot data base.

### **2.3 Assessment of Conservation Significance**

The only plant community known to occur in the locality and listed as a threatened community is an area of *Eucalyptus brookeriana* Wet Forest. It has an area of about 6 ha and is located to the immediate east but clear of the line linking each of the drill sites.

The only plant species known to occur within 5 km and of the study area and listed under the Threatened Species Act is *Viola cunninghamii*. Its known location is south-east of the study area and was not recorded during this survey.

Soils derived from serpentine are known to support a high number of endemic plant species, and this is a world wide phenomena. *Micrantheum serpentinum* is an endemic species which has a localized distribution on the serpentine outcrops of Tasmania's west. This species was not recorded during the survey and the nearest known locality is adjacent to the Waratah- Savage River Road, 25 km from Waratah, which is about 15 km from the site.

*Hakea epiglottis* also occurs on serpentine although it is a quite widespread species and not restricted to that rock type. This species was recorded during the survey.

### **2.4 Limitations**

The survey was undertaken in early October. No plant survey can guarantee that all vascular flora will be observed and recorded during a single visit, due to seasonal and annual variation in abundance and the possible absence of fertile material for identification. Ephemeral species that may have been present includes orchids, lilies and grasses. However, all significant species known to occur in the vicinity of the study area are considered in this report.

### **2.5 Site Surveys: Vegetation Types, Plant Communities & Species Recorded**

The study area comprises a range of vegetation types and plant communities due to the diverse geology and derived soils of the location, and the drainage conditions present.

Rainforest communities dominated by *Nothofagus* are found on the more fertile soils and better drained slopes. On the poorer soils and those derived from serpentine the vegetation becomes open Eucalypt forest with a dense understorey, and where drainage is impeded the Eucalypt canopy is largely absent and the vegetation becomes a shrubland. Buttongrass moorland occupies the wettest locations and valley floors and tends to form a mosaic with the shrubland where the two communities intersect.

- No threatened plant communities were observed within the study area.

A total of 55 vascular plant species were recorded during the surveys comprising 35 woody species (trees and shrubs) and 12 species of ferns. No grasses or orchids were recorded although 6 grass-like species (graminoids) such as sedges and lilies were observed including Cutting Grass and Buttongrass which were very prevalent in their respective communities. Both species are sedges and not true grasses as their common names suggest. Only 2 species of herbs were recorded. Endemic Tasmanian species numbered 11.

- No species listed under the Threatened Species Act was recorded during the survey.

The presence of symptomatic evidence of the root and die-back pathogen *Phytophthora* was also surveyed for, within the study site and at the Mount Magnet gravel pits.

No introduced species or environmental weeds were observed along Betts Track or within the study area as a whole.

**SURVEY 1: BETTS TRACK**

Betts Track passes through mature *Nothofagus* Gallery Rainforest from where it begins at the Savage River Road and continues to where the geology changes to ultramafics. There is an abrupt change in vegetation at this point to *Eucalyptus nitida* Open Forest which has a very dense understorey. The understorey has a diversity of plant species although it is predominantly *Leptospermum lanigerum*. The density of the Eucalypt canopy varies in response to the localized drainage conditions to a point where the trees are absent in the wettest sites and the vegetation becomes Wet Scrub dominated by the *Leptospermum*. The track passes through two small areas of Short Rainforest which has a higher diversity of understorey species than the Tall Rainforest. Horizontal is usually the dominant understorey species and this community tends to occur on less fertile and less well-drained soils. No symptomatic evidence of the presence of *Phytophthora* was observed along Betts Track. Plant families known to be susceptible to the disease (Epacridaceae and Proteaceae) were represented in species recorded in Survey 1. and no plants were observed which were in decline or showed observable symptoms. Some decline and dead branches were observed in the *Eucalyptus nitida* further east along Betts Track but it is considered to have been caused by other environmental factors rather than disease as other normally susceptible species were present and there was evidence of regrowth in the Eucalypts themselves..

Chainage	Vegetation Type / Plant Community	TasVeg Code
0.0 – 0.80 km	Tall (Gallery) <i>Nothofagus cunninghamii</i> Rainforest (old growth)	RMT
0.80 – 0.85	Short (Thamnic) <i>Nothofagus – Anodopetalum</i> Rainforest (creek crossing)	RMS
0.85 – 1.40	<i>Eucalyptus nitida</i> Open Forest over <i>Leptospermum lanigerum</i>	WNL
1.40 – 1.50	Short (Thamnic) <i>Nothofagus – Anodopetalum</i> Rainforest	RMS
1.50 – 2.00	<i>Eucalyptus nitida</i> Open Forest over <i>Leptospermum lanigerum</i>	WNL
2.00 – 2.40	<i>Leptospermum lanigerum</i> Wet Scrub	SLW
2.40	Starting point for Survey 2	

- Chainage begins at the main Waratah – Savage River Road.

**IMPACTS**

The proposed widening of Betts Track will have no significant impact on the botanical values of the above plant communities providing the clearing is limited to the required track width only. The *Eucalyptus nitida* Open Forest and the predominant understorey species are considered to have good regenerative capacity as demonstrated by the regrowth over Betts track eastwards of the survey area.

The vegetation at approximately chainage 1.4 – 1.6 km includes a number of old growth trees in close proximity to the southern side of the existing track. The track should be widened only on the northern side at this point to avoid impacting on these trees.

- Tree 1.....*Nothofagus cunninghamii*..... 5405126N – 368686E (2 m off track, south side)
- Tree 2 .....*Nothofagus cunninghamii* ..... 5405127 – 368687E (south side of track)
- Tree 3..... *Eucalyptus nitida*..... 5405391N- 368924E (south side of track)
- Tree 4 .....*Nothofagus cunninghamii*.....5405391N- 368928E (1.5 m south of track)
- Tree 5.....*Nothofagus cunninghamii*.....5405447N – 368871E (3m south of track)

**SURVEY 2: PROPOSED 4WD TRACK FROM BETTS TRACK TO DRILL SITE 5.**

The route of the proposed track begins from Betts Track at a point approximately 2.4 km from the Waratah – Savage River Road and extends southwards for a distance of approximately 1.8 km to Drill site No.5. Most of the route approximately follows the 720 metre contour. The proposed route is shown on the attached map compiled by Ron Gregory.

The route commences in *Leptospermum lanigerum* scrub which has a dense ground layer of *Gahnia grandis* (Cutting Grass). This vegetation continues for only a short distance (about 120 metres) before entering old-growth Myrtle Rainforest, (Tall (Gallery) *Nothofagus cunninghamii* Rainforest). Gallery Rainforest is characterized by a dense upper canopy of tall clean trunked trees but with a quite open understorey and a ground layer which is predominately mosses and lichens, and an occasional fern. *Sassafras*, *Atherosperma moschatum*, is present as a secondary tree but in this situation it rarely reaches the same stature of the Myrtle. The site soil conditions were moist but generally well drained.

The balance of the proposed track is within this rainforest community except for the last 150 metres to Drill site 5, which is Short (Thamnic) Rainforest with a dense understorey of Horizontal, *Anodopetalum biglandulosum*.

No evidence of the presence of *Phytophthora* was observed along the proposed route.

Chainage	Vegetation Type / Plant Community	TasVeg Code
0.0 – 0.12	<i>Leptospermum lanigerum</i> Wet Scrub	SLW
0.12 – 1.65	Tall (Gallery) <i>Nothofagus cunninghamii</i> Rainforest (old growth)	RMT
1.65 - 1.80	Short (Thamnic) <i>Nothofagus</i> – <i>Anodopetalum</i> Rainforest	RMS

- Chainage begins at Betts Track (2.4 km) from the Waratah – Savage River Road.

**IMPACTS**

Although the Tall Rainforest is not a threatened community and it is relatively widespread in western Tasmania it has conservation significance in that it is mature old-growth forest. Such forests have been reduced in area over recent times due to wild-fire and forestry activities.

The proposed track will have some impact on the community although the effect can be minimized by forming the track so that it avoids any standing old-growth trees. Ideally the track should be located down slope of adjacent old-growth trees and no closer than 4 metres if possible to limit the disturbance of drainage patterns and direct damage to roots from machinery.

The track should also be located on existing natural benches where ever possible to minimize the amount of cut and fill that may be required. The site substrate should be utilized as much as possible as the base for the track to limit the quantity of gravel that will need to be introduced to the site. This will benefit the future rehabilitation of the track. Natural regrowth has occurred along Betts Track itself, where it passes through mature rainforest with the principal initial colonizer being the ground fern, *Histiopteris incisa*. It is anticipated that similar regeneration will occur at this location. The track will have limited impact on the small section of Wet Scrub and the Short Rainforest.

**SURVEY 3: ALTERNATIVE ROUTE FOR 4WD TRACK FROM BETTS TRACK TO DRILL SITE 5.**

A sample alternative route for the proposed 4WD track across the buttongrass plain between Betts Track and Drill site 5 was also surveyed. The route cuts across the valley through areas of *Eucalyptus nitida* Open Forest over *Leptospermum lanigerum* Scrub, *Hakea epiglottis* Open Scrub, (Buttongrass Moorland with Emergent (*Hakea epiglottis*) Shrubs), Medium *Eucalyptus delegatensis* Forest, Short Rainforest and Buttongrass Moorland, and crossed a number of small creeks for a distance of approximately 1.4 km. The ground conditions along this route were very wet to swampy.

This alternative route would also involve the widening of Betts Track for up to a further 1,000 metres. The vegetation community along this section of Betts Track is mainly *Leptospermum lanigerum* Scrub with some emergent trees of *Eucalyptus nitida*.

None of these communities are listed as threatened and each is relatively widespread in the locality. Some clarification may be required for the *Hakea epiglottis* Open Scrub community however, as it does not appear to have been described as a stand alone community. It tends to form a mosaic with the Buttongrass Community and could come under the description of Buttongrass Moorland with Emergent Shrubs (TasVeg code MBS).

Buttongrass forms almost pure stands across the floor of the valley in very wet ground conditions. No symptomatic evidence was observed of the presence of Phytophthora along the alternative route. Species known to be susceptible to the disease were present and in a healthy condition such as *Sprengelia incarnata*, *Telopea truncata*, *Cenarrhenes nitida* and *Persoonia juniperina*..

Chainage	Vegetation Type / Plant Community	TasVeg Code
0 – 0.15 km	<i>Eucalyptus nitida</i> Open Forest over <i>Leptospermum lanigerum</i> Scrub	WNL
0.15 – 0.80	Buttongrass Moorland	MBU
0.80 – 1.00	<i>Hakea epiglottis</i> Scrub Open Scrub or Buttongrass Moorland with Emergent Shrubs	MBS
1.00 – 1.15	<i>Eucalyptus delegatensis</i> Medium Height Forest	WDA
1.15 – 1.40	Short (Thamnic) <i>Nothofagus</i> – <i>Anodopetalum</i> Rainforest	RMS

- Chainage begins at Betts Track. (approx. 3.4 km from main road)

## IMPACTS

The alternative route would present more challenges for the track construction as it crosses the valley and a number of small streams through very wet ground conditions and would require the importation of additional gravel for road base. The route would pass through a range of plant communities although it is considered that the impact on the vegetation could be minimized by limiting the clearance width for the track. It is anticipated that each of the woody plant communities would regenerate successfully if and when the track was closed. The communities where Buttongrass is the predominant species may not regenerate as readily.

## SURVEY 4: PROPOSED QUAD BIKE TRACK LINKING THE DRILL SITES

This survey is yet to be undertaken pending the cutting of an access track, as of 18<sup>th</sup> October 2006. The proximity of the threatened community *Eucalyptus brookeriana* Wet Forest (TasVeg code WBR) to the proposed track and drill sites will need to be ground truthed at that time.

## SURVEY 5: MOUNT MAGNET GRAVEL PITS

It is proposed that gravels required for widening Betts Track and constructing the new 4WD track will be imported from these gravel pits.

The pits were surveyed for symptomatic evidence of the presence of the soil borne root pathogen *Phytophthora cinnamomi*.

All vegetation in the vicinity of the gravel pit workings and down slope of the site was healthy and there was no evidence of die-back or decline in known susceptible plant groups, such as species in the Epacridaceae and Proteaceae families, in the vegetation adjoining the pit locality.

It is considered that the gravel pits and environs are clear of the disease, however care will need to be taken to ensure that the pathogen is not introduced from elsewhere on machinery and equipment which may have been operating in infected areas previously.

## 3. RECOMMENDATIONS TO LIMIT IMPACT

### 3.1 Survey 1: Betts Track

- No widening of Betts Track is required for the initial 0.8 km from the Waratah/ Savage River road through Myrtle Rainforest.
- Limit clearing of the balance of Betts Track to the minimum required track width only.
- Where old growth trees have been identified adjacent and close to the existing track, the track widening should be carried out on the opposite side only.

### 3.2 Survey 2: Proposed 4WD Track

- Align new track to avoid any old growth trees (mainly Myrtles)
- Locate track downslope of old growth trees and no closer than 4 metres where ever possible.
- Locate track on existing natural benches where possible in order to limit excavations.
- Utilize site substrate as track base as much as possible to limit the amount of gravel that will be required.

**3.3 Survey 3: Alternative 4WD Route**

- Not the preferred route for a 4WD track due to the low lying and very wet conditions, and the creek crossings across the valley.

**3.4 Survey 4: Proposed Track linking the Drill Sites**

- Survey yet to be undertaken

**3.5 Survey 5: Mount Magnet Gravel Pits**

- Accepted protocols should be observed to prevent the introduction of Phytophthora into the study area on equipment and machinery carting gravel for track construction works. (Trucks and machinery may have been working in infected areas previously).  
Strict hygiene and washdown procedures should be followed for all vehicles, machinery and equipment.

**3.6 Phytophthora Management**

- Accepted protocols should be observed to prevent the introduction of Phytophthora by all personnel, vehicles, machinery and equipment entering the site.
- No gravel or other material from unapproved sources should be brought onto the site.

**APPENDIX 1. PLANT COMMUNITIES & SPECIES RECORDED**

**1. Tall (Gallery) *Nothofagus cunninghamii* Rainforest**

Mature old growth Myrtle Rainforest was recorded along the first kilometer of Betts Track and is also the dominant community along the proposed route of the new 4WD track towards Drill site 5. This is a widespread community in western Tasmania. The TasVeg code for this community is RMT.

**DOMINANT TREES**

<i>Nothofagus cunninghamii</i>	Myrtle	abundant
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**SECONDARY TREES**

<i>Atherosperma moschatum</i>	Sassafras	common
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**SHRUBS**

<i>Anodopetalum biglandulosum</i>	Horizontal	occasional.
<i>Leptocophylla juniperina</i> subsp. <i>parvifolia</i>	Mountin Pink Berry	occ
<i>Pimelea drupacea</i>	Cherry Riceflower	occ
<i>Tasmannia lanceolata</i>	Native Pepper	occ

**HERBS**

<i>Hydrocoytle hirta</i>	Hairy Pennywort	occ
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**GRASSES & GRAMINOIDS**

<i>Gahnia grandis</i>	Cutting Grass	occ
<i>Libertia pulchella</i>	Pretty Grass-flag	com

**FERNS & ALLIES**

<i>Crepidomanes venosum</i>	Bristle Filmyfern	occ
<i>Dicksonia antarctica</i>	Soft Treefern	occ
<i>Grammitis billardierei</i>	Common Fingerfern	com
<i>Histiopteris incisa</i>	Bats Wing Fern	com
<i>Hypolepis rugulosa</i>	Ruddy Groundfern	occ
<i>Microsorium pustulatum</i>	Kangaroo Fern	occ
<i>Polystichum proliferum</i>	Mother Shieldfern	occ
<i>Rumohra adiantiformis</i>	Leathery Shieldfern	occ

**2. Short (Thamnic) *Nothofagus cunninghamii* – *Anodopetalum biglandulosum* Rainforest**

A rainforest community where Myrtle is the emergent tree although of lesser height than in the previous community. Horizontal provides a dense secondary layer and is as frequent in this community as the Myrtle itself. There is also a greater diversity and frequency of rainforest shrubs in this community than in the Tall Rainforest.

This community was recorded in the vicinity of Drill Site 5, (Surveys 2 & 3), and at three locations along Betts Track at chainages 0.80 – 0.85 and 1.15 – 1.40 km (Survey 1).

It is a widespread community in western Tasmania. The TasVeg code for this community is RMS.

**EMERGENT TREES**

<i>Nothofagus cunninghamii</i>	Myrtle	common
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**DOMINANT UNDERSTOREY**

<i>Anodopetalum biglandulosum</i>	Horizontal	abundant
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**UNDERSTOREY TREES**

<i>Atherosperma moschatum</i>	Sassafras	com
<i>Eucryphia lucida</i>	Leatherwood	occ
<i>Phyllocladus asplenifolius</i>	Celerytop Pine	com
<i>Pittosporum bicolor</i>	Cheesewood	occ

**SHRUBS**

<i>Anopteris glandulosa</i>	Tasmanian Laurel	occ
<i>Aristotelia peduncularis</i>	Heart Berry	occ
<i>Cenarrhenes nitida</i>	Native Plum	occ
<i>Leptecophylla juniperina</i> subsp. <i>parvifolia</i>	Mountain Pinkberry	occ
<i>Pimelea drupacea</i>	Cherry Riceflower	occ
<i>Tasmannia lanceolata</i>	Native Pepper	com
<i>Telopea truncata</i>	Waratah	occ
<i>Trochocarpa cunninghamii</i>	Stragglng Purpleberry	occ

**GRASSES & GRAMINOIDS**

<i>Gahnia grandis</i>	Cutting Grass	com
<i>Libertia pulchella</i>	Pretty Grass-flag	com

**FERNS & ALLIES**

<i>Crepidomanes venosum</i>	Bristle Filmyfern	occ
<i>Dicksonia antarctica</i>	Soft Treefern	com
<i>Grammitis billardierei</i>	Common Fingerfern	com
<i>Histiopteris incisa</i>	Batswing Fern	com
<i>Hypolepis rugulosus</i>	Ruddy Groundfern	com
<i>Polystichum proliferum</i>	Mother Shieldfern	com
<i>Rumohra adiantiformis</i>	Leathery Shieldfern	occ

**3. *Eucalyptus nitida* Open Forest over *Leptospermum lanigerum* Understorey**

This community is characterized by the West Coast Peppermint *Eucalyptus nitida* forming an open to very open canopy of low to medium height (6 to 10 metres). The frequency of the Eucalypt reduces where drainage is impeded to the point where it is absent from the wettest sites and then the vegetation becomes a scrub community.

The understorey is very dense and comprised of predominantly Woolly Tea Tree *Leptospermum lanigerum* up to about 4 metres in height and with dense thickets of *Bauera rubioides* and *Gahnia grandis* (Cutting Grass) making it largely impenetrable.

The community occurs on ultramafic derived soils in this location.

TasVeg Community code WNL.

Location: Betts Track chainages 0.85 – 1.40 and 1.50 to 2.00 km (Survey 1.) and 0 – 0.15 km alternative route from Betts Track to Drill 5 (Survey 3).

**DOMINANT TREES**

<i>Eucalyptus nitida</i>	West Coast Peppermint	abundant
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**PREDOMINANT UNDERSTOREY TALL SHRUBS**

<i>Leptospermum lanigerum</i>	Woolly Tea Tree	abundant
<i>Melaleuca squarrosa</i>	Scented Paperbark	common

**TALL SHRUBS**

<i>Acacia mucronata</i>	Caterpillar Wattle	occasional
<i>Banksia marginata</i>	Silver Banksia	occ
<i>Hakea lissosperma</i>	Mountain Needlebush	uncommon
<i>Phyllocladus asplenifolius</i>	Celerytop Pine	occ

**SHRUBS**

<i>Aristotelia pedunculata</i>	Heart Berry	uncommon
<i>Bauera rubioides</i>	Wiry Bauera	abundant
<i>Callistemon viridiflorus</i>	Prickly Bottlebrush	com
<i>Cenarrhenes nitida</i>	Native Plum	occ
<i>Epacris impressa</i>	Common Heath	uncom
<i>Leptecophylla juniperina</i> subsp. <i>parvifolia</i>	Pink Mountainberry	occ
<i>Leptospermum scoparium</i>	Manuka Tea Tree	occ
<i>Lomatia polymorpha</i>	Mountain Guitarplant	uncom
<i>Melaleuca squamea</i>	Swamp Honeymyrtle	occ
<i>Nematolepis squamea</i>	Satinwood	uncom
<i>Persoonia juniperina</i>	Prickly Geebung	rare
<i>Pimelea linifolia</i>	Slender Riceflower	uncom
<i>Pittosporum bicolor</i>	Cheesewood	occ
<i>Pultenaea juniperina</i>	Prickly Beauty	occ
<i>Sprengelia incarnata</i>	Swamp Heath	occ

<i>Tasmannia lanceolata</i>	Native Pepper	com
<i>Telopea truncata</i>	Waratah	com
<b>CLIMBERS</b>		
<i>Billardiera longiflora</i>	Climbing Blueberry	rare
<b>GRASSES &amp; GRAMINOIDS</b>		
<i>Diplarrena moraea</i>	White Flag-iris	com
<i>Dianella tasmanica</i>	Tasman Flaxlily	uncom
<i>Empodisma minus</i>	Spreading Roperush	occ
<i>Gahnia grandis</i>	Cutting Grass	abundant
<b>FERNS &amp; ALLIES</b>		
<i>Blechnum wattsi</i>	Hard Waterfern	occ
<i>Gleichenia dicarpa</i>	Pouched Coralfern	occ
<i>Sticherus tener</i>	Silky Fanfern	occ

**4. *Leptospermum lanigerum* Wet Scrub**

Species composition of this community is much the same as the *Eucalyptus nitida* community except that the tree canopy of the Eucalypt is absent or largely so, the dominant species being Woolly Tea tree *Leptospermum lanigerum* but with *Melaleuca squarrosa* being very common also. The height of the two main species is between 3 and 5 metres. As with the previous community the vegetation is very dense with thickets of *Bauera rubioides* and *Gahnia grandis*.

The soils are of ultramafic derivation and are very poorly drained where this community occurs. The TasVeg community code is SLW.

This community is widespread in the locality and was surveyed along Betts Track from chainage 2.0 – 2.4 km (Survey 1) and the initial part of the alternative route from Betts Track to drill site 5 from 0 km at Betts Track for a distance of 0.15 km, including 1.0 km of Betts Track itself (Survey 3)

**DOMINANTS**

<i>Leptospermum lanigerum</i>	Woolly Tea Tree	abundant
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**TALL SHRUBS**

<i>Acacia mucronata</i>	Caterpillar Wattle	occasional
<i>Banksia marginata</i>	Silver Wattle	occ
<i>Hakea lissosperma</i>	Mountain Needlebush	occ
<i>Melaleuca squarrosa</i>	Scented Paperbark	common

**SHRUBS**

<i>Bauera rubioides</i>	Wiry Bauera	abundant
<i>Callistemon viridiflorus</i>	Prickly Bottlebrush	com
<i>Cenarrhenes nitida</i>	Native Plum	uncom
<i>Leptecophylla juniperina</i> subsp. <i>parvifolia</i>	Pink Mountainberry	occ
<i>Leptospermum scoparium</i>	Manuka Tea Tree	occ
<i>Lomatia polymorpha</i>	Mountain Guitarplant	uncom
<i>Melaleuca squamea</i>	Swamp Honeymyrtle	com
<i>Nematolepis squamea</i>	Satinwood	uncom
<i>Pimelea linifolia</i>	Slender Riceflower	uncom
<i>Pittosporum bicolor</i>	Cheesewood	uncom
<i>Sprengelia incarnata</i>	Swamp Heath	occ
<i>Tasmania lanceolata</i>	Native Pepper	com
<i>Telopea truncata</i>	Waratah	com

**GRASSES & GRAMINOIDS**

<i>Diplarrena moraea</i>	White Flag-iris	com
<i>Empodisma minus</i>	Spreading Roperush	occ
<i>Gahnia grandis</i>	Cutting Grass	abundant

**FERNS & ALLIES**

<i>Blechnum wattsii</i>	Hard Waterfern	occ
<i>Gleichenia dicarpa</i>	Pouched Coralfern	occ

**5. Buttongrass Moorland**

A limited diversity of species is a characteristic of Buttongrass Communities and this community within the study area is devoid of trees and largely shrubless.

The community extends over the valley floor below the 660 metre contour in wet soil conditions.

The TasVeg community code is MBU.

The community was recorded in Survey 3 the alternative route option between Betts Tack and drill site 5 between chainage 0.15 – 0.80 km.

**DOMINANTS**

<i>Gymnoschoenus sphaerocephalus</i>	Buttongrass	abundant
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**SHRUBS**

<i>Hakea epiglottis</i>	Beaked Needlebush	uncom
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<i>Sprengelia incarnata</i>	Swamp Heath	occ
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<i>Telopea truncata</i>	Waratah	uncom
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**GRASSES & GRAMINOIDS**

<i>Diplarrena moraea</i>	White Flag-iris	com
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<i>Gahnia grandis</i>	Cutting Grass	occ
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**6. Buttongrass Moorland with Emergent Shrubs**

The TasVeg data base vegetation map describes this community as Open Rainforest Scrub, however the dominant shrubby species is *Hakea epiglottis* which is not specifically a rainforest plant.

Buttongrass is as frequent in the community as the Hakea and the community is adjacent to and forms a mosaic with the previous Buttongrass community. Therefore this community is more akin to Buttongrass Moorland with Emergent Shrubs.

The TasVeg code for this community is MBS.

The community was recorded in Survey 3 the alternative route, between chainage 0.80 and 0.95 km.

CO-DOMINANTS per FREQUENCY

<i>Gymnochoenus sphaerocephalus</i>	Buttongrass	abundant
<i>Hakea epiglottis</i>	Beaked Needlebush	abundant

SHRUBS

<i>Callistemon viridiflorus</i>	Prickly Bottlebrush	occ
<i>Melaleuca squamea</i>	Swamp Honeymyrtle	occ
<i>Telopea truncata</i>	Waratah	occ

GRASSES & GRAMINOIDS

<i>Diplarrena moraea</i>	White Flag-iris	com
<i>Gahnia grandis</i>	Cutting Grass	com

**7. *Eucalyptus delegatensis* Medium Forest**

The current TasVeg vegetation map defines this community as *Eucalyptus delegatensis* Dry Forest (DDE) although it is more of a wet forest type in this locality. Where the community adjoins the low rainforest community there is a greater predominance of rainforest species within the understorey and they become less prevalent with increasing distance.

This community also occurs to the south of the study area.

The TasVeg code for this community is WDA.

The community was recorded on Survey 3, the alternative 4WD route, between chainage 1.15 and 1.30 km.

**DOMINANT TREE**

<i>Eucalyptus delegatensis</i>	Gumtopped Stringybark	com
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**UNDERSTOREY TREES**

<i>Anodopetalum biglandulosum</i>	Horizontal	com
<i>Atherosperma moschatum</i>	Sassafras	occ
<i>Phyllocladus asplenifolius</i>	Celerytop Pine	occ

**SHRUBS**

<i>Bauera rubioides</i>	Wiry Bauera	com
<i>Hakea epiglottis</i>	Beaked Needlebush	com
<i>Leptospermum lanigerum</i>	Woolly Tea Tree	com
<i>Lomatia polymorpha</i>	Mountain Guitarplant	occ
<i>Melaleuca squarrosa</i>	Scented Paperbark	occ
<i>Sprengelia incarnate</i>	Swamp Heath	occ
<i>Tasmannia lanceolata</i>	Native Pepper	com
<i>Telopea truncata</i>	Waratah	com

**HERBS**

<i>Rubus gunnianus</i>	Mountain Raspberry	uncom
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**GRASSES & GRAMINOIDS**

<i>Diplarrena moraea</i>	White Flag-iris	occ
<i>Gahnis grandis</i>	Cutting Grass	com

**APPENDIX 2: Checklist of Vascular Species Recorded**

Dicotyledonae		
APIACEAE		Recorded in Community
<i>Hydrocotyle hirta</i>		RMT
CUNONIACEAE		
<i>Anodopetalum biglandulosum</i>	E	RMT, RMS, WDA
<i>Bauera rubioides</i>		WNL, SLW, WDA
ELAEOCARPACEAE		
<i>Aristotelia peduncularis</i>		RMS, WNL
EPACRIDACEAE		
<i>Epacris impressa</i>		WNL
<i>Leptecophylla juniperina</i> subsp. <i>parvifolia</i>		RMT, RMS, WNL, SLW,
<i>Trochocarpa cunninghamii</i>	E	RMS
<i>Sprengelia incarnata</i>		SLW, MBU, MBS, WDA
ERICACEAE		
<i>Gaultheria hispidula</i>		RMT
ESCALLONIACEAE		
<i>Anopterus glandulosus</i>	E	RMS
FABACEAE		
<i>Pultenaea juniperina</i>		WNL, SLW
FAGACEAE		
<i>Nothofagus cunninghamii</i>		RMT, RMS
MIMOSACEAE		
<i>Acacia mucronata</i>		WNL, SLW
MONIMIACEAE		
<i>Atherosperma moschatum</i>		RMT, RMS, WDA
MYRTACEAE		
<i>Baeckia gunniana</i>		SLW
<i>Callistemon viridiflorus</i>	E	WNL, SLW, MBS, WDA
<i>Eucalyptus delegatensis</i>	E	WDA
<i>Eucalyptus nitida</i>	E	WNL, SLW
<i>Leptospermum lanigerum</i>		WNL, SLW, WDA

APPENDIX 2: (cont)

*Leptospermum scoparium*  
*Melaleuca squamea*  
*Melaleuca squarrosa*

SLW, WNL  
 SLW, MBS  
 WNL, SLW, WDA

PITTOSPORACEAE

*Billardiera longiflora*  
*Pittosporum bicolor*

WNL  
 RMS, WNL, WDA

PROTEACEAE

*Banksia marginata*  
*Cenarrhenes nitida* E  
*Hakea epiglottis* E  
*Hakea lissosperma*  
*Lomatia polymorpha* E  
*Persoonia juniperina*  
*Telopea truncata* E

WNL, SLW  
 RMS, SLW, WNL  
 MBS, MBU, WDA  
 WNL, SLW  
 WNL, SLW, WDA  
 WNL, SLW  
 RMS, WNL, SLW, MBU, MBS, WDA

ROSACEAE

*Rubus gunnianus*

WDA

RUTACEAE

*Nematolepis squamea*

RMS, WNL

THYMELAEACEAE

*Pimelea drupaceae*  
*Pimelea linifolia*

RMT, RMS,  
 SLW, WNL

WINTERACEAE

*Tasmannia lanceolata*

RMT, WNL, SLW, WDA

Monocotyledonae

CYPERACEAE

*Gahnia grandis*  
*Gymnoschoenus sphaerocephalus*

RMS, WNL, SLW, MBU, WDA  
 MBU, MBS

IRIDACEAE

*Diplarrena moraea*  
*Libertia pulchella*

WNL, SLW, MBU, MBS, WDA  
 RMT, RMS

LILIACEAE

*Dianella tasmanica*

RMS, WNL

APPENDIX 2: (cont)

RESTIONACEAE

*Empodisma minus*

WNL, SLW

Gymnospermae

PODOCARPACEAE

*Phyllocladus asplenifolius* E

WNL, RMS, WDA

Pteridophyta

ASPENIACEAE

*Asplenium bulbiferum*

RMT

BLECHNACEAE

*Blechnum wattsii*

WNL, SLW

DENNSTAEDTIACEAE

*Histiopteris incisa*

*Hypolepis rugulosus*

RMT, RMS, WNL

RMT, WNL

DICKSONIACEAE

*Dicksonia antarctica*

RMT, RMS

DRYOPTERACEAE

*Polystichum proliferum*

*Rumohra adiantiformis*

RMS

RMT, RMS

GLEICHENIACEAE

*Gleichenia dicarpa*

*Sticherus tener*

WNL, SLW

RMS, WNL

GRAMMITIDACEAE

*Grammitis billardierei*

RMT, RMS

HYMENOPHYLLACEAE

*Crepidomanes venosum*

RMT, RMS

POLYPODIACEAE

*Microsorium pustulatum*

RMS

APPENDIX 2: (cont)

E = Endemic Species

**Community Codes**

RMT..... Tall (Gallery) *Nothofagus* Rainforest  
RMS..... Short (Thamnic) Rainforest  
WNL..... *Eucalyptus nitida* Open Forest  
SLW..... *Leptospermum lanigerum* Scrub  
WDA..... *Eucalyptus delegatensis* Medium Forest  
MBU..... Buttongrass Moorland  
MBS..... Buttongrass Moorland with Emergent Shrubs



