

# Eaglehawk Neck Road Upgrade



## Flora and Fauna Habitat Assessment

## Document information

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	Flora and Fauna Habitat Assessment
Client organisation	State Growth
Client contact	David Spiers
Project manager	Stephen Casey

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Authored by	Stephen Casey		14/9/2021
	(name)	(signature)	
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## 2 EXECUTIVE SUMMARY

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The Department of State Growth is planning road upgrade works along the Arthur Highway at Eaglehawk Neck on Tasmania's southeast coast. The aim of the works is to widen the existing road and potentially build a walking track on the eastern side of the neck near the road.

Department of State Growth has requested a natural values survey of the site to identify any special values which might require mitigation or permits.

Vegetation on the site is highly disturbed and generally in poor condition however some biodiversity values are present and need to be considered when undertaking the works.

### Threatened Vegetation Communities

A small area of *Eucalyptus viminalis* – *E. globulus* forest was recorded from the study area. This community is listed on the *Nature Conservation Act 2002* as threatened. A very small area of this community (330m<sup>2</sup>) occurred on the corner of Blow Hole Road and the Arthur Highway and it was not typical of this forest type.

A small area of the saltmarsh community, succulent saline saltmarsh, was found on the foreshore of Eaglehawk Bay. As result of a design change to accommodate heritage and community concerns, approximately 100m<sup>2</sup> of this community will be impacted. This community is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*. Referral, however, is not required for ecological communities listed as Vulnerable.

### Threatened Flora

No species of flora listed on either the *Tasmanian Threatened Species Protection Act 1995* or the *Environment Protection and Biodiversity Protection Act 1999* were recorded from the site or were considered likely to occur in the highly disturbed study area.

### Threatened Fauna

Fauna habitat at the site is of low quality due to the highly disturbed nature of the vegetation. Some listed mammal species may occasionally utilise the site and some listed bird species may overfly the area but due to lack of habitat, no threatened fauna are likely to reside on the site. Due to the highly modified nature of the study area and small scale of the works there is little chance that there will be an impact on any significant fauna values.

No significant fauna or habitat is likely to be impacted by the proposed works.

### Weeds and Diseases

There are statutory management plans for the four declared weed species present (blackberry, boneseed, English broom and Spanish heath). These plans outline management measures for these weed species in the Tasman municipality. The management plans for all these species, apart from boneseed, focus on containment and their spread from the municipality must be prevented. The management plan for boneseed focuses on eradicating the species from the municipality.

No sign of disease was recorded from the site.

## 2.1 RECOMMENDATIONS

The following recommendations are made with regard to the proposal.

- The areas of *E. viminalis*-*E. globulus* coastal forest should be taped off and roadwork should avoid the area. Any proposed walking track should avoid the area if practical and

if the walking track can't avoid it, the track should be constructed so as not to impact on any trees within the community.

- The area of the saltmarsh community not required for road upgrade works should be protected from further disturbance where possible.
- In order to prevent the spread of declared weeds within and from the municipality, boneseed should be eradicated within the project works footprint prior to any earthworks commencing. Construction machinery should be cleaned prior to first entry to the site as well as when leaving and any weed material and soil should be removed and disposed of appropriately to prevent the spread of weeds and diseases. Construction machinery should be cleaned as described in DPIWE 2004 Washdown Guidelines for Weed and Disease Control Edition 1.

### 3 INTRODUCTION AND BACKGROUND

The Department of State Growth is planning road upgrade works along the Arthur Highway at Eaglehawk Neck on Tasmania’s southeast coast. The aim of the works is to widen the existing road and potentially build a walking track on the eastern side of the neck near the road.

Department of State Growth has requested a natural values survey of the site to identify any special values which might require mitigation or permits. The study area can be seen in Figure 1.



Figure 1. Location of the works area on the Arthur Highway at Eaglehawk Neck on Tasmania’s southeast coast.

## 4 METHOD

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### 4.1 FLORA AND FAUNA

The area of the proposed roadworks was assessed during a vegetation and fauna habitat assessment undertaken on the 18 February 2019. The field investigation involved a meandering survey of the study area. Information recorded included community structure and condition. Vegetation communities were identified and attributed to Tasmanian Vegetation Mapping Units (Harris and Kitchener 2013). All native species of flora and fauna encountered during the survey were recorded. Nomenclature for flora follows the current census of Tasmanian Vascular Plants ([http://www.tmag.tas.gov.au/data/assets/pdf\\_file/0003/154164/2017\\_Census\\_of\\_Tasmanian\\_Vascular\\_Plants.pdf](http://www.tmag.tas.gov.au/data/assets/pdf_file/0003/154164/2017_Census_of_Tasmanian_Vascular_Plants.pdf)).

### 4.2 LIMITATIONS

Due to varying flowering times and seasonality of occurrence it is possible that not all flora species that occur at the site were identified in the survey. Some threatened species, particularly short lived annuals, orchids and lilies that may be present at the site may have been missed because they were not able to be identified (they were not flowering) or they were not evident at this time of year (they were annual plants that had died back or not emerged at the time of survey).

The fauna assessment was limited to a habitat assessment for fauna species, including the ground truthing of potential habitats for significant fauna species that were identified in database searches. Any indirect evidence of fauna presence was also recorded (e.g. scats, diggings, burrows, shelters etc). No systematic fauna surveys were undertaken.

Mapping was undertaken using a handheld GPS with an accuracy of +/- 5-10m. Mapping vegetation communities and boundaries at this small scale is very difficult particularly when vegetation is in poor condition. Vegetation boundaries are approximate only.

### 4.3 CRITERIA FOR DETERMINING FLORA AND FAUNA SPECIES OF CONSERVATION SIGNIFICANCE

The conservation significance of the flora and fauna at the proposed roadworks was assessed using the following criteria.

- They were listed on the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
- They were listed on the *Tasmanian Threatened Species Protection Act 1995*

The requirements of the *Tasmanian Threatened Species Protection Act 1995*, and the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* are summarised below. The requirements of the *Tasmanian Forest Practices Act 1985* are also summarised below. This Act and the associated Forest Practices Code are included because they prescribe the manner in which the clearing of native vegetation can be undertaken and afford protection to Threatened Native Vegetation Communities listed on Schedule 3A of the *Nature Conservation Act 2002*.

#### 4.3.1 *Environment Protection and Biodiversity Conservation Act 1999*

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) provides for the protection of matters of national environmental significance and the conservation of Australia's biodiversity. Whilst the States are primarily responsible for environmental impact assessment there are a number of triggers that may initiate Commonwealth involvement in a project. These are:

- listed threatened species and communities

- listed migratory species
- Ramsar wetlands of international importance
- Commonwealth marine environment
- world heritage properties
- national heritage places
- the Great Barrier Reef Marine Park
- nuclear actions
- a water resource, in relation to coal seam gas development and large coal mining development.

#### 4.3.2 *Threatened Species Protection Act 1995*

Generally, the following obligations under the *Tasmanian Threatened Species Protection Act 1995* (TSPA) are relevant to proposed works. In the absence of a permit:

- no listed species may be killed, injured or collected
- listed species on land subject to an interim protection order must not be disturbed
- there must be no disturbance to listed species contrary to a land management agreement
- any interim protection order made to conserve the critical habitat of a listed taxon of flora or fauna must be complied with. In the absence of a permit, no activity may be undertaken on land subject to an interim protection order.

#### 4.3.3 *Forest Practices Act 1985*

The *Forest Practices Act 1985* provides that the Forest Practices Code (FPC) prescribes the manner in which forest practices or clearance and conversion of native vegetation is to be conducted and provides for the protection of the natural and cultural values. Forest Practices Plans are required when clearing trees or clearance and conversion of Threatened Native Vegetation Communities listed on Schedule 3A of the *Nature Conservation Act 2002*.

A Forest Practices Plan (FPP) will not be required for the proposed works as a FPP is unnecessary where

(d) the harvesting of timber or the clearing of trees on any land, or the clearance and conversion of a threatened native vegetation community on any land, for one or more of the following purposes:

- (i) dam works authorised by a Division 3 permit issued under the Water Management Act 1999;
- (ii) the construction and maintenance of gas pipelines;
- (iii) the construction and maintenance of public roads;**

## 5 RESULTS

### 5.1 FLORA

#### 5.1.1 Vegetation Communities

The study area consists of highly disturbed roadside vegetation, with small areas of remnant native vegetation as well as grassed road verges and public open spaces. All the vegetation is in poor condition with the highly modified roadside vegetation supporting a large and diverse number of weeds species including weeds declared under the *Tasmanian Weed Management Act 1999*.

Seven Tasmanian Vegetation Mapping units (TASVEG), as described in Harris & Kitchener (2013) are identified within the study area with the majority of the area mapped various types of modified land.

One small area was identified as *Eucalyptus viminalis*- *E. globulus* coastal forest which is a community listed as threatened on the *Nature Conservation Act 2002*. The extent and distribution of these mapping units can be seen in Figure 7.

#### Permanent Easement (FPE)

This mapping unit consisted of all the roads as well as disturbed roadside vegetation within the study area and was often very weedy (Figure 2 and Figure 7).



Figure 2. The area immediately adjacent to the road and verges was mapped as permanent easement

#### Extra Urban Miscellaneous (FUM)

This community is confined to the public open spaces outside the road corridor. It generally consisted of public buildings and their surrounding grassed areas. It can be seen within the fencing in Figure 2.

#### Weed Infestation (FWU).

One area in the north of the study area is mapped as Weed Infestation (Figure 3 and Figure 7). While some hardy native species persisted in the area (*Acacia melanoxylon*, *Senecio linearis* and *Cassinia aculeata*) the area is dominated by *Rubus fruticosus* (blackberry), *Passiflora tarminiana* (banana passionfruit), and to a lesser extent *Vinca major* (periwinkle) and *Pittosporum undulatum* (sweet pittosporum). Several large *Cupressus macrocarpa* (Monterey cypress) also occurred in this area.



Figure 3. One area in the north of the study area supported a dense and diverse array of exotic species (left) including large Monterey pines (right).

### Sand and Mud (OSM)

This mapping unit covers the tidal sandy mud flats of Eaglehawk Bay within the study area.

### *Acacia longifolia* coastal scrub (SAC)

This mapping unit occupied the sandy portions of the study area behind the fore-dune on the isthmus (Figure 4 and Figure 7). The dominant shrubs are *Acacia longifolia* (coast wattle) *Leucopogon parviflorus* (coast beardheath) and *Rhagodia candolleana* (coastal saltbush), with the trailing *Tetragonia implexicoma* (bower spinach) being common. *Banksia marginata* (silver banksia) was occasional. This community was in variable condition with *Rubus fruticosus* (blackberry) and *Passiflora tarminiana* (banana passionfruit) being common. A number of large *Pinus radiata* (radiata pines) have been felled between the fore-dune and the study area. Although these large pines have been cut down much of the trunks and branches have remained and this has resulted in the germination of a number of pine wildlings (Figure 8). Removal of any cones and wildlings prior to them maturing would prevent future pine seedlings establishing.



Figure 4. *Acacia longifolia* coastal scrub occurring behind the fore dune on the Eaglehawk Neck isthmus.

### *Eucalyptus viminalis* – *E. globulus* coastal forest (DVC)

A very small area (330m<sup>2</sup>) of this community is present on the corner of Blow Hole Rd in a slight depression (Figure 5 and Figure 7). *Eucalyptus viminalis* dominates the canopy at approximately 6-8m. *Acacia melanoxylon* (blackwood) and *Exocarpos cupressoides* (native cherry) and *Cassinia aculeata* (dolly bush) occurred as tall shrubs. The understory was dominated by *Pteridium esculentum* (bracken) with very occasional *Pimelea drupacea* (cherry riceflower). This community is

listed as threatened under the *Nature Conservation Act 2002*. This community was not typical of the listed forest community.



Figure 5. A small patch of *E. viminalis* – *E. globulus* coastal forest was found in a depressions near the corner of Blow Hole Rd.

#### **Saline Succulent herbland (ASS)**

A small area of this community was found on the foreshore area of Eaglehawk Bay (Figure 6 and Figure 7). It is dominated by *Sarcocornia quinqueflora* (beaded glasswort), *Suaeda australis* (southern seablite) *Atriplex cinerea* (grey saltbush) and *Disphyma crassifolium subsp. clavellatum* (roundleaf pigface). *Juncus kraussii subsp. australiensis* (sea rush) is found fringing the saltmarsh area and the weedy *Osteospermum fruticosum* (trailing daisy) is becoming prominent. This community is listed as Vulnerable on the EPBC. Vulnerable ecological communities are not referable under the EPBCA.



Figure 6. A small area of the saltmarsh community Succulent saline herbland was found on the Eaglehawk Bay shoreline.

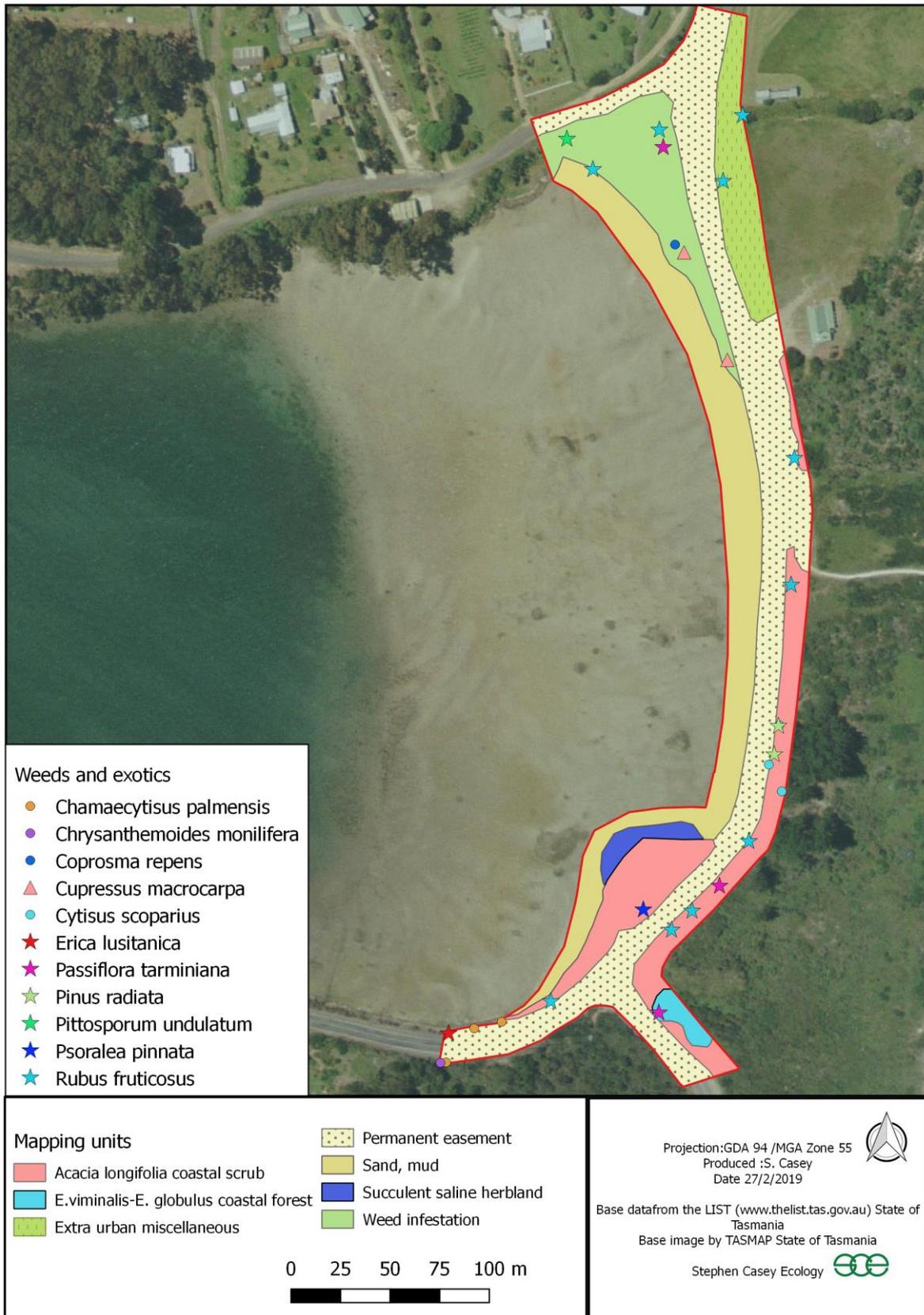


Figure 7. Mapping units, declared weeds and exotic species recorded from the study area.

### 5.1.2 Threatened Vegetation Communities

A small area of the threatened vegetation community *Eucalyptus viminalis* – *E. globulus* forest was recorded from the study area. It is listed on the *Nature Conservation Act 2002* as threatened. The community found is not typical of this forest type and this is likely the result of mapping and classifying vegetation communities at this small which can be problematic.

A small area of the saltmarsh community, succulent saline saltmarsh, was found on the foreshore of Eaglehawk Bay. This community is listed as Vulnerable under the *Environment Protection and Biodiversity Conservation Act 1999*.

### 5.1.3 Threatened Flora

The field survey recorded 124 species within the study area of which 64 were introduced species including four species listed as declared weeds under the *Weed Management Act 1999*. A full list of species is provided in Appendix 1.

Twenty one threatened flora species have previously been recorded within 5 km of the study area and a list of these are provided in Appendix 2. Many of the habitats that support these species in the broader area are not present within the small area of the study site and so are not expected or likely to occur here.

Four threatened species *Caladenia filamentosa* (daddy longlegs), *Euphrasia semipicta* (peninsula eyebright), *Phyllangium divergens* (wiry mitrewort) and *Prasophyllum pulchellum* (pretty leek-orchid) have been recorded within 500m of the site. However many of these records are extremely old (most prior to 1960 and some dating back to the 19<sup>th</sup> century) and have very poor locational accuracy (> 1000m).

None of these species were recorded from the site and given the very small area of impact expected and highly disturbed and weedy nature of the site there is little chance that these species would occur in the study area or would be impacted.

## 5.2 THREATENED FAUNA

Available data sources, including the Natural Values Atlas (NVA) and the EPBC Protected Matters Search Tool identified a number of species that have the potential to occur in suitable habitat on the site. These species are detailed in Appendix 3. Some mammal species such as the *Perameles gunnii gunnii* (eastern barred bandicoot), *Sarcophilus harrisii* (Tasmanian devil), *Dasyurus maculatus* (spotted-tailed quoll), and *Dasyurus viverrinus* (eastern quoll) may occasionally utilise the site and some bird species may overfly the area but due to lack of habitat, no threatened fauna are likely to reside on the site. Due to the highly modified nature of the study area and small scale of the works there is little chance that there will be an impact on any significant fauna values.

## 5.3 WEEDS AND DISEASES

A large number of weed species were present on the site and the cover of weeds was high in some areas particularly on the corner of the Arthur Highway and Jetty Road. Four species found are declared weeds listed in the *Weed Management Act 1999*. Declared weeds include:

- *Rubus fruticosus* (blackberry);
- *Chrysanthemoides monilifera* (boneseed);
- *Cytisus scoparius* (English broom); and
- *Erica lusitanica* (Spanish Heath).

The occurrence of these declared weed species is patchy with only blackberry being recorded extensively (Figure 7 and Figure 8). There are statutory management plans for these species which

outline management measures in the Tasman municipality. These measures have been considered in developing the recommendations in the following section.



Figure 8. Declared weed species found within the study area

Other environmental weeds found on the site included:

- *Passiflora tarminiana* (banana passionfruit)- widespread;
- *Cotoneaster* (cotoneaster)- occasional;
- *Arctotheca calendula* (capeweed)-localised;
- *Pinus radiata* (radiata pine)- localised
- *Paspalum dilatatum* (paspalum)- occasional;
- *Pittosporum undulatum* (sweet pittosporum)-localised;
- *Chamaecytisus palmensis*- (tree lucerne)-localised;
- *Psoralea pinnata* (blue butterfly bush)-localised;
- *Agapanthus praecox* (Agapanthus)-occasional; and
- *Malva sp* (mallow)-widespread.

In addition to the species above, a large number of agricultural and roadside weeds were recorded. A full list of introduced species can be seen in Appendix 1.

No disease was recorded from the site.

## 6 DISCUSSION AND RECOMMENDATIONS

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Vegetation on the site is highly disturbed and generally in poor condition however some biodiversity values are present and need to be considered when undertaking the works.

### 6.1 THREATENED VEGETATION COMMUNITIES

A small area of *Eucalyptus viminalis* –*E. globulus* forest was recorded from the study area. This community is listed on the *Nature Conservation Act 2002* as threatened. A very small area of this community (330m<sup>2</sup>) occurred and it was not typical of this forest type. Classification of vegetation communities at this very small scale is difficult as areas of this size often do not have the necessary diversity of characteristics to accurately distinguish them.

A small area of the saltmarsh community, succulent saline saltmarsh, was found on the foreshore of Eaglehawk Bay. Due to a change in design of the road works to accommodate heritage and community concerns, approximately one third of area of this community (290m<sup>2</sup>) will be impacted. This community is listed as Vulnerable under the EPBCA. Referral, however, is not required for ecological communities listed as Vulnerable.

### 6.2 THREATENED FLORA

No species of flora listed on either the *Tasmanian Threatened Species Protection Act 1995* or the *Environment Protection and Biodiversity Protection Act 1999* were recorded from the site.

Although a number of threatened species have been previously recorded from nearby locations none of these species would be expected to occur in the study area.

### 6.3 THREATENED FAUNA

Fauna habitat at the site is of low quality due to the highly disturbed nature of the vegetation. Some mammal species may occasionally utilise the site and some bird species may overfly the area but due to lack of habitat, no threatened fauna are likely to reside on the site. Due to the highly modified nature of the study area and small scale of the works there is little chance that there will be an impact on any significant fauna values.

No significant fauna or habitat is likely to be impacted by the proposed works.

### 6.4 WEEDS AND DISEASES

There are statutory management plans for the four declared weed species present (blackberry, boneseed, English broom and Spanish heath). These plans outline management measures for these weed species in the Tasman municipality. The management plans for all these species, apart from boneseed, focus on containment and their spread from the municipality must be prevented. The management plan for boneseed focuses on eradicating the species from the municipality.

No sign of disease was recorded from the site.

### 6.5 RECOMMENDATIONS

The following recommendations are made with regard to the proposal.

- The areas of *E. viminalis*-*E. globulus* coastal forest should be taped off and roadwork should avoid the area. Any proposed walking track should avoid the area, if practical and if the walking track can't avoid it, the track should be constructed so as not to impact on any trees within the community.
- The area of the saltmarsh community not required for road design works should be protected from further disturbance during works.

- In order to prevent the spread of declared weeds within and from the municipality, boneseed should be eradicated within the project works footprint prior to any earthworks commencing. Construction machinery should be cleaned prior to first entry to the site as well as when leaving and any weed material and soil should be removed and disposed of appropriately to prevent the spread of weeds and diseases. Construction machinery should be cleaned as described in DPIWE 2004 Washdown Guidelines for Weed and Disease Control Edition 1.

## 7 REFERENCES

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Threatened Species Section. (1998). *Listing Statements: Various*

8 **APPENDIX 1**—FLORA SPECIES RECORDED FROM THE STUDY AREA**Status Codes**

i – introduced,

D - declared weed *Weed Management Act 1999*

<b>Name</b>	<b>Common name</b>	<b>Status</b>
<b>DICOTYLEDONAE</b>		
<b>APOCYNACEAE</b>		
<i>Vinca major</i>	blue periwinkle	i
<b>AIZOACEAE</b>		
<i>Carpobrotus rossii</i>	native pigface	
<i>Disphyma crassifolium</i> subsp. <i>clavellatum</i>	roundleaf pigface	
<b>ASTERACEAE</b>		
<i>Arctotheca calendula</i>	capeweed	i
<i>Bedfordia linearis</i> subsp. <i>linearis</i>	<i>slender blanketleaf</i>	
<i>Cassinia aculeata</i>	dollybush	
<i>Chrysanthemoides monilifera</i>	boneseed	D
<i>Cirsium vulgare</i>	spear thistle	i
<i>Conyza sumatrensis</i>	tall fleabane	i
<i>Gazania linearis</i>	tufted gazania	i
<i>Hypochoeris radicata</i>	rough catsear	i
<i>Leontodon taraxacoides</i> subsp. <i>taraxacoides</i>	hairy hawkbit	i
<i>Olearia stellulata</i>	sawleaf daisybush	
<i>Senecio biserratus</i>	jagged fireweed	
<i>Senecio glomeratus</i> subsp. <i>glomeratus</i>	shortfruit purple fi reweed	
<i>Senecio linearifolius</i>	common fireweed groundsel	
<i>Senecio quadridentatus</i>	cotton fireweed	
<i>Sonchus asper</i>	prickly sowthistle	i
<i>Taraxacum officinale</i>	common dandelion	i
<b>BRASSICACEAE</b>		
<i>Brassica napus</i>	rape	i
<i>Capsella bursa-pastoris</i>	shepherds purse	i
<b>CARYOPHYLLACEAE</b>		
<i>Cerastium glomeratum</i>	sticky mouse-ear	i
<i>Silene gallica</i>	French catchfly	i
<b>CASUARINACEAE</b>		
<i>Allocasuarina monilifera</i>	necklace sheoak	
<i>Allocasuarina verticillata</i>	drooping sheoak	
<b>CHENOPODIACEAE</b>		
<i>Atriplex australasica</i>	southern saltbush	i?

<i>Atriplex cinerea</i>	grey saltbush	
<i>Atriplex prostrata</i>	creeping orache	i
<i>Chenopodium album</i>	fat hen	i
<i>Rhagodia candolleana subsp. candolleana</i>	coastal saltbush	
<i>Sarcocornia quinqueflora</i>	beaded glasswort	
<i>Suaeda australis</i>	southern seablite	
<b>CONVULVULACEAE</b>		
<i>Dichondra repens</i>	kidneyweed	
<b>EPACRIDACEAE</b>		
<i>Astroloma humifusum</i>	native cranberry	
<i>Leucopogon parviflorus</i>	coast beardheath	
<b>ERICACEAE</b>		
<i>Erica lusitanica</i>	Spanish heath	D
<b>EUPHORBIACEAE</b>		
<i>Euphorbia peplus</i>	petty spurge	i
<b>FABACEAE</b>		
<i>Bossiaea cinerea</i>	showy bossia	
<i>Chamaecytisus palmensis</i>	tree lucerne	i
<i>Cytisus scoparius</i>	English broom	D
<i>Indigofera australis</i>	native indigo	
<i>Medicago sp.</i>	medick	i
<i>Trifolium sp.</i>	clover	i
<i>Psoralea pinnata</i>	blue butterflybush	i
<i>Vicia hirsuta</i>	hairy vetch	i
<b>GERANIACEAE</b>		
<i>Erodium botrys</i>	long heronsbill	i
<i>Geranium dissectum</i>	cutleaf cranesbill	i
<i>Pelargonium australe</i>	southern storksbill	
<b>GENTIANACEAE</b>		
<i>Centaurium erythraea</i>	common centaury	i
<b>GOODENIACEAE</b>		
<i>Goodenia ovata</i>	hop native-primrose	
<b>HALORAGACEAE</b>		
<i>Gonocarpus teucrioides</i>	forest raspwort	
<b>HAEMODORACEAE</b>		
<i>Anigozanthos sp.</i>	kangaroo paw	i
<b>LAURACEAE</b>		
<i>Cassytha glabella</i>	slender dodderlaurel	
<b>LINACEAE</b>		
<i>Linum marginale</i>	native flax	
<b>MALVACEAE</b>		
<i>Malva sp.</i>	mallow	i

**MIMOSACEAE**

<i>Acacia dealbata</i>	silver wattle	
<i>Acacia genistifolia</i>	spreading wattle	
<i>Acacia longifolia subsp. sophorae</i>	coast wattle	
<i>Acacia melanoxylon</i>	blackwood	
<i>Acacia myrtifolia</i>	redstem wattle	
<i>Acacia verticillata subsp. verticillata</i>	prickly moses	

**MYRTACEAE**

<i>Eucalyptus amygdalina</i>	black peppermint	
<i>Eucalyptus ovata</i>	black gum	
<i>Eucalyptus viminalis</i>	white gum	
<i>Leptospermum scoparium var. scoparium</i>	common teatree	
<i>Melaleuca squarrosa</i>	scented paperbark	

**OLYGNACEAE**

<i>Acetosella vulgaris</i>	sheep sorrel	i
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**OXALIDACEAE**

<i>Oxalis corniculata</i>	yellow woodsorrel	
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**PITTOSPORACEAE**

<i>Bursaria spinosa subsp. spinosa</i>	prickly box	
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**PLANTAGINACEAE**

<i>Plantago coronopus</i>	buckshorn plantain	i
<i>Plantago lanceolata</i>	ribwort plantain	i

**PRIMULACEAE**

<i>Anagallis arvensis var. arvensis</i>	scarlet pimpernel	i
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**POLYGONACEAE**

<i>Acetosella vulgaris</i>	sheep sorrel	i
<i>Rumex crispus</i>	curled dock	i

**PROTEACEAE**

<i>Banksia marginata</i>	silver banksia	
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**RANUNCULACEAE**

<i>Ranunculus repens</i>	creeping buttercup	
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**RHAMNACEAE**

<i>Pomaderris pilifera</i>	hairy dogwood	
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**ROSACEAE**

<i>Acaena novae-zelandiae</i>	common buzzy	
<i>Cotoneaster sp</i>	Cotoneaster	i
<i>Rubus fruticosus</i>	blackberry	D
<i>Rubus parvifolius</i>	native raspberry	
<i>Sanguisorba minor subsp. muricata</i>	salad burnet	i

**RUBIACEAE**

<i>Coprosma repens</i>	mirrorbush	i
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**RUTACEAE**

*Correa alba var. alba* white correa

**PASSIFLORACEAE**

*Passiflora tarminiana* banana passionfruit i

**PITTOSPORACEAE**

*Pittosporum undulatum subsp. undulatum* sweet pittosporum i

**SAPINDACEAE**

*Dodonaea viscosa subsp. spatulata* broadleaf hopbush

**SCROPHULARIACEAE**

*Verbascum thapsus* great mullein i

**MONOCOTYLEDONAE**

**CYPERACEAE**

*Lepidosperma concavum* sand swordsedg

*Lepidosperma gladiatum* coast swordsedg

**JUNCACEAE**

*Juncus kraussii subsp. australiensis* sea rush

**IRIDACEAE**

*Watsonia meriana var. bulbillifera* bulbil watsonia i

**LILIACEAE**

*Agapanthus praecox* Agapanthus i

*Dianella revoluta* spreading flaxlily

**POACEAE**

*Ammophila arenaria* marram grass i

*Austrostipa sp* speargrass

*Avena fatua* wild oat i

*Agrostis capillaris* brown top bent grass i

*Aira caryophyllea* silvery hairgrass i

*Briza maxima* greater quaking-grass i

*Bromus hordeaceus* soft brome i

*Bromus willdenowii* prairie grass i

*Cynodon dactylon var dactylon* couchgrass i

*Dactylis glomerata* cocksfoot i

*Distichlis distichophylla* Australian saltgrass

*Elymus scaber* rough wheatgrass

*Holcus lanatus* Yorkshire fog i

*Lagurus ovatus* harestalk grass i

*Lolium sp.* ryegrass i

*Paspalum dilatatum* paspalum i

*Phalaris minor* lesser canarygrass i

*Poa poiformis* coastal tussockgrass

*Poa labillardierei* silver tussock



<i>Rytidosperma caespitosum</i>	common wallabygrass	
<i>Rytidosperma setaceum</i>	bristly wallabygrass	
<i>Rytidosperma sp.</i>	wallaby grass	
<i>Sporobolus africanus</i>	ratstail grass	i
<i>Vulpia bromoides</i>	squirreltail fescue	i
<b>RESTIONACEAE</b>		
<i>Hypolaena fastigiata</i>	tassel roperush	
<i>Leptocarpus tenax</i>	slender twinerush	
<b>XANTHORRHOEACEAE</b>		
<i>Lomandra longifolia</i>	sagg	
<b>GYMNOSPERMAE</b>		
<b>CUPRESSACEAE</b>		
<i>Cupressus macrocarpa</i>	Monterey cypress	i
<b>PINACEAE</b>		
<i>Pinus radiata</i>	radiata pine	i
<b>PTERIDOPHYTA</b>		
<b>DENNSTAEDTIACEAE</b>		
<i>Pteridium esculentum</i>	bracken	

## 9 APPENDIX 2. THREATENED FLORA SPECIES PREVIOUSLY RECORDED FROM WITHIN 5KM OF THE STUDY AREA.

Species	Common Name	SS	NS	Bio	Observation Count	Last Recorded
<i>Acacia ulicifolia</i>	juniper wattle	r		n	1	14-Mar-1986
<i>Caladenia filamentosa</i>	daddy longlegs	r		n	3	05-Oct-1974
<i>Corunastylis nuda</i>	tiny midge-orchid	r		n	1	01-Jan-1917
<i>Cyathea cunninghamii</i>	slender treefern	e		n	50	05-Mar-2017
<i>Cyathodes platystoma</i>	tall cheeseberry	r		e	19	19-Dec-2012
<i>Cyrtostylis robusta</i>	large gnat-orchid	r		n	1	01-Jun-1922
<i>Deyeuxia minor</i>	small bentgrass	r		n	1	16-Mar-1983
<i>Diuris palustris</i>	swamp doubletail	e		n	2	01-Nov-1922
<i>Epacris virgata</i> (Kettering)	pretty heath	pv		e	55	05-Jul-2017
<i>Euphrasia collina</i> subsp. <i>deflexifolia</i>	eastern eyebright	r		e	5	25-Nov-1999
<i>Euphrasia semipicta</i>	peninsula eyebright	e	EN	e	95	04-Dec-2016
<i>Juncus amabilis</i>	gentle rush	r?		n	2	03-Jan-1973
<i>Phyllangium divergens</i>	wiry mitrewort	v		n	1	01-Jan-1892
<i>Pimelea flava</i> subsp. <i>flava</i>	yellow riceflower	r		n	19	07-Dec-2014
<i>Prasophyllum apoxychilum</i>	tapered leek-orchid	v	EN	e	18	02-Nov-2013
<i>Prasophyllum pulchellum</i>	pretty leek-orchid	e	CR	e	1	01-Dec-1961
<i>Thelymitra atronitida</i>	blackhood sun-orchid	e		n	1	20-Nov-2017
<i>Thelymitra holmesii</i>	bluestar sun-orchid	r		n	1	09-Dec-2003
<i>Thelymitra jonesii</i>	skyblue sun-orchid	e	EN	e	10	07-Nov-2002
<i>Thelymitra malvina</i>	mauve tuff sun-orchid	e		n	1	18-Nov-1974
<i>Thismia rodwayi</i>	fairy lanterns	r-		n	2	31-Oct-2012

## 10 APPENDIX 3 LISTED THREATENED FAUNA SPECIES RECORDED WITHIN IN 5KM OF THE SITE .

Species	Common Name	SS	NS	Bio	Observation Count	Last Recorded
<i>Accipiter novaehollandiae</i>	grey goshawk	e		n	1	30-Apr-2011
<i>Aquila audax</i>	wedge-tailed eagle	pe	PEN	n	1	05-Jul-2017
<i>Aquila audax</i> subsp. <i>fleayi</i>	tasmanian wedge-tailed eagle	e	EN	e	10	19-Nov-2013
<i>Dasyurus maculatus</i>	spotted-tail quoll	r	VU	n	1	13-Sep-2018
<i>Dasyurus viverrinus</i>	eastern quoll		EN	n	2	05-May-1986
<i>Dermochelys coriacea</i>	leatherback turtle	v	VU	n	1	30-Jun-1995
<i>Diomedea epomophora</i>	southern royal albatross		VU	n	1	20-Nov-2016
<i>Eubalaena australis</i>	southern right whale	e	EN	m	47	26-Jun-2012
<i>Gazameda gunnii</i>	Gunn's screw shell	v			7	12-Aug-2012
<i>Haliaeetus leucogaster</i>	white-bellied sea-eagle	v		n	2	01-Jan-1985
<i>Halobaena caerulea</i>	blue petrel	v	VU	n	1	26-Aug-1984
<i>Helicarion rubicundus</i>	Burgundy Semi-slug	r			22	25-May-2004
<i>Lathamus discolor</i>	swift parrot	e	CR	mbe	4	07-Dec-1995
<i>Lissotes menalcas</i>	mount mangana stag beetle	v		e	8	01-Mar-2006
<i>Megaptera novaeangliae</i>	humpback whale	e	VU	m	21	14-Jun-2011
<i>Mirounga leonina</i>	southern elephant seal	e	VU	n	4	13-Feb-1998
<i>Mirounga leonina</i> subsp. <i>macquariensis</i>	southern elephant seal	pe	PVU	n	10	24-Mar-2008
<i>Parvulastra vivipara</i>	live-bearing seastar	v	VU	e	3	08-Feb-2016
<i>Patiriella vivipara</i>	live-bearing seastar	pv	PVU	e	1	01-Jan-0001
<i>Perameles gunnii</i>	eastern barred bandicoot		VU	n	62	11-Dec-2016
<i>Pteropus poliocephalus</i>	grey-headed flying-fox		VU	n	1	04-May-1951
<i>Sarcophilus harrisii</i>	tasmanian devil	e	EN	e	20	01-Jul-2011
<i>Thalassarche cauta</i>	shy albatross	v	VU	n	2	20-Nov-2016
<i>Thinornis rubricollis</i>	hooded plover		VU	n	25	26-Oct-2013

Source: Natural Values Atlas

