

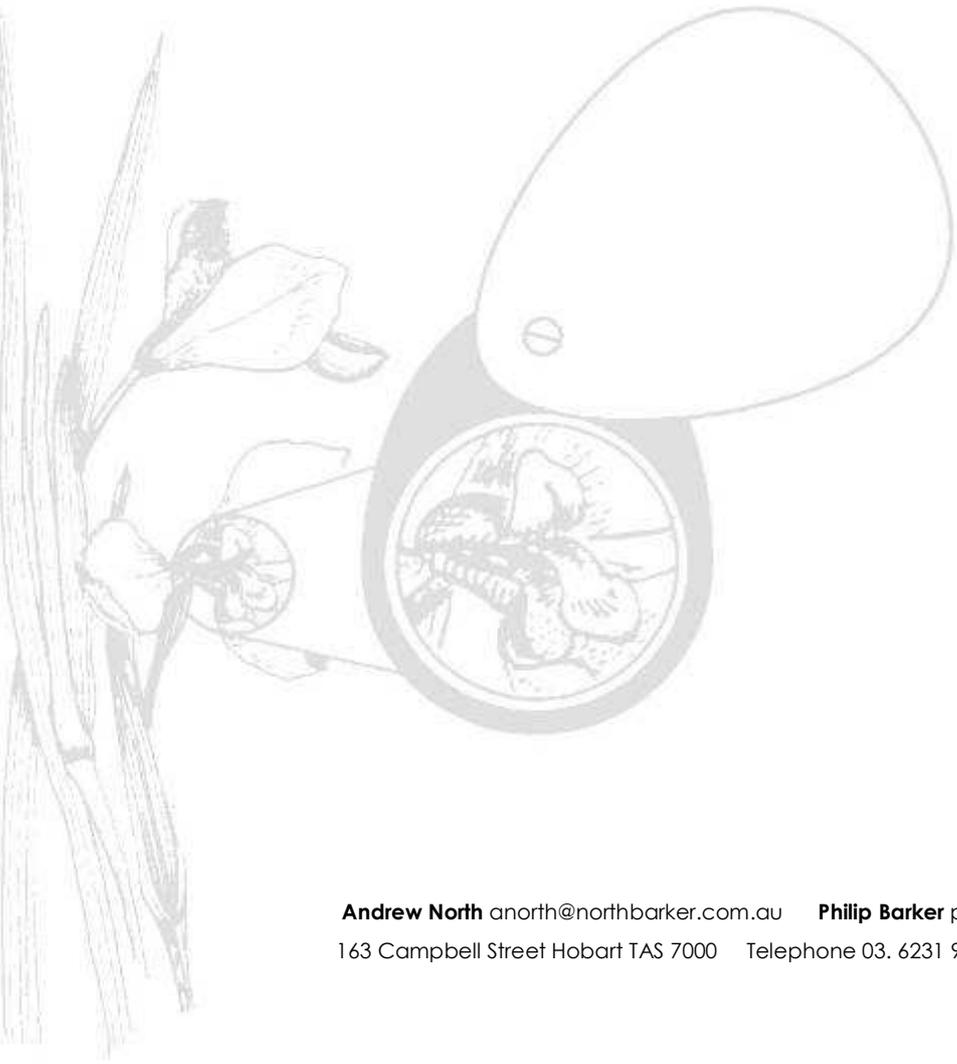
Campbell Town Bauxite Extraction

FLORA AND FAUNA HABITAT ASSESSMENT

For Pitt & Sherry

5th December 2013

PAS088



SUMMARY

Australian Bauxite (ABx) is proposing to establish a bauxite mine on grazing land to the northwest of Campbell Town. North Barker Ecosystem Services have been engaged by ABx to assess the potential for the site to support biodiversity values that trigger state and/or Commonwealth environmental legislation.

The site was surveyed during April, May and November, 2013. Because flora surveys do not always capture the full complement of species on a site (particularly when plants are reduced in size by grazing), parts of the assessment rely primarily on desktop estimation of the probability of species presence or absence (and therefore risk of impact), based on habitat suitability and previous observations in the local area.

Vegetation

There are three Tasveg types in the study area:

- Agricultural land (FAG).
- Midlands woodland complex (DMW) - *E. viminalis facies*; and
- Bursaria - Acacia woodland (NBA)

The findings of field surveys were not consistent with TASVEG v2.0 mapping, which indicates significant patches of the threatened (Tasmanian *Nature Conservation Act 1995*) Midlands woodland complex (DMW). Contrary to the Tasveg mapping, the surveys found that the vast majority of trees stand over pasture, with just a few very small remnants with highly degraded native understoreys.

Tasmanian lowland native grassland, high quality examples of which are a threatened ecological community under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999 (EPBCA)*, is known to occur within 5 km of the site. However, no area of vegetation on site meets all of the criteria needed to qualify as threatened lowland native grassland under the EPBC. In particular, one area of NBA is sufficiently degraded by weed invasion to be excluded as EPBC grassland.

Flora

Two flora species listed under the Tasmanian *Threatened Species Protection Act 1995 (TSPA)* were observed on site:

- knotty speargrass, *Austrostipa nodosa* (rare); and
- spreading knawel, *Scleranthus fasciculatus* (vulnerable).

One other TSPA listed species, *Austrostipa scabra*, is considered to have a moderate chance of occurring on site in low numbers, possibly suppressed by grazing.

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Under the TSPA, a permit to take will be required for *Austrostipa nodosa* and *Scleranthus fasciculatus* if they cannot be avoided. However, *Austrostipa nodosa* is outside of the proposed footprint.

Fauna

Although the state (rare) and nationally (vulnerable) listed spotted-tailed quoll *Dasyurus maculatus* was recorded on site, the proposed action is not considered likely to result in a significant impact on this species.

The site also has suitable characteristics (including large tree hollows and perch sites) and prey for occupation by masked owls (endangered TSPA, vulnerable EPBC). However, targeted call back surveys and tree observations did not record any evidence of the presence of the species. The action is not considered likely to result in a significant impact upon the species.

The site is unsuitable for Tasmanian devil dens. The undisturbed recent and old carcasses of wallaby suggest that the Tasmanian devil has not been present on the site for some time and as such it is not currently part of a home range.

Consequently, referral to the federal minister on the basis of impacts to EPBC listed fauna is not considered to be necessary.

Weeds

Control of the declared weeds gorse, horehound and winged slender thistle may be necessary if operations on site are likely to breach the containment principles of the *Tasmanian Weed Management Act* – i.e. introduce the weeds into other areas where they currently do not occur, or where they may impact threatened flora.

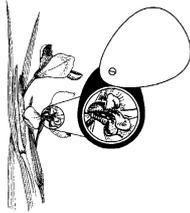
ACKNOWLEDGMENTS

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INTRODUCTION

Background:

Australian Bauxite (ABx) is proposing to establish a bauxite mine on grazing land to the northwest of Campbell Town, Tasmania. The property is located off Macquarie Road, approximately 6 km from the Midland Highway (Figure 1).

North Barker Ecosystem Services (NBES) have been engaged by ABx to assess the potential for the site to support biodiversity values that might trigger state and/or national environmental legislation. This report documents the findings of site surveys and a desktop review of conservation values known from similar habitats nearby. This will guide the client in appropriate planning measures to move forward with the proposal.

Methods: During April, May and November, 2013, the site was visited on four occasions by members of NBES, either singly or in pairs. Three field trips undertaken during daylight hours focussed on vegetation and the site's suitability as habitat for threatened fauna. These surveys constituted a complete search of the site, with observations of threatened species (Tasmanian *Threatened Species Protection Act 1995* [TSPA] and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*¹ [EPBCA]) and environmental and 'declared'² weeds recorded with a handheld GPS.

Observations of habitat suitability for fauna, as well as direct and/or indirect indicators of presence (*i.e.* scats, tracks, dens, *etc.*) were made concurrently. In particular, all old growth trees on site were (recorded with GPS and) examined for suitability as nest sites for masked owls – this constituted visual examination of the trees from ground level, looking for characteristic regurgitated food pellets around their bases. While the site was searched, dominant plant species at the community level were noted, and a complete plant species list compiled within four ¼ ha plots with relatively high nativeness, using a form of the Timed Meander Search Procedure³.

To extend upon the assessment of habitat suitability for masked owls, one site visit (on the 15th May, 2013) included a nocturnal spotlight survey and masked owl call playback survey. The call playback procedure involved five minutes of listening time, five minutes of broadcast of screech and chatter calls, followed by five minutes of listening and spotlighting around the vicinity of the playback. This procedure was carried out at three locations across the site. Prior to the commencement of each survey a variety of environmental conditions were recorded, with the commencement of the survey being contingent upon the absence of wind and heavy rain, as well as a mild or warm temperature (Todd, 2012).

¹ Tasmanian *Threatened Species Protection Act 1995*; Commonwealth *Environment Protection and Biodiversity Conservation Act, 1999*

² Tasmanian *Weed Management Act 1999*

³ Goff *et al.* 1982

Field data from the present study were supplemented with data from the Tasmanian Natural Values Atlas (Report 57909) and the EPBC Protected Matters database.

Botanical nomenclature follows the current census of Tasmanian plants⁴.

Limitations: The botanical survey was undertaken in autumn and spring. No plant survey can guarantee that all vascular flora species will be recorded during a single visit due to the limitations of sampling techniques, seasonal and annual variation in abundance and the possible absence of fertile material for identification. Ephemeral species that may have been overlooked for example include early spring and summer flowering herbs and grasses. Additional species are likely to occur that may be recorded by repeated visits over several years and at different seasons. However, all significant species known to occur in the vicinity of the study area are considered in this report.

Site Description

The 173 ha site is located within largely-cleared dry-sclerophyll woodland now dominated primarily by agricultural grasses. There are only scattered degraded remnants of the original vegetation. This is typical of much low-lying farmland within the Northern Midlands Council in the Northern Midlands bioregion of Tasmania⁵ (Figure 1). The site's soil is derived exclusively from igneous rocks. The study area receives an annual average of less than 500 mm of rainfall and is between 210 and 240 m a.s.l.

The surrounding area includes extensive agricultural land, remnants of native grassland and eucalypt forest, and areas of weeds.

⁴ Baker & de Salas, 2013

⁵ IBRA5 - Peters & Thackway 1998

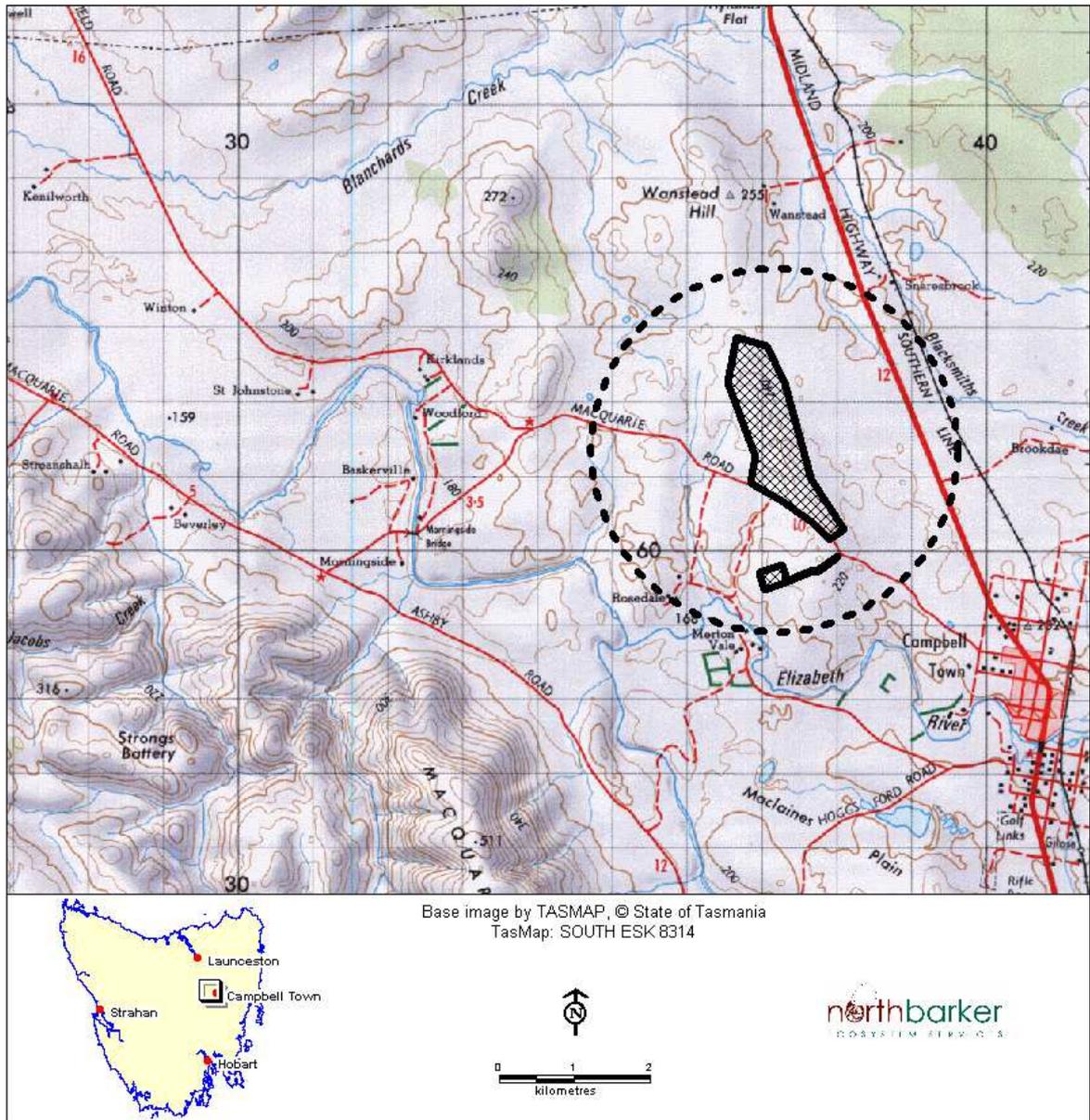


Figure 1: Location of the property

ASSESSMENT OF CONSERVATION SIGNIFICANCE

Vegetation types are classified according to TASVEG⁶. The State and Federal Governments are committed to achieving a Comprehensive Adequate and Representative (CAR) Reserve System based on TASVEG mapping.

The reservation target of a vegetation type relates to its current extent compared with the modelled extent prior to European settlement. This comparison provides an estimate of the proportion lost due to land clearing. Those vegetation types that are rare (generally less than 1000 ha), or have

⁶ Harris & Kitchener 2005

suffered considerable loss (approaching 70% for vulnerable and 90% for endangered) qualify for listing as “threatened” on the *Nature Conservation Act 2002*⁷.

For forests, reservation targets were set using the nationally agreed JANIS criteria as part of the Tasmanian Regional Forest Agreement (RFA). These aim to achieve a 15% reservation level of area extent prior to European settlement (often referred to as pre 1750). The reservation targets reflect the extent of loss with “threatened” vegetation types having higher targets. The JANIS principles also include the consideration of the bioregional representation of each vegetation type within the CAR reserve system.

The reservation at state and bioregional level has been calculated for all TASVEG 2 communities⁸. This does not include any modelling of pre-1750 levels, but is based on a tenure analysis of what is currently mapped.

The most recent bioregional and state analysis reservation against JANIS criteria was completed for the Independent Verification Group for the Tasmanian Forests Intergovernmental Agreement⁹. This analysis calculates areas required to achieve a CAR Reserve system based on the RFA modelling. No similar modelling has been undertaken for the current TASVEG non forest communities, although native grassland communities have been assessed at the State level¹⁰.

Vegetation matters of national environmental significance (MNES) are listed on the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBCA).

The conservation significance of species is determined at a State and Federal level by the Tasmanian *Threatened Species Protection Act 1995* and Commonwealth EPBCA (Appendix 1), the implications of which are considered in light of the relevant legislation (Appendix 2).

BIOLOGICAL VALUES

Vegetation

Field surveys established that the site contains agricultural land and two native vegetation communities (Table 1, Figure 2):

- Agricultural land (FAG),
- Midlands woodland complex (DMW) - Threatened Nature Conservation Act 2002 - and
- *Bursaria*, *Acacia* woodland (NBA).

⁷ Schedule 3a NCA 2002

⁸ DPIPWE 2010

⁹ Knight 2012

¹⁰ Lowland Grassland Review Expert Group 2008

The DMW remnants found on site are very low quality (generally being restricted to the rockiest areas unsuitable for agriculture) and less than 0.5 ha in size, to the extent that in some cases they are merely a cluster of old-growth trees. All but one of the old-growth trees within the DMW remnants are *Eucalyptus viminalis*, with the exception being *E. pauciflora*. Regrowth within the sparse DMW subcanopy includes both *E. viminalis* and *E. pauciflora*, as well as *Acacia dealbata*, *A. mearnsii* and *Bursaria spinosa*. Ground layer vegetation within the remnants is heavily compromised by the presence of gorse (*Ulex europaeus*) but does include patches of natives such as *Themeda triandra*, *Austrostipa* spp., *Pimelea humilis*, *Geranium potentilloides*, *Poa rodwayi*, *Pelargonium australe* and *Cheilanthes austrotenuifolia*.

The current statewide vegetation map, TASVEG2, is consistent with the results of our field survey in that it indicates that the site is largely dominated by agricultural land (FAG) with small scattered remnants of DMW. However, the DMW is far less extensive than indicated by Tasveg.

DMW is a class of vegetation that captures several woodland communities on fertile, lowland areas, mainly within the northern midlands. Essentially DMW is a mosaic of *Eucalyptus ovata* forest and woodland (DOV), *E. viminalis* grassy forest and woodland (DVG), and *E. pauciflora* forest and woodland on dolerite (DPD) – the tree layer is sparse (less than 20%), while the ground layer can be a diverse mix of herbs, sub-shrubs and grasses, with only occasional large shrubs and small trees, these typically being *Bursaria spinosa* and *Acacia dealbata*. Because DMW is a mosaic (*i.e.* within a given area the species dominance shifts regularly over short distances), viewing the community at a small scale can create the impression that the vegetation should be classified not as DMW but as one of the constituent communities (DOV, DVG or DPD).

At the present site, remnant old-growth trees are almost exclusively open grown *E. viminalis*, creating the impression that the site may have once been covered by DVG rather than DMW. In terms of community conservation legislation, the difference between DMW and DVG is significant, as DMW is a threatened community under the NCA and DVG is not. Thus, for the purposes of this report we adopted the Tasveg treatment of the native woodland remnants on site as DMW dominated by *E. viminalis*.



Plate 1 – Remnant old-growth *E. viminalis* within the sites largely agricultural landscape

Table 1: Extent and reservation status of the native vegetation communities recorded in the study area.¹¹

TASVEG community and extent in study area	Current ha	Reservation ha / %	Current ha	Reservation ha / %	Status NCA
Region	TAS	TAS	Northern Midlands	Northern Midlands	
Midlands woodland complex (DMW) 800 ha	900	20 1.6 % (current)	800	20 2 % (current)	Threatened
<i>Bursaria Acacia</i> woodland	16600	1000 7%	3400	100 4%	Not threatened

High quality lowland native grasslands of Tasmania, including those dominated by *Themeda triandra* (GTL), are considered threatened communities under the EPBC. Although no GTL was mapped at the present site, it is technically possible for small areas of GTL to occur within a larger extent of DMW of NBA (or similarly sparsely wooded communities). It was with this in mind that some relatively dense patches of *Themeda triandra* on site were tested in accordance with the five criteria outlined for Tasmanian lowland native grasslands under the EPBC. All criteria must be met for a patch to qualify as threatened:

- Extent:
 - Patch size must be ≥ 1 ha
- Perennial Native Tussock Cover:
 - ≥ 50 % of the cover of perennial tussocks must be represented by the grass genera *Poa* and/or *Themeda*; OR
 - Where the perennial tussock cover represented by these two genera is < 50 %, then the ground cover of native herbs (excluding grasses, other than from the genera *Poa* or *Themeda*) needs to be ≥ 50 % of total ground cover.
- Species Richness:
 - When *P. labillardierei* is the dominant native perennial tussock species the grassland has ≥ 5 native wildflower species per 0.5 ha during September to March; OR

¹¹ Knight 2012

-
- When *T. triandra* or *P. rodwayi* is the dominant native perennial tussock species the grassland has ≥ 10 native wildflower species per 0.25 ha during September to March;
 - Tree and Shrub Cover:
 - ≤ 5 mature (> 5 m tall) *Eucalyptus* trees per hectare; AND
 - ≤ 30 % solid crown cover of other native trees and tall shrubs greater than 2 m (e.g. *Bursaria*, *Acacia* and/or *Allocasuarina* species); AND
 - ≤ 10 % solid crown cover of regenerating *Eucalyptus* trees or other woody native species.
- Note: The ecological community may also contain tree stumps or dead trees. Where present, these do not contribute to the calculation of solid crown cover
- Weeds:
 - Perennial non-native plant species account for < 20 % of total ground cover at any time of the year.

The areas of *Themeda triandra* on site fail to meet the criteria covering extent and weeds, with gorse being a prominent component of all patches (between 20 and 50 % cover) and most patches being less than 1 ha.

The stand of NBA which could potentially support *Themeda* grassland had been recently burnt in Autumn 2013. The regeneration in spring 2013 was sufficient to assess the patch against the criteria. The patch fails to meet the EPBC grassland criteria on two counts. 1. cover of weeds and 2. size, being less than 1 ha over which the canopy is less than 30%.

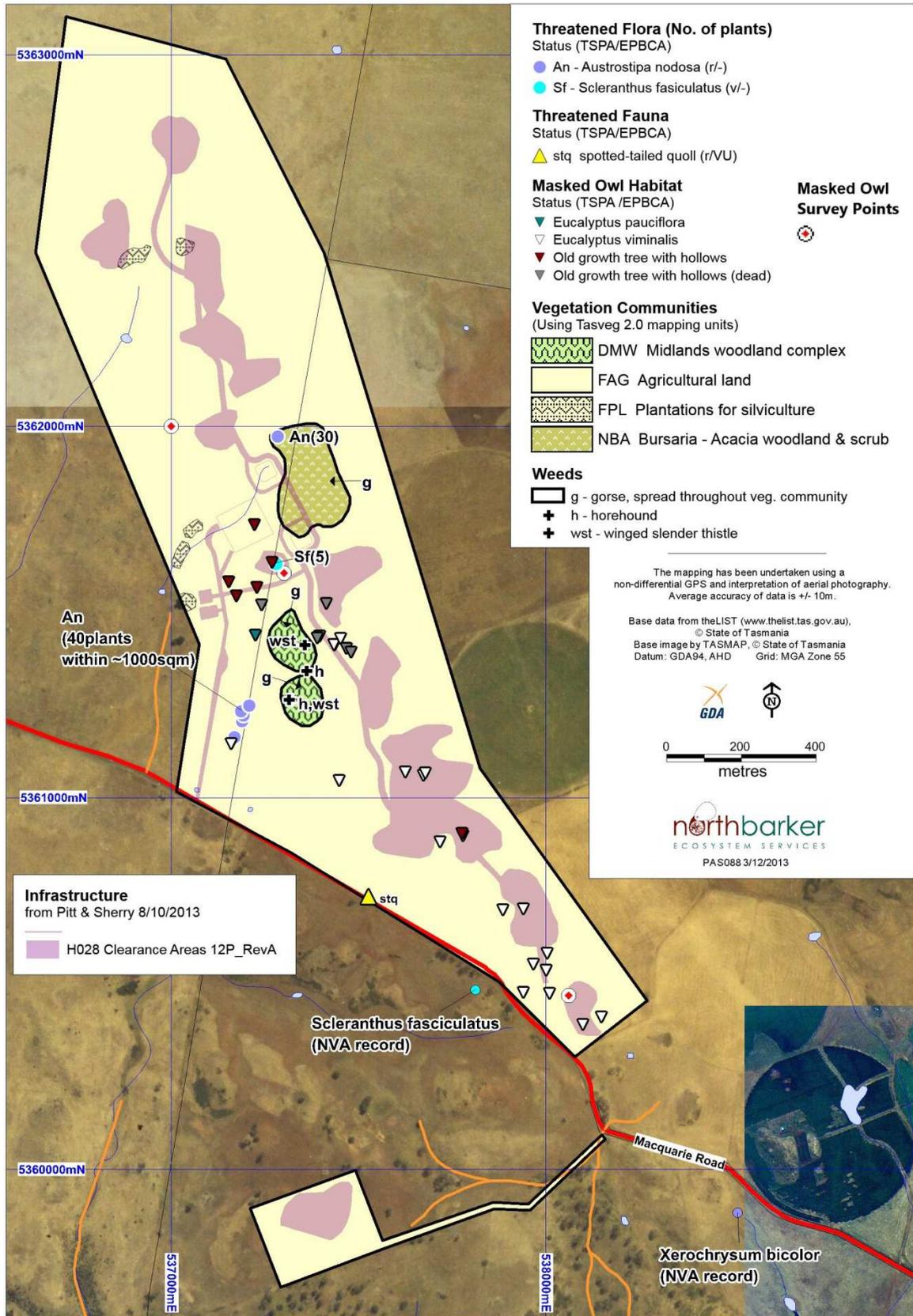


Figure 2: Vegetation, habitat trees, threatened flora and weeds

THREATENED FLORA – IMPACT AND MITIGATION.

A moderate number of plants only were observed within the ¼ ha plots surveyed (Appendix 3). Outside of the plot, however, two threatened plant species were recorded on site:

- Knotty speargrass is distinguished in the field from other common *Austrostipa* species by its generally smaller size (up to 80 cm tall), smallish, markedly sickle-shaped awns, and relatively small leaves around 4 mm wide (and not less than 1.5 mm). Knotty speargrass occurs widely in low rainfall areas such as the Midlands, the upper Derwent Valley and the southeast, with the total number of observations on the Tasmanian Natural Values Atlas in excess of 350. In intensively grazed areas its population numbers may be underestimated, and this is likely to be the case in the present study.
- Around 70 knotty speargrass *Austrostipa nodosa* (TSPA – rare) were observed in two locations within areas of cleared land and outside of the proposed footprint.



Plate 2 – *Austrostipa nodosa* within FAG on site

- Spreading knawel *Scleranthus fasciculatus* (TSPA – vulnerable) This ground-hugging herb differs from its cushion plant like relatives in its diffuse, spreading habit and flowers in clusters of two. The species occurs in grasslands and grassy woodlands within the midlands and the southeast on areas of bare soil. There are six other records known within 5 km, while there are a total of 333 records on the NVA for the state as a whole.
- Five plants were recorded within a small DMW remnant within the proposed footprint. If the plants cannot be avoided a Permit will be required to “take” this species.

Previous surveys within 5 km of the property have identified a variety of other species of threatened flora variously listed under the Commonwealth *Environment Protection & Biodiversity Conservation Act 1999* (EPBCA) or the Tasmanian *Threatened Species Protection Act 1995* (TSPA). All of these threatened species are listed in Table 2 (as well as some other species with a possibility of occurring on site based on habitat mapping presented within the EPBC Protected Matters database). Table 2 also presents a description of their preferred habitat, an assessment of the likelihood of their occurrence on site, and reference to the number and proximity of previous observations in the area.

This assessment indicates that one species is considered to have a moderately high probability of occurring on site. ***Austrostipa scabra* subsp. *falcata*** (TSPA rare) occupies a similar niche and often co-occurs with *A. nodosa*, which was observed on site – thus *A. scabra* may have been overlooked if present in low numbers. Two other species, ***Stackhousia subterraneum*** (TSPA endangered) and ***Triptilodiscus pygmaeus*** (TSPA vulnerable), have a large number (> 25) of records within 5 km and have suitable habitat present on site (albeit in a limited area compromised by weeds), but were not observed during the spring survey and are considered unlikely to have been overlooked.

The remaining threatened species that are known from the surrounding area (Figure 3) or similar habitats elsewhere are unlikely to occur on site due to a lack of suitable habitat or are conspicuous species unlikely to have been overlooked during the surveys.

Table 2: Flora species of conservation significance recorded within a 5 km radius of the site¹²

Species	Status ¹³ TSPA / EPBCA	Potential to occur	Local observations and ecological preferences ¹⁴
Present on site			
<i>Austrostipa nodosa</i> knotty speargrass	Rare/ -	Present	Around 70 plants were recorded on site, exclusively within cleared agricultural land.
<i>Scleranthus fasciculatus</i> spreading knawel	Vulnerable/ -	Present	Observed in a DMW remnant on an outcrop.
Known from within 5 km			
<i>Acacia axillaris</i> midlands wattle	Vulnerable/ VULNERABLE	None	Occurs in riparian sites and surrounding slopes and flats of the catchment of the Elizabeth and Esk Rivers. Nine records on the NVA within 5 km. No suitable habitat present on site.
<i>Amphibromus macrorhinus</i> longnosed swampgrass	Endangered/ -	None	A species of moist depressions and water edges. Six records on the NVA within 5 km. No suitable habitat present on site.
<i>Aphelia gracilis</i> slender fanwort	Rare/ -	Very low	Occurs in moist depressions in areas with little above-ground competition. Four records on the NVA within 5 km. Suitable landscape position has been converted to pasture.
<i>Asperula scoparia</i> subsp. <i>scoparia</i> prickly woodruff	Rare/ -	Low	Two records on the NVA within 5 km. Remnant habitat is suitable but limited in extent. Not observed and unlikely to be overlooked.
<i>Austrostipa bigeniculata</i> double jointed spear grass	Rare/ -	Low	Occurs in grassland and grassy woodland. Two records on the NVA within 5 km. Remnant habitat is suitable but limited in extent.

¹² Natural Values Report # 57909 (9th May 2013), DPIPW/E¹³ Tasmanian *Threatened Species Protection Act 1995*, Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.¹⁴ Lazarus *et al.* 2003; Jones *et al.* 1999

Species	Status ¹³ TSPA / EPBCA	Potential to occur	Local observations and ecological preferences ¹⁴
<i>Austrostipa scabra</i> rough spear grass	Rare/ -	Moderate - high	Occupies a similar niche and often co-occurs with <i>A. nodosa</i> , which was recorded on site. Ten records on the NVA within 5 km. Possible overlooked if present in low numbers only.
<i>Barbarea australis</i> native wintercress	Endangered/ CRITICALLY ENDANGERED	None	No suitable riparian habitat present. No records within 5 km.
<i>Caesia calliantha</i> blue grasslily	Rare/ -	Low	Occurs in grassland and grassy woodland. Twelve records on the NVA within 5 km. Remnant habitat on site is suitable but limited in extent.
<i>Caladenia anthracina</i> blacktip spider orchid	Endangered/ CRITICALLY ENDANGERED	Very low	Occurs in grassy forest and woodland on sandy soils. Five records on the NVA within 5 km. Intolerant of grazing so low possibility of persisting in remnants within a matrix of agricultural land, such as the present site.
<i>Calocephalus lacteus</i> milky beauty heads	Rare/ -	Low	Occurs in grassland and grassy woodland. Five records on the NVA within 5 km. Remnant habitat on site is suitable but limited in extent.
<i>Carex longebrachiata</i> drooping sedge	Rare/ -	None	Occurs in moist grassland and riparian flats. Two records on the NVA within 5 km. No suitable habitat on site. Not observed and unlikely to be overlooked.
<i>Carex tasmanica</i> curly sedge	Rare/ -	Very low	Occurs in moist grassland and riparian flats. Eight records on the NVA within 5 km. Limited suitable habitat present. Not observed and unlikely to have been overlooked.
<i>Colobanthus curtisiae</i> grassland cup flower	Rare/ VULNERABLE	Low - moderate	Occurs in open sites in grassy habitat on basalt and adjacent sands. Three records on the NVA within 5 km. Can persist in grazed remnants. Possibly overlooked if present in low numbers only.
<i>Cryptandra amara</i> pretty pearlflower	Endangered/ -	Very low	Three records on the NVA within 5 km. Remnant habitat is suitable but limited in extent. Surveys occurred at the beginning of the flowering period but species was not observed and is unlikely to have been overlooked.
<i>Cynoglossum australe</i>	Rare/ -	Low	Occurs in sandy soils in grassy woodland and very dry dolerite soils on open ground. One record on the NVA within 5 km.

Species	Status ¹³ TSPA / EPBCA	Potential to occur	Local observations and ecological preferences ¹⁴
austral hounds tongue			Suitable habitat is present but the species was not observed and unlikely to have been overlooked.
<i>Dianella amoena</i> grassland flaxlily	Rare/ ENDANGERED	Low	Occurs in grasslands on fertile soils. Twenty-six records on the NVA within 5 km. A highly distinctive species unlikely to have been overlooked other than where burnt.
<i>Epacris acuminata</i> claspleaf heath	-/ VULNERABLE	None	One record on the NVA within 5 km. No suitable habitat present. A conspicuous species unlikely to have been overlooked.
<i>Glycine latrobeana</i> clover glycine	Vulnerable/ VULNERABLE	Low	Occurs in grassland on fertile soils. Fourteen records on the NVA within 5 km. Intolerant of grazing and thus unlikely to persist within the remnants on site.
<i>Haloragis heterophylla</i> variable raspwort	Rare/ -	Low	Occurs in moist drainage lines in grassland and grassy woodland. Twenty-four records on the NVA within 5 km. Limited suitable habitat present and not easily overlooked.
<i>Hypoxis vaginata</i> var. <i>vaginata</i> sheathing yellow star	Rare/ -	Low	Occurs in moist grassland, with one record on the NVA within 5 km. Limited suitable habitat present.
<i>Isoetes drummondii</i> subsp. <i>drummondii</i> plain quillwort	Rare/ -	None	Occurs in aquatic riparian habitat. Two records on the NVA within 5 km. No suitable habitat present.
<i>Isoetopsis graminifolia</i> grass cushion	Vulnerable/ -	Low	Three records on the NVA within 5 km. Habitat on site is suitable but small in extent.
<i>Lepidium hyssopifolium</i> basalt pepper-cress	Endangered/ ENDANGERED	Low	Limited suitable habitat present. Palatable to stock and thus unlikely to persist on such a property with evidence of grazing and agriculture. No records within 5 km.
<i>Lepilaena australis</i> Australian watermat	Extinct	None	One historical record from Campbell Town. Presumed extinct and no suitable habitat on site.
<i>Leucochrysum albicans</i> var. <i>tricolour</i> grassland paper	Endangered/ ENDANGERED	Low	Occurs on basalt soils in grassland. Four records on the NVA within 5 km. Remnant habitat on site is marginally suitable but limited in extent.

Species	Status ¹³ TSPA / EPBCA	Potential to occur	Local observations and ecological preferences ¹⁴
daisy			
<i>Leucopogon virgatus</i> var. <i>brevifolius</i> short-leaf beard heath	Rare/ -	Very low	Occurs in heathy and grassy forest on sand. One record on the NVA within 5 km. Not observed, unlikely to be overlooked, and very limited suitable habitat present.
<i>Lobelia pratioides</i> poison lobelia	Vulnerable/ -	None	Occurs in marshland and riparian habitat. Twelve records on the NVA within 5 km. No suitable habitat present.
<i>Myriophyllum integrifolium</i> tiny water milfoil	Vulnerable/ -	Very low	Occurs in muddy swampy soils and wet land margins. Two records on the NVA within 5 km. No suitable habitat present.
<i>Prasophyllum incorrectum</i> golfers leek orchid	Endangered/ ENDANGERED	Very low	Occurs in grassy forest and woodland on sandy soil. One record (from 1999) on the NVA within 5 km. Limited suitable habitat present and possibly eliminated from potential sites by habitat degradation, grazing and fertilizer application.
<i>Prasophyllum olidum</i> pungent leek orchid	Endangered/ CRITICALLY ENDANGERED	Very low	Occurs in grassland on moist sandy soil. One record (2008) on the NVA within 5 km. Limited suitable habitat present and possibly eliminated from potential sites by habitat degradation, grazing and fertilizer application.
<i>Prasophyllum tunbridgense</i> Tunbridge leek orchid	Endangered/ ENDANGERED	Very low	Occurs in grassland on loamy soils. One record (1996) on the NVA within 5 km. Limited suitable habitat present and possibly eliminated from potential sites by habitat degradation, grazing and fertilizer application.
<i>Pterostylis commutata</i> midland greenhood	Endangered/ CRITICALLY ENDANGERED	Very low	Occurs in grasslands and grassy woodlands on fertile soils. Remnant habitat is suitable but limited in extent. No records within 5 km and currently known only from Tunbridge and Ross.
<i>Pterostylis wapstrarum</i> fleshy greenhood	Endangered/ CRITICALLY ENDANGERED	Very low	Occurs in grasslands and grassy woodlands on fertile soils. Remnant habitat is suitable but limited in extent. No records within 5 km.
<i>Pterostylis ziegeleri</i> grassland greenhood	Vulnerable/ ENDANGERED	Low	Occurs in grassland on fertile soils, particularly basalt. Eleven records on the NVA within 5 km. Remnant suitable habitat present but possibly eliminated from

Species	Status ¹³ TSPA / EPBCA	Potential to occur	Local observations and ecological preferences ¹⁴
			potential sites by habitat degradation, grazing and fertilizer application.
<i>Pultenaea prostrata</i> silky bushpea	Vulnerable	Very low	Occurs in grassy habitat on sandy soils. Two records on the NVA within 5 km. Limited suitable habitat present. Unlikely to have been overlooked.
<i>Ranunculus prasinus</i> midlands buttercup	Endangered/ ENDANGERED	None	Occurs in moist herfields on wetland and drainage margins. Three records on the NVA within 5 km. No suitable habitat present.
<i>Rytidosperma popinensis</i> roadside wallabygrass	Rare/ ENDANGERED	Low	Limited suitable habitat present. Surveys occurred late in the species' growing period, but foliage is generally distinctive and easily spotted. Species is likely to be delisted at the national level in line with its recent downlisting in Tasmania. No records within 5 km.
<i>Schoenus latelaminatus</i> medusa bogsedge	Endangered/ -	None	Only one known population in Tasmania, which differs from the present site in that it is seasonally inundated.
<i>Scleranthus diander</i> tufted knawel	Vulnerable/ -	Low	Occurs in grassland on basalt. Three records on the NVA within 5 km. Remnant habitat is suitable but limited in extent. Unlikely to have been overlooked.
<i>Senecio squarrosus</i> leafy groundsel	Rare/ -	Low	Occurs in grassy woodland and forest. One record on the NVA within 5 km. Limited suitable habitat present. Most abundant after fires.
<i>Stackhousia subterraneum</i> grassland candles	Endangered/ -	Low	Occurs in grassland and grassy woodland often on sandy soils. 43 records on the NVA within 5 km. Unlikely to have been overlooked during the spring survey.
<i>Stuckenia pectinata</i> fennel pondweed	Rare/ -	None	No suitable aquatic habitat present. Two historical (1948) records only on the NVA within 5 km.
<i>Triptilodiscus pygmaeus</i> dwarf sunray	Vulnerable/ -	Low	Occurs in grassland on fertile soils, particularly basalt. 29 records on the NVA within 5 km. Unlikely to have been overlooked unless present in low numbers only.
<i>Trithuria submersa</i>	Rare/ -	None	Occurs in riparian aquatic habitats. Three records on the NVA within 5 km. No

Species	Status ¹³ TSPA / EPBCA	Potential to occur	Local observations and ecological preferences ¹⁴
submerged watertuft			suitable habitat present.
<i>Velleia paradoxa</i> spur velleia	Vulnerable/ -	Low	Occurs on fertile soils in grassy forest and woodlands. Four records on the NVA within 5 km. Remnant habitat is suitable but limited in extent. Not likely to be overlooked.
<i>Vittadinia burbridgeae</i> smooth New Holland daisy	Rare/ -	Low	Remnant habitat is suitable, but the distinctive species is still actively growing and flowering elsewhere in the northern midlands and is thus unlikely to have been overlooked. Can however have large spatial variations in its distribution between years. Seven records on the NVA within 5 km.
<i>Vittadinia cuneata</i> var. <i>cuneata</i> fuzzy New Holland daisy	Rare/ -	Low	Occurs in grasslands and grassy woodlands on fertile soils. Remnant habitat is suitable but limited in extent. Three records on the NVA within 5 km.
<i>Vittadinia gracilis</i> woolly New Holland daisy	Rare/ -	Low	Occurs in grasslands and grassy woodlands on fertile soils. Remnant habitat is suitable but limited in extent. Ten records on the NVA within 5 km.
<i>Wilsonia rotundifolia</i> round leaf Wilsonia	Rare/-	None	A saltmarsh species. No suitable habitat present. Five records on the NVA within 5 km.
<i>Xanthorrhoea arenaria</i> sand grasstree	Vulnerable/ VULNERABLE	None	No suitable habitat present. No records within 5 km.
<i>Xerochrysum bicolor</i> east coast everlasting	Rare/ -	Very low	Historical records only in the region (four from 1984 within 5 km), possibly erroneous. Generally a species of coastal cliffs.

WEEDS

Although the site supports a variety of introduced plants, particularly pasture species such as *Holcus lanatus*, *Lolium* spp., *Phalaris aquatica*, *Phalaris minor*, *Malva neglecta* and *Cynosurus echinatus*, only three species listed as 'declared weeds' under the Tasmanian *Weed Management Act 1999* were recorded on the property, those being gorse (*Ulex europaeus*), which occurred extensively within parts of the property not subjected to frequent

cultivation, winged slender thistle (*Carduus tenuiflorus*), which occurred patchily within pasture and remnants, and horehound (*Marrubium vulgare*), which occurred sparingly, mostly in patches of bare ground within the areas of agricultural land.

THREATENED FAUNA – IMPACT AND MITIGATION.

Our desktop survey revealed that a variety of threatened and/or migratory fauna are known from the local area (5 km radius) or have the potential to occur there based on habitat mapping (EPBC database). Table 3 provides a description of the preferred habitat of these species and an assessment of the likelihood of their occurrence on site. For wide-ranging species like devils, quolls and eagles, the likelihood of occurrence considers foraging and nesting/denning requirements separately, with nesting and denning requirements generally being more specific and more limited, and thus more critical to the persistence of species and individuals than foraging requirements.

During the diurnal field surveys, several Bennett's wallabies (*Macropus rufogriseus*) were observed on site, as was a burrow of the common wombat (*Vombatus ursinus*), neither of which are listed threatened species. In addition, observations were made of only three native bird species (the noisy miner, forest raven and the wedge-tailed eagle), as well as three introduced species (common starling, skylark and house sparrow). Although this is unlikely to represent a complete list of diurnal avifauna to utilise the property, it is indicative of the reduced habitat quality due to the habitat alteration that has occurred.

The wedge-tailed eagle is a threatened species (Endangered EPBC and TSPA), but the site is in no way considered to be important to the survival of the species or even the persistence of the pair observed on site. The pair of adults observed was mostly only circling the air above the property, with one individual briefly landing in a tree to investigate the activities of the scientist below. The property contains no suitable habitat for eagle nesting and is not considered to represent a limited resource in terms of foraging habitat.

During the nocturnal spotlight survey, observations were made of 40 common brushtail possums (*Trichosurus vulpecula*), five Bennett's wallabies and four introduced rabbits (*Oryctolagus cuniculus*). In addition, a single adult male spotted-tailed quoll, *Dasyurus maculatus*, (Rare – TSPA; Vulnerable – EPBC) was killed (presumably by passing traffic) on Macquarie Road (immediately adjacent to the study area) during the spotlight survey.

No masked owls were observed on site during spotlight observations or in response to the call playback procedure. None of their characteristic regurgitated pellets were observed at the base of old-growth trees.

Those fauna with even a low probability of nesting on site are further discussed below.

Table 3: Fauna species of conservation significance previously recorded, or which may potentially occur, within 5 km of the property¹⁵

Species	Status TSPA/ EPBCA	Likelihood of occurrence	Observations and preferred habitat ¹⁶
BIRDS			
<i>Apus pacificus</i> fork-tailed swift	-/ Migratory	Very low	An aerial insectivore that would only fly over the site if present, but is more likely to be observed further north in Tasmania.
<i>Aquila audax</i> subsp. <i>fleayi</i> wedge-tailed eagle	Endangered/ ENDANGERED	Foraging: PRESENT Nesting: None	Requires large sheltered trees for nesting and is highly sensitive to disturbance during the breeding season. No suitable nesting habitat present on site and no known nests within 5km. Habitat suitable for occasional foraging only.
<i>Ardea alba</i> great egret	-/ Migratory	None	A wetland species, for which there is no suitable habitat present on site.
<i>Ardea ibis</i> cattle egret	-/ Migratory	None	A wetland species, for which there is no suitable habitat present on site.
<i>Haliaeetus leucogaster</i> white-bellied sea-eagle	Vulnerable/ Migratory	Foraging: None Nesting: None	Occurs in coastal habitats and large inland waterways. Habitat and location suitable not suitable.
<i>Hirundapus caudacutus</i> white-throated needletail	-/ Migratory	None	Uncommonly recorded in Tasmania. An aerial species most likely unaffected by terrestrial habitat alteration outside of its Northern Hemisphere breeding range.
<i>Lathamus discolor</i> swift parrot	Endangered/ ENDANGERED	None	For nesting this species requires tree hollows adjacent to food plants, which are blue gums (<i>E. globulus</i>) and black gums (<i>E. ovata</i>). The present site is not within its core breeding and foraging range and contains no blue gums or black gums.
<i>Myiagra cyanoleuca</i> satin flycatcher	-/ Migratory	None	An interstate migrant of which some of the population spends the summer breeding months in Tasmania. Widely distributed across forested environments but sensitive to fragmentation and canopy thinning, and negatively predicted by the

¹⁵ Natural Values Report # 57909 (9th May 2013), DPIPWE¹⁶ Bryant & Jackson 1999

Species	Status TSPA/ EPBCA	Likelihood of occurrence	Observations and preferred habitat ¹⁶
			presence of noisy miners. No suitable habitat remains on site.
<i>Tyto novaehollandiae castanops</i> masked owl	Endangered/ VULNERABLE	Moderate foraging Nesting: LOW	Requires a mosaic of forest and open areas for foraging and large old-growth hollow-bearing trees for nesting. Several old-growth trees with viable hollows for masked owl nests are found on site and the species has been previously observed within 5 km (one record only). Our targeted surveys however, yielded no observations on site.
MAMMALS			
<i>Dasyurus maculatus</i> spotted-tailed quoll	Rare/ VULNERABLE	Foraging: PRESENT Denning: LOW	The site is not located within what is considered to be the core range of this species and only one observation record previously existed from within 5 km. However, the individual killed on Macquarie Road on the night of the spotlight survey would almost certainly use the site for foraging. The presence of tree hollows, occasional hollow logs, and an abundance of suitable prey, suggests that the property could be a regularly used part of a territory but is less likely to be preferred by a female for a den due to the exposure of the trees and the predominance of possums and starlings on the site.
<i>Perameles gunnii</i> eastern barred bandicoot	- / VULNERABLE	None	This species favours a mosaic of grassy areas (for foraging) and dense vegetation (for shelter and nesting). The site is within a core habitat region and supports a mosaic of vegetation; however, the eastern barred bandicoot is most likely locally extinct, having undergone a large shift in distribution in association with land clearance. Observations in the area are restricted to historical land owner accounts only.
<i>Sarcophilus harrisii</i> Tasmanian devil	Endangered/ ENDANGERED	Foraging: Low Denning: None	One public record within 5 km in the past 10 years, as well as 5 previous records within the past 40 years. Habitat on site is suitable for foraging only, although the presence of several wallaby carcasses on site indicates that devils are presently not scavenging on the property.
REPTILES			
<i>Pseudemoia pagenstecheri</i>	Vulnerable/ -	Very low	Occurs in <i>Poa</i> tussock grassland and <i>Themeda</i> grassland without trees. Suitable habitat on site is very marginal, being compromised both

Species	Status TSPA/ EPBCA	Likelihood of occurrence	Observations and preferred habitat ¹⁶
tussock skink			spatially and floristically. No records within 5km.
AMPHIBIANS and FISH			
<i>Galaxias fontanus</i> swan galaxias	Endangered/ ENDANGERED	None	Site is located within a core habitat region, but not suitable habitat is present for aquatic species. No records within 5 km.
<i>Litoria raniformis</i> green and gold frog	Vulnerable/ VULNERABLE	None	Occurs in well vegetated wetlands. Site is located with a core habitat region, but contains no suitable habitat. No records within 5 km.
<i>Prototroctes maraena</i> Australian grayling	Vulnerable/ VULNERABLE	None	No suitable aquatic habitat present. No records within 5 km.
INVERTEBRATES			
<i>Catadromus lacordairei</i> green-lined ground beetle	Vulnerable/ -	None	Considered to be potentially present based on habitat mapping only, as within Tasmania the species has only been collected from within grassy woodlands within the northern midlands on gilgai (earth depressions and allied mounds in cracking clays). Unlike the present site, most collection sites have been located adjacent to permanent water bodies. No records within 5 km.
<i>Ecnomina vega</i> caddis fly (Macquarie River)	Rare/ -	None	No suitable aquatic habitat present. No records within 5 km.

Tasmanian masked owl, *Tyto novaehollandiae castanops* (TSPA – Endangered; EPBC – Vulnerable)

The Tasmanian masked owl occurs across Tasmania apart from the southwest. It has been recorded from wet eucalypt forest, non-eucalypt dominated forest, scrub, and urban fringe environments (Bell and Mooney, 2002); however, most records of the species are from lowland, dry sclerophyll forest in the southeast and central north (Bell and Mooney, 1997). Masked owls feed mostly on small to medium-sized mammals including introduced rodents and rabbits (Todd, 2012).

The masked owl nests in large hollows in large, old trees in dry forest, woodland and paddocks. Daytime roost sites are usually in trees (among

dense foliage or in tree hollows), cliffs (overhangs, potholes and caves) and occasionally farm sheds and out-buildings (Bell et al. 1997).

The present site contains numerous old-growth trees with viable hollows for masked owl nests. The site also appears to support an abundance of viable prey, such as common starlings, young brushtail possums, rabbits, and most likely rats and mice. Our targeted surveys, however, in the form of nocturnal spotlight and call playback, and diurnal searching for regurgitated pellets, yielded no observations. Negative results from such surveys do not categorically rule out the presence of masked owls on site, with even targeted efforts generally yielding only a low number of positive results (Todd, 2012). Based on the sites location and characteristics there is still a low probability that masked owls utilise the site for nesting. The exposure of the site works against it as preferred for nests. It is not likely, however, that any individuals that may occur on site would be part of what could be considered an important population under the EPBC, with such a label best being applied to populations that occupy large, unbroken tracts of lowland, dry sclerophyll forest.

Spotted-tailed quoll, *Dasyurus maculatus* (TSPA – Rare; EPBC – Vulnerable)

The spotted-tailed quoll occurs throughout Tasmania and also in eastern Australia. Populations on the Australian mainland have declined to the extent that Tasmania is now their stronghold. Within Tasmania, the core range for the spotted-tailed quoll is lowland forested areas of the north, bounded by Wynyard, Gladstone and the central and north-eastern highlands. Lower densities of animals occur elsewhere in suitable habitat. Optimal habitat for the spotted-tailed quoll is thought to be fertile, extensive (and unfragmented), lowland, wet forest vegetation. The species is most abundant in areas containing rainforest, wet forest and blackwood swamp forest¹⁷. Individuals are mostly solitary with home ranges that vary between 100 ha and 5000 ha, with females tending to have smaller, largely exclusive ranges, and males having ranges that overlap with those of several females¹⁸.

The present study site is not located within what is considered to be the core range of this species¹⁹, and only one observation record previously existed from within 5 km²⁰. However, the individual killed on Macquarie Road on the night of the spotlight survey would almost certainly use the site for foraging. The presence of tree hollows and occasional hollow logs (both of which can be used for denning and shelter²¹, and an abundance of suitable prey²², suggests that the property could be a regularly used part of a territory. Although there may be more spotted-tailed quolls on site, according to the

¹⁷ Bryant & Jackson, 1999

¹⁸ Long & Nelson 2010 cited in the spotted-tailed quoll (Tasmanian population) Species Profile and Threats Database <http://www.environment.gov.au>,

¹⁹ Natural Values Report # 57909 (9th May 2013), DPIPW E

²⁰ Natural Values Report # 57909 (9th May 2013), DPIPW E

²¹ Belcher and Darrant, 2006; Glen and Dickman, 2006a

²² Glen and Dickman, 2006b

definition provided under the EPBC, it is not likely that the site supports part of what could be considered an important population (Figure 4), with important populations more likely to be found within the core range and with the habitat characteristics outlined above.

LEGEND

Natural Values Atlas records within 5km

NVA Threatened Flora records by threat status

National (EPBCA) and State (TSPA) threat status

- Critically Endangered (EPBCA)
- Endangered (EPBCA)
- Vulnerable (EPBCA)
- endangered (TSPA)
- vulnerable (TSPA)
- rare & rare (unofficial) (TSPA)

Species within 5km. Colour indicates highest status (EPBCA/TSPA)

- Acacia axillaris (Vulnerable / vulnerable)
- Amphibromus macrorhinus (/ endangered)
- Aphelia gracilis (/ rare)
- Aphelia pumilio (/ rare)
- Asperula scoparia subsp. scoparia (/ rare)
- Austrostipa bigeniculata (/ rare)
- Austrostipa nodosa (/ rare)
- Austrostipa scabra (/ rare)
- Austrostipa scabra subsp. falcata (/ rare (unofficial))
- Caesia calliantha (/ rare)
- Caladenia anthracina (Critically Endangered / endangered)
- Calocephalus lacteus (/ rare)
- Carex longibrachiata (/ rare)
- Carex tasmanica (Vulnerable /)
- Colobanthus curtisiae (Vulnerable / rare)
- Cryptandra amara (/ endangered)
- Cynoglossum australe (/ rare)
- Dianella amoena (Endangered / rare)
- Epacris acuminata (Vulnerable /)
- Glycine latrobeana (Vulnerable / vulnerable)
- Haloragis heterophylla (/ rare)
- Hyalosperma demissum (/ endangered)
- Hypoxis vaginata (/ rare)
- Isoetes drummondii subsp. drummondii (/ rare)
- Isoetopsis graminifolia (/ vulnerable)
- Lepidium hyssopifolium (Endangered / endangered)
- Lepilaena australis (/ extinct)
- Leucochrysum albicans var. tricolor (Endangered / endangered)
- Leucopogon virgatus var. brevifolius (/ rare)
- Lobelia pratioides (/ vulnerable)
- Muehlenbeckia axillaris (/ rare)
- Myriophyllum integrifolium (/ vulnerable)
- Prasophyllum incorrectum (Critically Endangered / endangered)
- Prasophyllum olidum (Critically Endangered / endangered)
- Prasophyllum taphanyx (Critically Endangered / endangered)
- Prasophyllum tunbridgense (Endangered / endangered)
- Pterostylis ziegeleri (Vulnerable / vulnerable)
- Pultenaea humilis (/ vulnerable)
- Pultenaea prostrata (/ vulnerable)
- Ranunculus prasinus (Endangered / endangered)
- Rhodanthe anthemoides (/ rare)
- Schoenus latelaminatus (/ endangered)
- Scleranthus diander (/ vulnerable)
- Scleranthus fasciculatus (/ vulnerable)
- Senecio squarrosus (/ rare)
- Stackhousia subterranea (/ endangered)
- Stuckenia pectinata (/ rare)
- Triptilodiscus pygmaeus (/ vulnerable)
- Trithuria submersa (/ rare)
- Vallisneria australis (/ rare)
- Velleia paradoxa (/ vulnerable)
- Vittadinia burbidgeae (/ rare (unofficial))
- Vittadinia cuneata var. cuneata (/ rare)
- Vittadinia gracilis (/ rare)
- Wilsonia rotundifolia (/ rare)
- Xanthoparmelia willisii (/ endangered)
- Xerochrysum bicolor (/ rare)

NVA Threatened Fauna records by threat status

National (EPBCA) and State (TSPA) threat status

- ▲ Endangered (EPBCA)
- ▲ Vulnerable (EPBCA)
- ▲ vulnerable (TSPA)
- ▲ rare (TSPA)

Species within 5km. Colour indicates highest status (EPBCA/TSPA)

- ▲ Catadromus lacordairei (/vulnerable)
- ▲ Dasyurus maculatus (Vulnerable/rare)
- ▲ Dasyurus maculatus subsp. maculatus (Vulnerable/rare)
- ▲ Ecnomina vega (/rare)
- ▲ Galaxias fontanus (Endangered/endangered)
- ▲ Litoria raniformis (Vulnerable/vulnerable)
- ▲ Perameles gunnii (Vulnerable/)
- ▲ Sarcophilus harrisii (Endangered/endangered)
- ▲ Tyto novaehollandiae (Vulnerable (Unofficial)/endangered (unofficial))

Study Area

- Study Area (from Final MLA jpeg-22/04/2013 by Pitt & Sherry)
- 5km buffer of study area

NVA threatened flora records are from:

Natural Values Atlas (www.naturalvaluesatlas.tas.gov.au), 10/10/2012, © State of Tasmania

NVA threatened fauna records are from:

Natural Values Atlas (www.naturalvaluesatlas.tas.gov.au), 08/01/2013, © State of Tasmania

Base image by TSMAP, © State of Tasmania

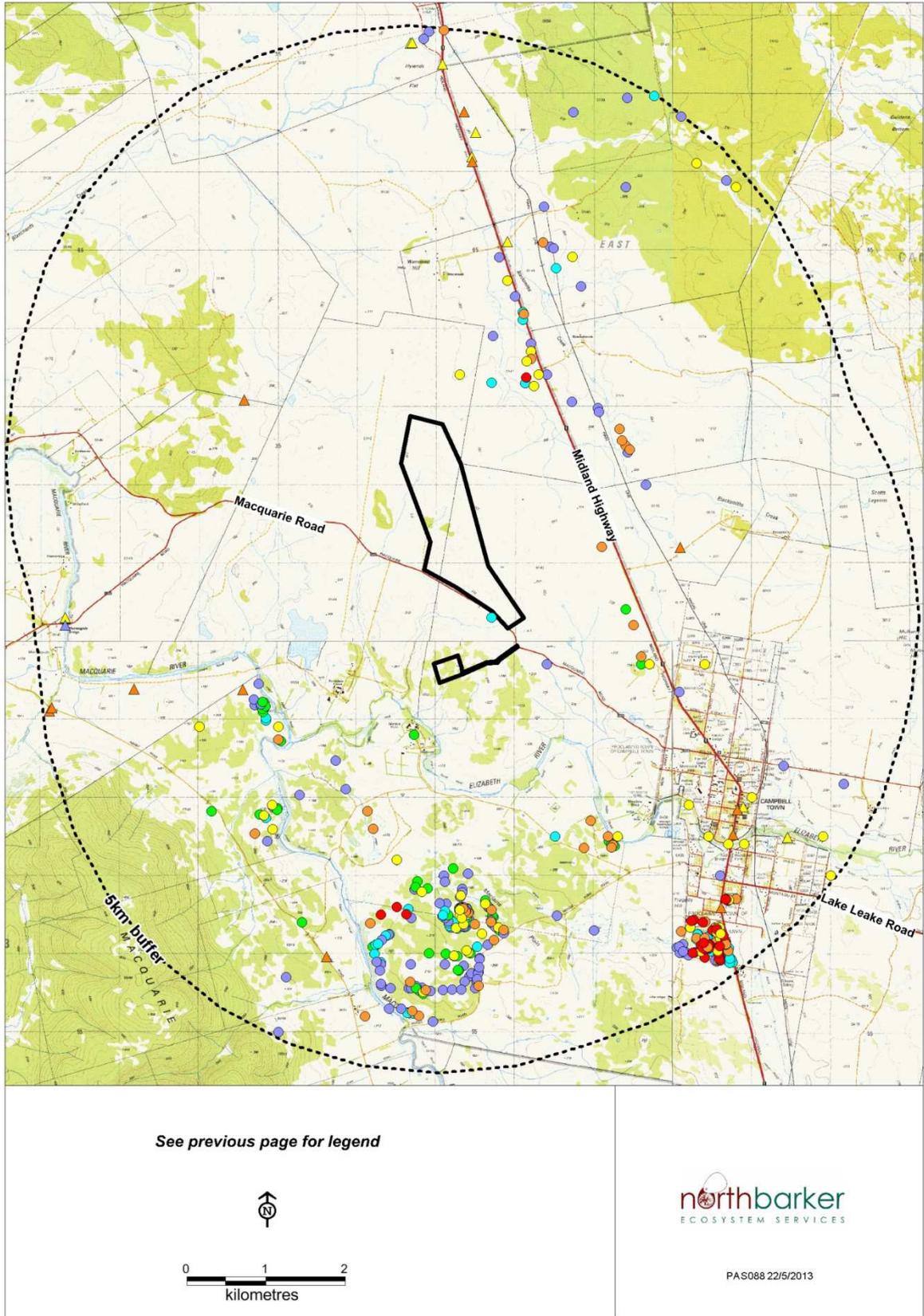


Figure 3: Threatened flora and fauna records within 5 km of the site

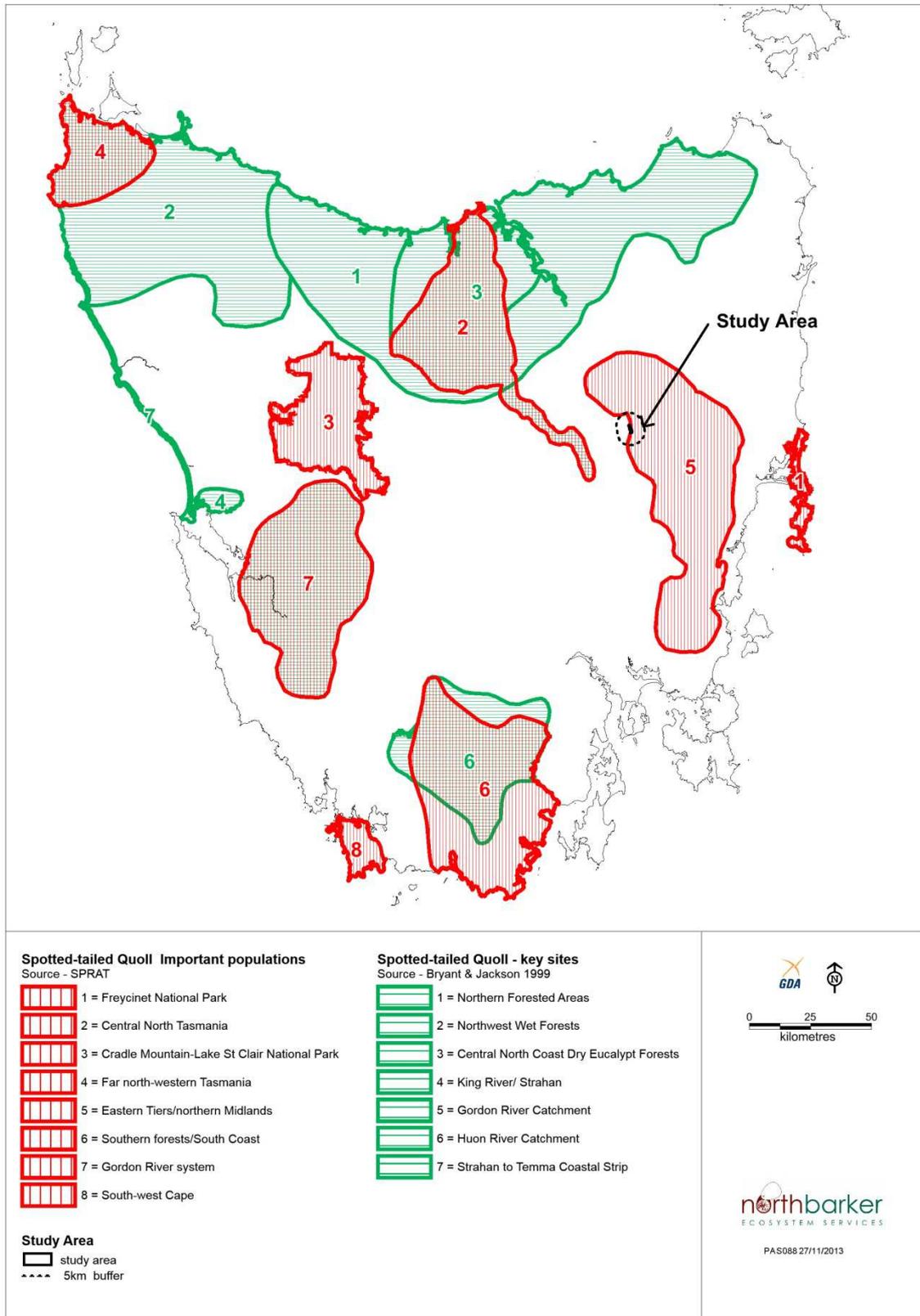


Figure 4: Extent of important populations and key sites for the spotted-tailed quoll.

LEGISLATIVE IMPLICATIONS

Flora:

Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBCA)

The EPBCA is structured for self-assessment; the proponent must indicate whether or not the project is considered a 'controlled action', which, if confirmed would require approval from the Commonwealth Minister. Referral as a controlled action is necessary if an action is *likely* to have a significant impact on listed threatened species and/or ecological communities.

In terms of EPBC listed flora, the assessments of probability of occurrence have been made based on habitat suitability and nearby observations. The potential for significant impacts depends on plant numbers and the extent of occurrence, both within and surrounding the proposed area of disturbance.

Colobanthus curtisiae has a low-moderate chance of occurring on site, but it is considered to be unlikely that the species has been overlooked unless present in low numbers. Furthermore, the condition of the site works against such populations being important to conservation or critical to the survival of a species. Under continued current land use such populations would be unlikely to persist due to the impacts of exposure, weed invasion and effects of fertiliser anyway.

Tasmanian Threatened Species Protection Act 1995 (TSPA)

Any species listed under the TSPA cannot knowingly be directly impacted without a permit to take. For bauxite extraction to occur under the present proposal **a permit to take will be needed *Scleranthus fasciculatus*, and *Austrostipa nodosa* and** with the need for the latter being contingent upon the capacity for avoidance because it is outside the proposed footprint.

Application for permits to take are made to the Policy and Conservation Assessment Branch (PCAB) of DPIPWE. A commitment to obtain these permits should be included in the project's DPEMP documentation.

Fauna:

Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBCA)

In the context of the **spotted-tailed quoll** and the **masked owl**, which are both listed as VULNERABLE under the EPBC, an action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:

- lead to a long-term decrease in the size of an important population of a species;
- reduce the area of occupancy of an important population;

- fragment an existing important population into two or more populations;
- adversely affect habitat critical to the survival of a species;
- disrupt the breeding cycle of an important population;
- modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;
- result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat;
- introduce disease that may cause the species to decline; or
- interfere substantially with the recovery of the species.

Critical definitions in understanding these criteria are those of '*population*' and '*important population*'. Under the EPBC a *population* of a species is defined as an occurrence of the species in a particular area. In relation to critically endangered, endangered or vulnerable threatened species, occurrences include but are not limited to:

- a geographically distinct regional population, or collection of local populations, or
- a population, or collection of local populations, that occurs within a particular bioregion.

In terms of an *important population* of a species, the EPBC defines an important population as a population that is necessary for a species' long-term survival and recovery. This may include populations identified as such in recovery plans, and/or that are:

- key source populations either for breeding or dispersal
- populations that are necessary for maintaining genetic diversity, and/or
- populations that are near the limit of the species range.

Having applied the significant impact criteria to both the spotted-tailed quoll and the masked owl for the present proposed action (Appendix 4), it is not considered to be likely that the action will result in a significant impact upon either species.

In the case of the spotted-tailed quoll, the site is not considered to be habitat for an important population because the area is located outside of the species core range and contains habitat generally considered to be suboptimal for high densities of the species. In addition, the action is not likely to result in a decline or inhibit the recovery of the species overall.

The same can be said for the masked owl, with the site not likely to harbour individuals of an important population because of the low cover of dry native forest in the surrounding area – much less than the 50 % cover found to be a threshold for increasing the probability of occupation of the species.

Thus, referral to the minister on the basis of impacts to EPBC listed fauna is not considered to be necessary.

Tasmanian Weed Management Act 1999 (WMA)

Under the relevant statutory weed management plans, the Northern Midlands is recognised as a 'Zone B' area for horehound, winged slender thistle and gorse. Zone B municipalities are those which host moderate or large infestations of the declared weed that are not deemed eradicable because the feasibility of effective management is low at this time. Therefore the objective is containment of infestations. This includes preventing spread of the declared weed from the municipality or into properties currently free of the weed or which have developed or are implementing a locally integrated weed management plan for that species. As well there is a requirement to prevent spread of the weeds to properties containing sites for significant flora, fauna and vegetation communities.

Depending of the specifics of extraction on site, weed control may be necessary to prevent the spread of gorse (in particular), winged slender thistle and horehound.

CONCLUSION:

The proposed lease area is of relatively low value to biodiversity having been largely converted to exotic pasture. Remnant native vegetation is in general severely degraded both in terms of condition and the size of remnants. The vegetation offers little value as native fauna habitat.

The remnant of NBA supports a diverse flora but is sufficiently degraded in size and by weeds to exclude the grasslands within from being defined as EPBC grasslands.

The two occurrences of threatened flora are species that are commonly reported from degraded remnants and are not judged to be important populations of either.

A Permit to take will be required where avoidance is not possible. Weed management is recommended to minimise the spread of weeds from the site to other locations.

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APPENDIX 1- DEFINITIONS OF CONSERVATION VALUES OF PLANT AND ANIMAL SPECIES

SPECIES OF NATIONAL SIGNIFICANCE

Listed in Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*

The *EPBC Act* has six categories of threat status for species:

1. **Extinct** - If at a particular there is no reasonable doubt that the last member of the species has died
2. **Extinct in the wild** - If it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or If it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form
3. **Critically endangered** - If at a particular time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria
4. **Endangered** - If it is not critically endangered; and it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria
5. **Vulnerable** - If at a particular time it is not critically endangered or endangered; and it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.
6. **Conservation dependent** - If, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years

SPECIES OF STATE SIGNIFICANCE

Listed in Tasmanian *Threatened Species Protection Act 1995 (TSP Act)*

Threatened flora and fauna species in Tasmania are listed in Schedules 3 (extinct or endangered), 4 (vulnerable) or 5 (rare). These three categories are defined in Section 15 of the Act.

1. **Extinct** - If no occurrence of the taxon in the wild can be confirmed during the past 50 years
2. **Endangered** - If it is in danger of extinction because long-term survival is unlikely while the factors causing it to be endangered continue operating.
3. **Vulnerable** - If it is likely to become an endangered taxon while the factors causing it to be vulnerable continue operating.
4. **Rare** - If it has a small population in Tasmania that is not endangered or vulnerable but is at risk.”

Species that have been nominated and approved by the Scientific Advisory Committee for listing in the Act

SPECIES OF REGIONAL OR GENERAL SIGNIFICANCE

The following definitions are from three publications: Flora Advisory Committee 1994, Vertebrate Advisory Committee 1994, Invertebrate Advisory Committee 1994

Flora only - Species listed as rare but not necessarily ‘at risk’ (**r3**)

Fauna only – Species requiring monitoring (**m**)

Both – Species of unknown risk status (**k**) in Tasmania, or thought to be uncommon within region, or a species having a declining range or populations within the area.

Species considered to be outside its normal range or of an unusual form as determined and justified in the body of the report.

Species identified in regional studies as being of conservation significance that are not listed in current legislation

Species that have been recognised but have not been formally described in a published journal that are thought to significant as determined and justified in the body of the report.

Plant species that are not known to be reserved. To be so it must be known to exist in at least one secure Reserve. Secure reserves include reserves and parks requiring the approval of both Houses of Parliament for their revocation. They include: National Parks, Aboriginal Sites, Historic Sites, Nature Reserves, State Reserves, Game Reserves, Forest Reserves, Wellington Park, and insecure reserves in the World Heritage Area which is protected by international agreement under the World Heritage Convention.

APPENDIX 2 - Legislative implications of threatened species

Tasmanian State Legislation Affecting Threatened Species

Threatened Species Protection Act 1995

Threatened flora and fauna species in Tasmania are listed in Schedules 3 (endangered) and 4 (vulnerable) of the Threatened Species Protection Act, 1995. Rare species that are considered to be 'at risk' are listed in Schedule 5 of the Act. These three categories are defined in Section 15 of the Act.

1. "An extant taxon of native flora or fauna may be listed as **endangered** if it is in danger of extinction because long-term survival is unlikely while the factors causing it to be endangered continue operating.
2. A taxon of native flora or fauna may be listed as **vulnerable** if it is likely to become an endangered taxon while the factors causing it to be vulnerable continue operating.
3. A taxon of native flora or fauna may be listed as **rare** if it has a small population in Tasmania that is not endangered or vulnerable but is at risk."

The Act provides mechanisms for protecting these species from threatening processes the implementation of 'recovery plans', 'threat abatement plans', 'land management plans', 'public authority agreements', and 'interim protection orders'.

Section 51 (a) of the TSPA states that: "A person must not knowingly, without a permit - take, trade in, keep or process any listed flora or fauna". The Act defines 'take' as including: "kill, injure, catch, damage, destroy and collect. A land manager is therefore required to obtain a permit from the Tasmanian Department of Primary Industries, Water and Environment (DPIPWE) to carry out management that may adversely affect any of the species listed in the Act

Commonwealth of Australia Legislation Affecting Threatened Species

Environment Protection and Biodiversity Conservation Act 1999

The EPBC Act establishes a process for assessing actions that are likely to have impacts of *national environmental significance*. Such impacts include World Heritage Areas, RAMSAR Wetland sites of international importance, migratory species protected under international agreements, nuclear actions, the Commonwealth marine environment and **nationally threatened species and communities**.

Threatened species are defined in several categories:

1. Extinct

- If at a particular there is no reasonable doubt that the last member of the species has died

2. Extinct in the wild

- If it is known only to survive in cultivation, in captivity or as a naturalised population well outside its past range; or
- If it has not been recorded in its known and/or expected habitat, at appropriate seasons, anywhere in its past range, despite exhaustive surveys over a time frame appropriate to its life cycle and form

3. Critically endangered

- If at a particular time, it is facing an extremely high risk of extinction in the wild in the immediate future, as determined in accordance with the prescribed criteria

4. Endangered

- If it is not critically endangered; and it is facing a very high risk of extinction in the wild in the near future, as determined in accordance with the prescribed criteria

5. Vulnerable

- If at a particular time it is not critically endangered or endangered; and it is facing a high risk of extinction in the wild in the medium-term future, as determined in accordance with the prescribed criteria.

6. Conservation dependent

- If, at that time, the species is the focus of a specific conservation program, the cessation of which would result in the species becoming vulnerable, endangered or critically endangered within a period of 5 years

An action that is likely to affect species that are listed in any of the above categories may require ministerial approval unless the Commonwealth Environment Minister has granted an exemption. The Act establishes a **referral process** to Environment Australia to determine whether an action requires a formal **approval** and thus would be required to proceed through the **assessment and approval process**.

A referral must provide sufficient information to allow the Minister to make a decision. The Minister is then required to make a decision within 20 business days of the referral. The Minister may decide an approval is not necessary if the action is taken in a specified manner. The action may not require approval but may require a **permit** if undertaken on Commonwealth land. If an approval is required then an **environmental assessment** must be carried out. In such instances the environmental assessment approach will be determined by the Minister and may vary from preliminary documentation to a full public inquiry depending on the scale and complexity of the impact.

APPENDIX 3 – PLANT SPECIES LIST**Status codes:**

ORIGIN	NATIONAL SCHEDULE	STATE SCHEDULE
i - introduced	EPBC Act 1999	TSP Act 1995
d - declared weed WM Act	CR - critically endangered	e - endangered
en - endemic to Tasmania	EN - endangered	v - vulnerable
t - within Australia, occurs only in Tas.	VU - vulnerable	r - rare

Sites:

1	DMW - E537358, N5361389	2/05/2013 Grant Daniels
2	NBA - E537430, N5361778	19/11/2013 Philip Barker
3	DMW - E537322, N5361464	19/11/2013 Grant Daniels
4	DMW - E537360, N5361317	19/11/2013 Grant Daniels
5	DMW - E537275,, N5361635	2/5/2013 Philip Barker

Site	Name	Common name	Status
	DICOTYLEDONAE		
	AMARANTHACEAE		
2 3 4	<i>Ptilotus spathulatus</i>	pussytails	
	APIACEAE		
3 4	<i>Daucus glochidiatus</i>	australian carrot	
	ASTERACEAE		
3	<i>Arctotheca calendula</i>	capeweed	i
3 4	<i>Carduus tenuiflorus</i>	slender thistle	d
2 3	<i>Chrysocephalum apiculatum</i>	common everlasting	
1 3 4	<i>Cirsium vulgare</i>	spear thistle	i
3	<i>Euchiton sp.</i>	cudweed	
1 4	<i>Hypochaeris radicata</i>	rough catsear	i
3 4	<i>Leontodon saxatilis</i>	hairy hawkbit	i
3 4	<i>Leptorhynchos nitidulus</i>	shiny buttons	
3	<i>Leptorhynchos squamatus</i>	scaly buttons	
3 4	<i>Logfia gallica</i>	narrow cudweed	i
4	<i>Senecio glomeratus</i>	shortfruit purple fireweed	
4	<i>Silybum marianum</i>	variegated thistle	i
3	<i>Solenogyne dominii</i>	smooth flat-herb	
3 4	<i>Sonchus asper</i>	bluegreen prickly sowthistle	i
	BORAGINACEAE		
3	<i>Myosotis discolor</i>	changing forgetmenot	i
	BRASSICACEAE		
3	<i>Brassica tournefortii</i>	mediterranean turnip	i
3	<i>Raphanus raphanistrum</i>	wild radish	i

	CAMPANULACEAE		
3	<i>Wahlenbergia sp.</i>	bluebell	
	CARYOPHYLLACEAE		
4	<i>Cerastium glomeratum</i>	sticky mouse-ear	i
5	<i>Scleranthus fasciculatus</i>	knawl	
	CASUARINACEAE		
2	<i>Allocasuarina verticillata</i>	drooping sheoak	
	CONVOLVULACEAE		
3 4	<i>Convolvulus angustissimus ssp. angustissimus</i>	blushing bindweed	
3 4	<i>Dichondra repens</i>	kidneyweed	
	CRASSULACEAE		
3	<i>Crassula decumbens var. decumbens</i>	spreading stonecrop	
2	<i>Crassula sieberiana</i>	stone-crop	
3 4	<i>Crassula sieberiana subsp. sieberiana</i>	rock stonecrop	
	DILLENIACEAE		
3 4	<i>Hibbertia hirsuta</i>	hairy guineaflower	en
	DROSERACEAE		
2	<i>Drosera peltata</i>	pale sundew	
3 4	<i>Drosera peltata subsp. auriculata</i>	tall sundew	
2	<i>Drosera spatulata</i>	rosy sundew	
	EPACRIDACEAE		
3	<i>Astroloma humifusum</i>	native cranberry	
	EUPHORBIACEAE		
2	<i>Poranthera microphylla</i>	small poranthera	
	FABACEAE		
2	<i>Medicago arabica</i>	spotted medick	i
3 4	<i>Trifolium dubium</i>	suckling clover	i
2	<i>Trifolium pratense</i>	red clover	i
3	<i>Trifolium repens</i>	white clover	i
1	<i>Trifolium sp.</i>	clover	
3 4	<i>Trifolium subterraneum</i>	subterranean clover	i
1 3 4	<i>Ulex europaeus</i>	gorse	d
	FUMARIACEAE		
3 4	<i>Fumaria muralis subsp. Muralis</i>	wall fumitory	i
	GENTIANACEAE		
3	<i>Centaurium erythraea</i>	common centaury	i
3 4	<i>Sebaea ovata</i>	yellow sebaea	
	GERANIACEAE		
3	<i>Erodium moschatum</i>	musky heronsbill	i
2	<i>Geranium dissectum</i>	cutleaf cranesbill	i
1 2	<i>Geranium potentilloides var. potentilloides</i>	mountain cranesbill	
3 4	<i>Geranium retrorsum</i>	grassland cranesbill	

1 3	<i>Pelargonium australe</i>	southern storksbill	
	LAMIACEAE		
4	<i>Marrubium vulgare</i>	white horehound	d
	LINACEAE		
2	<i>Linum marginale</i>	native flax	
	MIMOSACEAE		
2	<i>Acacia dealbata subsp. dealbata</i>	silver wattle	
1 3 4	<i>Acacia mearnsii</i>	black wattle	
	MYRTACEAE		
4	<i>Eucalyptus pauciflora subsp. pauciflora</i>	cabbage gum	
	OXALIDACEAE		
3 4	<i>Oxalis exilis</i>	feeble woodsorrel	
	PITTOSPORACEAE		
3 4	<i>Bursaria spinosa subsp. spinosa</i>	prickly box	
	PLANTAGINACEAE		
1 4	<i>Plantago coronopus</i>	buckshorn plantain	i
1	<i>Plantago hispida</i>	hairy plantain	
2	<i>Plantago varia</i>	variable plantain	
	POLYGONACEAE		
4	<i>Acetosella vulgaris</i>	sheep sorrel	i
	PRIMULACEAE		
2 3 4	<i>Lysimachia arvensis</i>	scarlet pimpernel	i
	RESEDACEAE		
3 4	<i>Reseda luteola</i>	weld	i
	ROSACEAE		
2	<i>Acaena echinata</i>	spiny sheeps burr	
3 4	<i>Acaena ovina var. velutina</i>	downy sheepsburr	
	RUBIACEAE		
2 3 4	<i>Asperula conferta</i>	common woodruff	
3	<i>Galium australe</i>	tangled bedstraw	
	SCROPHULARIACEAE		
2 4	<i>Veronica gracilis</i>	slender speedwell	
	THYMELAEACEAE		
1 2 3 4	<i>Pimelea humilis</i>	dwarf riceflower	
	MONOCOTYLEDONAE		
	CYPERACEAE		
3 4	<i>Gahnia rodwayi</i>	dwarf sawsedge	en
2 3 4	<i>Schoenus apogon</i>	common bogsedge	
	JUNCACEAE		
3	<i>Juncus bufonius</i>	toad rush	
3	<i>Juncus capitatus</i>	capitate rush	i
	LILIACEAE		

2 3 4	<i>Arthropodium minus</i>	small vanilla-lily	
1 4	<i>Hypoxis glabella var. glabella</i>	tiny yellowstar	
	POACEAE		
1 3 4	<i>Aira caryophylla</i>	silvery hairgrass	i
4	<i>Aira elegantissima</i>	delicate hairgrass	
3 4	<i>Austrodanthonia diemenica</i>	tasmanian wallabygrass	en
4	<i>Austrodanthonia setacea</i>	bristly wallabygrass	
2	<i>Austrodanthonia sp.</i>	wallabygrass	
1 3 4	<i>Austrostipa mollis</i>	soft speargrass	
3	<i>Austrostipa pubinodis</i>	tall speargrass	
3 4	<i>Austrostipa rudis subsp. australis</i>	southern speargrass	
1	<i>Austrostipa sp.</i>	speargrass	
2	<i>Austrostipa stiposa</i>	corkscrew speargrass	
3 4	<i>Briza minor</i>	lesser quaking-grass	i
4	<i>Bromus diandrus</i>	great brome	i
3 4	<i>Bromus hordeaceus</i>	soft brome	i
3	<i>Catapodium rigidum</i>	ferngrass	i
1 4	<i>Cynosurus echinatus</i>	rough dogstail	i
3 4	<i>Dactylis glomerata</i>	cocksfoot	i
4	<i>Dichelachne crinita</i>	longhair plumegrass	
2 3 4	<i>Ehrharta stipoides</i>	weeping grass	
2 3 4	<i>Holcus lanatus</i>	yorkshire fog	i
3	<i>Hordeum murinum</i>	barley, wall barley grass	i
3	<i>Hordeum murinum subsp. glaucum</i>	bluish barleygrass	i
3	<i>Hordeum murinum subsp. leporinum</i>	long-anther barleygrass	i
4	<i>Hordeum murinum subsp. murinum</i>	shortflower barleygrass	i
3 4	<i>Lolium rigidum</i>	wimmera ryegrass	i
2	<i>Poa labillardierei</i>	silver tussockgrass	
3	<i>Poa pratensis</i>	kentucky bluegrass	i
1 2 3 4	<i>Poa rodwayi</i>	velvet tussockgrass	
1 2 3 4	<i>Themeda triandra</i>	kangaroo grass	
3	<i>Vulpia fasciculata</i>	dune fescue	i
3	<i>Vulpia myuros forma megalura</i>	foxtail fescue	i
4	<i>Vulpia sp.</i>	fescue	i
	XANTHORRHOACEAE		
3	<i>Lomandra longifolia</i>	sagg	
	PTERIDOPHYTA		
	ADIANTACEAE		
1 2 3 4	<i>Cheilanthes austrotenuifolia</i>	green rockfern	

APPENDIX 4 – TESTS OF SIGNIFICANT IMPACTS**Spotted-tailed quoll**

Criteria for potential for significant impact to the spotted-tailed quoll	Outcome	Justification
1. lead to a long-term decrease in the size of an important population of a species;	No	Not an important population based on habitat in the region and species core distribution.
2. reduce the area of occupancy of an important population;	No	Not an important population based on habitat in the region and species core distribution.
3. fragment an existing important population into two or more populations;	No	Not an important population based on habitat in the region and species core distribution.
4. adversely affect habitat critical to the survival of a species;	No	Although 'Critical habitat' under the EPBCA is not included for this species on the EPBC Register of Critical Habitat, it is more likely to be large tracts of wet, fertile and complex vegetation, rather than farmland with scattered trees, such as the present site.
5. disrupt the breeding cycle of an important population;	No	Not an important population based on habitat in the region and species core distribution.
6. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;	No	The sites total area is likely only to constitute part of the range of one or a small number of individuals. Thus, actions on the site are not likely to result in the decline of the species.
7. result in invasive species that are harmful to the vulnerable species becoming established in the vulnerable species' habitat;	No	The invasive species presently considered most likely to impact on the spotted-tailed quoll is the European fox. The site is located within optimal fox habitat, but there is no likely scenario in which the proposed actions would facilitate the introduction of the fox into the area, should it not already be present.
8. introduce disease that may cause the species to decline.	No	There is no known disease that causes decline in populations of the spotted-tailed quoll, nor are any likely to be introduced due to actions associated with the present proposal.
9. interferes substantially with the recovery of the species.	No	There is no conceivable reason why the proposed action will interfere with the recovery of this species, particularly as the site is not within core range and not considered to constitute part of the range of an important population.

Masked owl:

Criteria for potential for significant impact to the masked owl	Outcome	Justification
1. lead to a long-term decrease in the size of an important population of a species;	No	Not an important population based on habitat in the region (in particular the low remaining cover of dry sclerophyll forest), the paucity of local records, and the sites location outside of the species core range.
2. reduce the area of occupancy of an important population;	No	Not an important population based on habitat in the region (in particular the low remaining cover of dry sclerophyll forest), the paucity of local records, and the sites location outside of the species core range.
3. fragment an existing important population into two or more populations;	No	Not an important population based on habitat in the region (in particular the low remaining cover of dry sclerophyll forest), the paucity of local records, and the sites location outside of the species core range.
4. adversely affect habitat critical to the survival of a species;	No	Although the site as aspects of high quality masked owl habitat, critical habitat is more likely to be large tracts of dry, lowland, sclerophyll forest, rather than farmland with scattered trees, such as the present site.
5. disrupt the breeding cycle of an important population;	No	Not an important population based on habitat in the region (in particular the low remaining cover of dry sclerophyll forest), the paucity of local records, and the sites location outside of the species core range.
6. modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline;	No	The sites total area is likely only to constitute part of the range of one or a small number of individuals. Thus, actions on the site are not likely to result in the decline of the species.
7. result in invasive species that are harmful to the vulnerable species becoming established in the vulnerable species' habitat;	No	There is no likely scenario in which the proposed actions would facilitate the introduction into the area of an invasive species potentially detrimental to the masked owl. At this point no introduced species in Tasmania are considered to pose a significant threat to masked owls. Indeed, exotic birds in some cases constitute an important prey species.
8. introduce disease that may cause the species to decline.	No	There is no known disease that causes decline in populations of the masked owl, nor are any likely to be introduced due to actions associated with the present proposal.
9. interferes substantially with the recovery of the species.	No	There is no conceivable reason why the proposed action will interfere with the recovery of this species, particularly as the site is not within core range and not considered to constitute part of the range of an important population.