Species Impact Statement

Potato Point Fire Buffer Construction Works (Stage 2), Eurobodalla National Park, Far South Coast Region

A report prepared for NSW Office of Environment & Heritage

APRIL 2014

Report No. EcIA.0555

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Draft	12/04/2014	SS, MH, AC, GS, JW	Linda Sass	Steve Sass
Final	21/04/2014	SS	-	Steve Sass

Disclaimer

Front Cover Image

Left: White-footed Dunnart trapped during targeted surveys in the locality. Right: Swamp Oak Floodplain Forest endangered ecological community within the study area.

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Certification

This is to certifiy that this Species Impact Statement (SIS) prepared by EnviroKey Pty. Ltd., has been prepared in accordance with the requirements of Sections 109 and 110 of the New South Wales (NSW) *Threatened Species Conservation Act 1999* and with regard to the requirements given by the Director-General of the NSW Office of Environment and Heritage.

Date 21/04/2014

Mr. Steve Sass, B.App.Sci (Env.Sci) (Hons), Principal Ecologist, EnviroKey Pty. Ltd.

I, Timothy Shepherd, Regional Manager, NSW National Park and Wildlife Service, Narooma, NSW, being the applicant for the proposed works described in this '*Species Impact Assessment: Potato Point Fire Buffer Construction Works (Stage 2), Eurobodalla National Park, Far South Coast Region*', have read and understood this Species Impact Statement. I understand the implications of the recommendations made in the statement and accept that they may be placed as conditions of consent or concurrence for the proposed works.

Date 22.4.14

Mr. Timothy Shepherd, Regional Manager, NSW National Parks and Wildlife Service

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Executive Summary

EnviroKey Pty. Ltd was commissioned by the New South Wales (NSW) Office of Environment and Heritage (OEH) to prepare a Species Impact Statement (SIS) in accordance with the requirements of the Director-General of OEH for the proposed construction and operation of the Potato Point Fire Buffer (Stage 2) (the "proposed works") within Eurobodalla National Park (NP) on the far south coast of NSW. The proposed works are located within the Eurobodalla local government area (LGA).

The preferred option for the proposed works (the subject of this SIS) was selected by OEH as a result of consideration of the environmental constraints identified during the initial stages of the Review of Environmental Factors (REF) preparation and the SIS field surveys. Consequently, the preferred option aims to avoid as far as practical, potential adverse ecological impacts.

The requirement to prepare an SIS was made after a REF was prepared for the Potato Point Fire Buffer (Stage 1). That REF recommended that a SIS be prepared for the proposed Stage 2 works and was based largely on the potential impacts to Swamp Oak Floodplain Forest (SOFF), an endangered ecological community (EEC) listed in Part 3 of schedule 1 of the NSW *Threatened Species Conservation Act 1995* (TSC Act).

The proposed works would involve the construction and operation of a fire buffer at Potato Point. This would include the clearing of 1.47 hectares of vegetation including 1.03 hectares of SOFF EEC as well as indirect impacts such as edge effects and soil erosion. The study area is located in the Eurobodalla LGA, the Bega Coastal Foothills of the Mitchell Landscapes (Mitchell 2002), the catchment of a wetland mapped under State Environmental Planning Policy No. 14 (SEPP 14 – wetland no. 136), the Bateman sub-region of the Southern Rivers Catchment Management Area (CMA) and Eurobodalla NP.

In accordance with the Director-Generals Requirements (DGR), an assessment of the potential impacts to SOFF EEC was undertaken in this SIS, along with all species, populations and ecological communities required by the DGR and any additional species listed under the TSC Act and the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) with a likelihood of being affected by the proposed works.

A list of subject species provided within the DGR was refined through a series of preliminary habitat assessment and likelihood of occurrence to develop a list of target species. The target species comprised 23 species of fauna, five species of flora and one EEC. Subsequently, the field surveys were designed to specifically target these biota.

Three Biometric Vegetation Types were identified within the study area. These comprised:

- SR649 Swamp Oak – Prickly Tea-tree – Swamp Paperbark swamp forest on coastal floodplains

- SR642 Spotted Gum – Grey Ironbark – Woollybutt grassy open forest on coastal flats (modified)
- Ecotonal vegetation (SR642 dominant, some affinities with SR649, SR512)

SR649 is consistent with the NSW Scientific Committee determination for SOFF EEC.

No threatened flora were recorded.

Four general fauna habitats were recorded within the study area (Casuarina Forest, Wetland, Forest and Cleared Land). Target threatened fauna surveys resulted in the detection of 11 threatened fauna species (6 within the study area). The threatened fauna detected within the study area being:

- Glossy Black-cockatoo, vulnerable TSC Act.
- Square-tailed Kite, vulnerable TSC Act.
- Striated Fieldwren, endangered TSC Act.
- Eastern Bentwing Bat, vulnerable TSC Act.
- Large-footed Myotis, vulnerable TSC Act.
- White-footed Dunnart, vulnerable TSC Act.

At the completion of the field surveys, the list of target species was further refined to include an as sessment of affected species. The affected species were the subject of further detailed assessment within the SIS. The affected species comprised 19 threatened fauna and one endangered ecological community.

A series of impact amelioration measures are proposed to mitigate any adverse effect of the proposed works on threatened biota. These include long-term management strategies and ongoing monitoring. No compensatory strategies such as biodiversity offsetting are warranted.

Definitions & Acronyms used within this report

APZ - asset protection zone

BBAM - Biobanking Assessment Methodology

CMA - Catchment Management Authority

DGR - Director-General's requirements

EEC - endangered ecological community

EP&A Act - NSW *Environmental Planning and Assessment Act 1979*.

EPBC Act - Commonwealth *Environment Protection and Biodiversity Conservation Act 1995*.

FAMS - Feral Animal Management Strategy

HBT - hollow-bearing tree

LGA - Local Government Area.

Likely - taken to be a real chance or possibility.

Locality - means the area within a 5 kilometre radius of the proposed works.

local population (migratory or nomadic fauna) - the population comprises those individuals that are likely to occur in the study area from time to time.

local population (resident fauna) - the population comprises those individuals known or likely to occur in the study area, as well as any individuals occurring in adjoining areas (contiguous or otherwise) that are known or likely to use habitats in the study area.

local population (threatened flora) - the population comprises those individuals occurring in the study area or the cluster of individuals that extend into habitat adjoining and contiguous with the study area that could reasonably be expected to be cross-pollinating with those in the study area.

migratory species - a species specified in the schedules of the EPBC Act.

NP - National Park

NPWS - National Park and Wildlife Service

NP&W Act - *NSW National Park and Wildlife Act 1974*

NV Act - NSW *Native Vegetation Act 2003*

OEH - NSW Office of Environment & Heritage

PoM - Plan of Management

RCP - Regional Conservation Plan

REF - Review of Environmental Factors

region - means a biogeographical region that has been recognised and documented such as the Interim Biogeographical Regions of Australia (IBRA) (Thackway and Creswell 1995). The study area is located within the South-East Corner Bioregion.

SEPP - State Environmental Planning Policy

SF - State Forest

SFAZ - Strategic Fire Advantage Zone

SIS - Species Impact Statement

SOFF - Swamp Oak Floodplain Forest

subject site - the area to be directly affected by the proposed activity. That is, the footprint of the proposed works.

study area - includes the subject site and any additional areas that are likely to be affected by the proposed activity, either directly or indirectly.

threatened biota - means those threatened species, endangered populations or endangered ecological communities considered known or likely to occur in the study area.

threatened species - a species specified in the schedules of the TSC Act or the EPBC Act.

TSC Act - NSW *Threatened Species Conservation Act 1995.*

TSMP - Threatened Species Monitoring Plan

WMS - Weed Management Strategy

Table of Contents

Figures, Tables & Maps

1 FORM OF THE SPECIES IMPACT STATEMENT

This Species Impact Statement (SIS) has been prepared in accordance with the requirements of the Director-General of the NSW Office of Environment & Heritage (OEH) issued on the 20th of December 2013 (**Appendix A**).

2 CONTEXTUAL INFORMATION

2.1 INTRODUCTION

EnviroKey Pty. Ltd (EnviroKey) was commissioned by the New South Wales (NSW) Office of Environment & Heritage (OEH) to prepare a S pecies Impact Statement (SIS) for the proposed construction and operation of the Potato Point Fire Buffer (Stage 2) within Eurobodalla National Park (NP) on the far south coast of NSW (now referred to as the "proposed works"). The proposed works are located within the study area identified on **Map 1**.

A Review of Environmental Factors prepared for Stage 1 of the Potato Point Fire Buffer which included significance assessments in accordance with the NSW *Environmental Planning & Assessment Act 1979* (EP&A) recommended that a SIS be prepared for the proposed Stage 2 works (NGH 2013). This recommendation was based largely on t he potential impacts to Swamp Oak Floodplain Forest (SOFF), an endangered ecological community (EEC) listed in Part 3 of schedule 1 of the NSW *Threatened Species Conservation Act 1995*. As a result, a request for the Director-Generals Requirements (DGR) was made by the NSW National Parks and Wildlife Service (NPWS) on 26th November 2013 to OEH Regional Operations Group (ROG), Queanbeyan for the proposed Stage 2 works. DGR were issued on 20th December 2013.

OEH will be the proponent and determining authority for the proposed works in accordance with Part 5 of the NSW *Environmental Planning and Assessment Act 1979*.

2.2 BACKGROUND

Potato Point is a small coastal village located in the Eurobodalla local government area (LGA) on the NSW far south coast. The village comprises around 150 dwellings with a large proportion of these used as holiday homes (PPRFS 2010).

Eurobodalla NP was created in December 1995 and covers around 2,220 hectares (NPWS 2000) with some areas, such as the study area, not forming part of Eurobodalla NP until 2001 when they were purchased from Eurobodalla Shire Council. The Park on three sides, with the Pacific Ocean bordering the fourth, surrounds Potato Point.

In response to concerns made by the Potato Point Community Association, the NSW Minster for the Environment and Heritage, Hon. Robyn Parker, directed the NPWS to undertake the required environmental assessment for the proposed works.

2.3 DESCRIPTION OF FEASIBLE ALTERNATIVES

A number of feasible alternatives were considered by OEH and these are detailed within the REF (EnviroKey 2014). The preferred option was chosen by OEH in consideration of the environmental constraints identified during the initial stages of the REF preparation, the SIS

field surveys and a Bushfire Risk Assessment prepared by Dr Kevin Tolhurst. Consequently, the preferred option aims to avoid as far as practical, potential adverse ecological impacts.

The preferred option (the proposed works) ensures enhanced bushfire protection for Potato Point and the protection of core environmental values. These include:

- Reduction of fuel loads in close proximity to Potato Point.
- Ongoing maintenance of Asset Protection Zones (APZ), Mechanically Treated Strategic Fire Advantage Zones and Strategic Fire Advantage Zones (SFAZ).
- Fire Trail Maintenance.
- Protection of core Swamp Oak Forest Endangered Ecological Community (SOFF EEC).
- Protection of SEPP14 wetland No. 136 and associated drainage lines.
- Retention of habitat critical to the survival of the endangered Striated Fieldwren.
- Protection of the threatened White-Footed Dunnart which is considered a species that cannot withstand further loss.
- Retention of known foraging habitat of the vulnerable Glossy Black Cockatoo.

2.4 SUBJECT SITE AND STUDY AREA

2.4.1 Defining the subject site

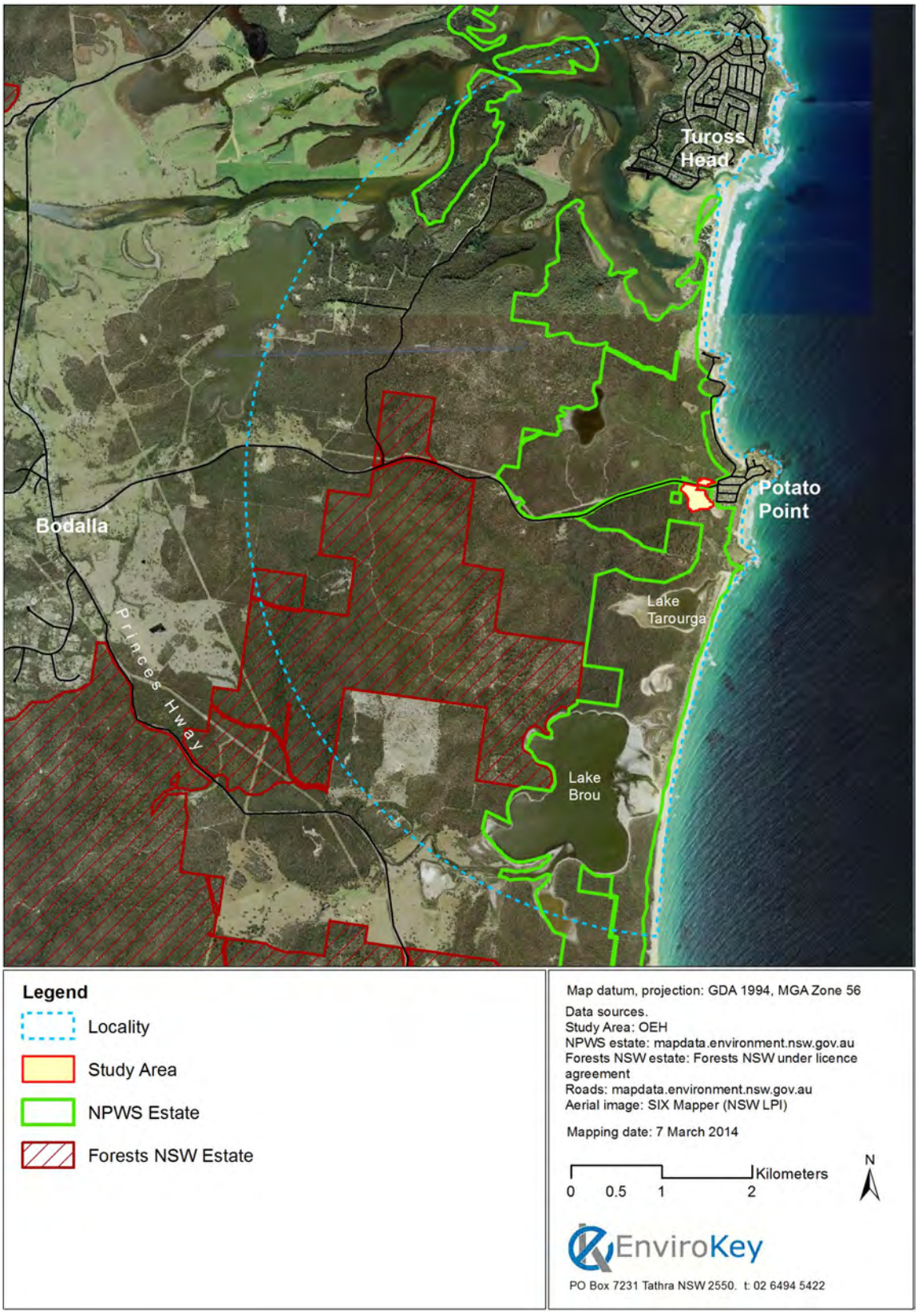
The subject site is the area of land directly affected by the proposed works. That is the land within Eurobodalla NP that will be cleared or modified by the proposed works. The subject site is the area to be directly impacted by the proposed works. The preferred option as proposed by OEH will result in a direct impact of 1.47 hectares including 1.03 hectares of SOFF EEC. The extent of the subject site (referred to as the Treatment Area) is detailed in **Map 2**.

2.4.2 Description of SIS study area

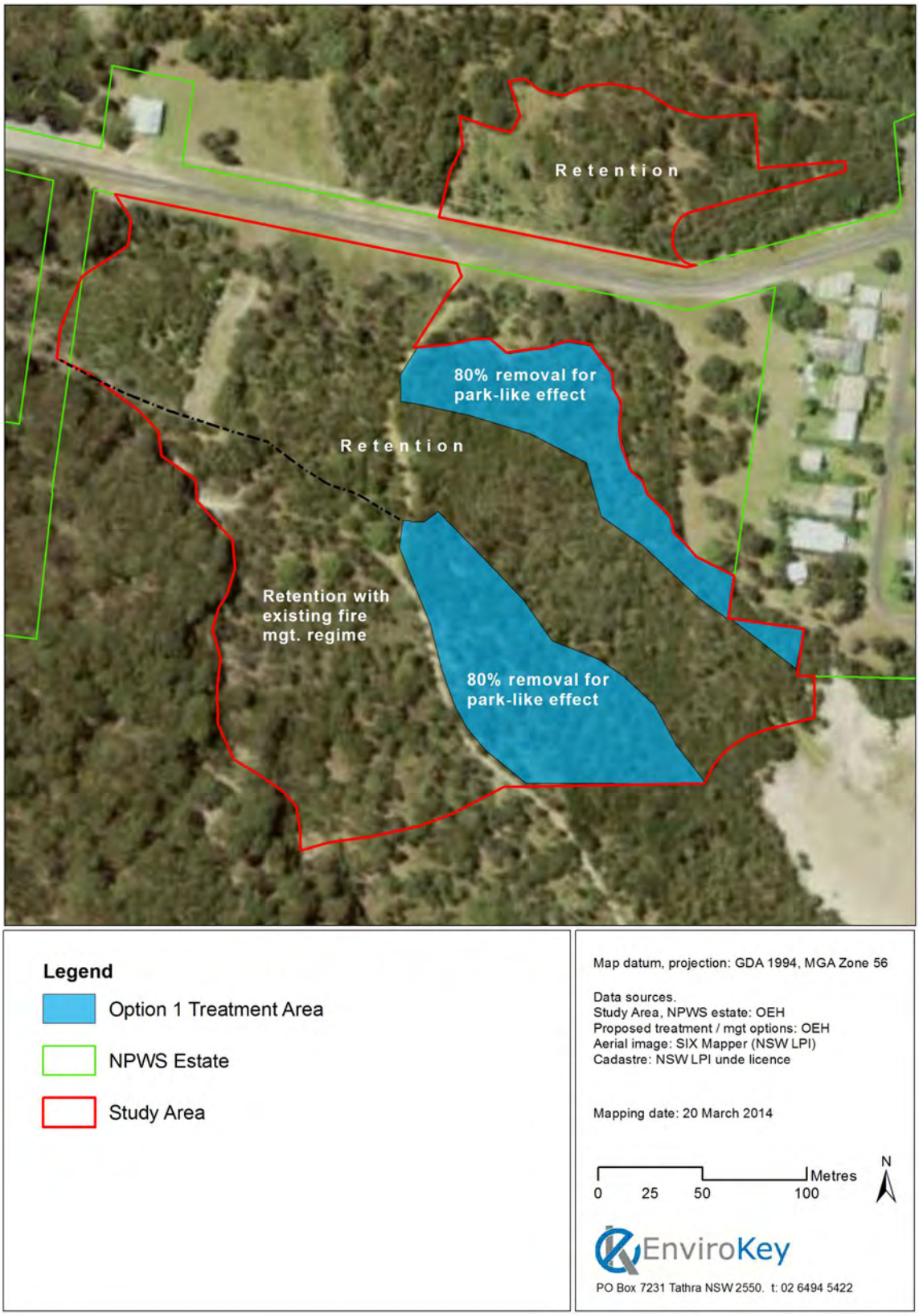
Definition

The study area was determined by NPWS and outlined within the technical brief for the SIS (January 2014). The extent of the study area is provided in **Map 2**.

The study area is located in the Eurobodalla LGA, the Bega Coastal Foothills of the Mitchell Landscapes (Mitchell 2002), the catchment of a wetland mapped under State Environmental Planning Policy No. 14 (SEPP 14 – wetland no. 136), the Bateman sub-region of the Southern Rivers Catchment Management Area (CMA) and Eurobodalla NP.



Map 1: The location of the study area and the 5 km locality boundary as defined by the DGR.



Map 2: Identification of the study area and the subject site (Option 1 Treatment Area) for this SIS.

The SIS focuses on the potential impacts on threatened species, populations, communities and their habitats within the study area as this contains additional areas which may be affected by the proposed works, either directly or indirectly.

Previous land use

The study area and surrounds have, in parts, been previously cleared. A sequence of air photographs clearly demonstrate that native overstorey has regenerated over a proportion of the study area and south to Jemison's Point (**Figure 1-6**). The chronology of photographs suggests that some native overstorey vegetation was present in a portion of the study area loosely corresponding with a drainage line that extends from a coastal wetland to beyond the western boundary of the study area. This is also confirmed by a c.1966 photograph provided in the Potato Point Community Association submission to the Hon. Andrew Constance (dated 6 April 2013) (**Figure 7**).

Fire history

Based on the fire history records maintained by NPWS, two hazard reduction burns have impacted on the study area since the land was purchased by NPWS from Eurobodalla Shire Council in 2001. These were conducted on 27-28/04/2005 and 01/04/2010. Given that the minimum threshold for this portion of Eurobodalla NP is five years, it is likely that the next hazard reduction burn would occur within the next year or two depending on fuel loads (Tristan Ricketson, email communication, 18/03/2014). Prior to the purchase of the land in 2001, significant regrowth had already occurred within the study area.

It is understood that two wildfires have encroached on the study area. These were in the seasons of 1954/55 and 1984/85. Another wildfire (1968/69) burnt close to the boundaries of the study area, but not within it (Tristan Ricketson, email communication, 18/03/2014).

An existing APZ on the western side of Jemison's Point Road within the study area is maintained by NPWS. This is mechanically managed on an annual basis (Tristan Ricketson, email communication, 18/03/2014).

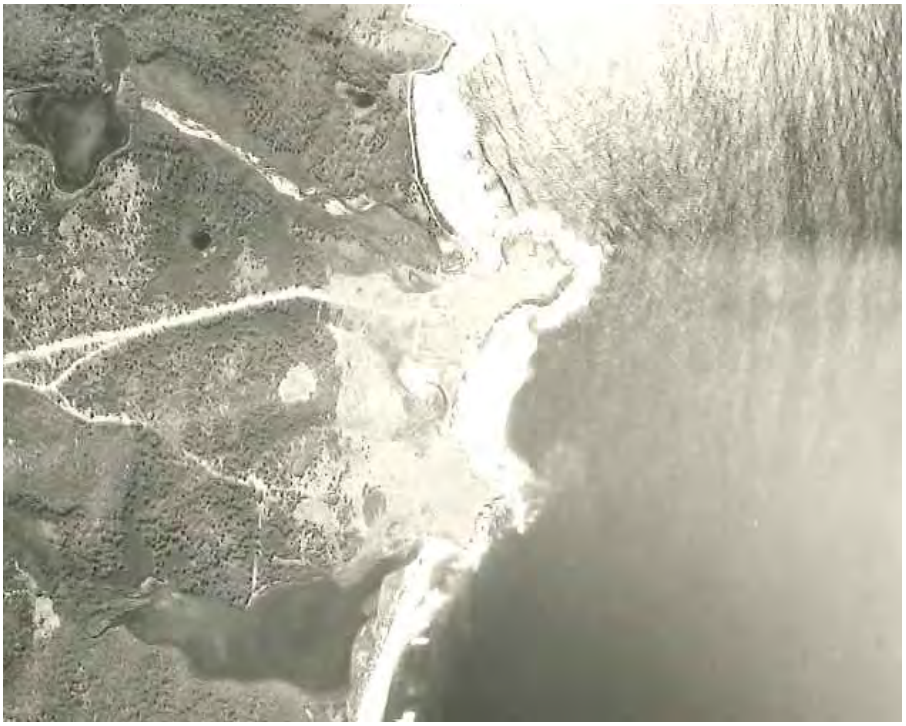


Figure 1: Aerial photograph showing the study area and surrounds circa. 1967 (Source: OEH).

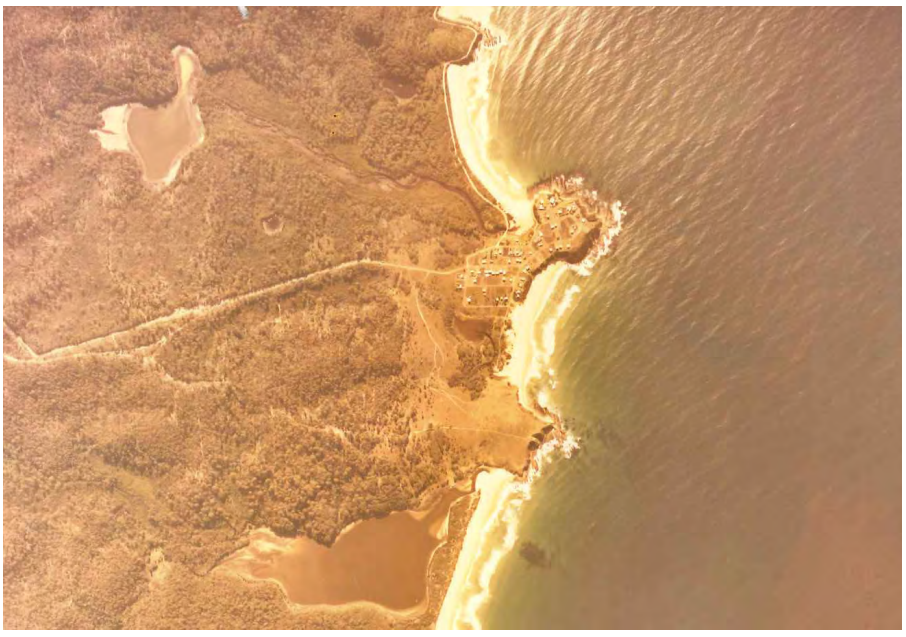


Figure 2: Aerial photograph showing the study area and surrounds circa. 1981 (Source: OEH).

Figure 3: Aerial photograph showing the study area and surrounds circa. 1999 (Source: OEH).

Figure 4: Aerial photograph showing the study area and surrounds circa. 2002 (Source: Google Earth Pro).

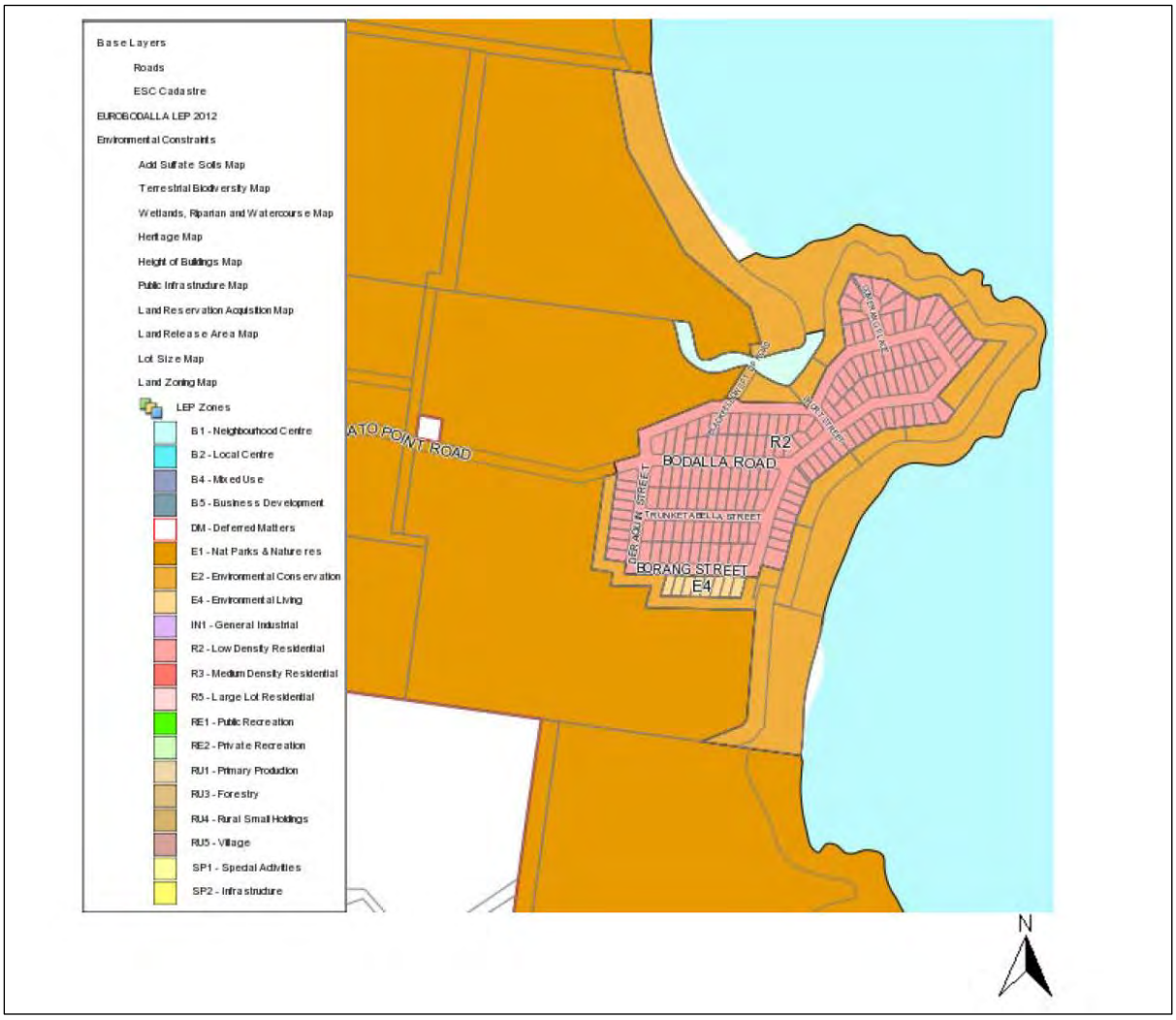
Figure 5: Aerial photograph showing the study area and surrounds circa. 2004 (Source: Google Earth Pro).

Figure 6: Aerial photograph showing the study area and surrounds circa. 2011 (Source: Google Earth Pro).

Figure 7: Extent of the clearing in the Potato Point area (Photograph from Potato Point Community Association submission to the Hon. Andrew Contstance. Date of photograph 12/10/66).

2.5 LAND TENURE INFORMATION

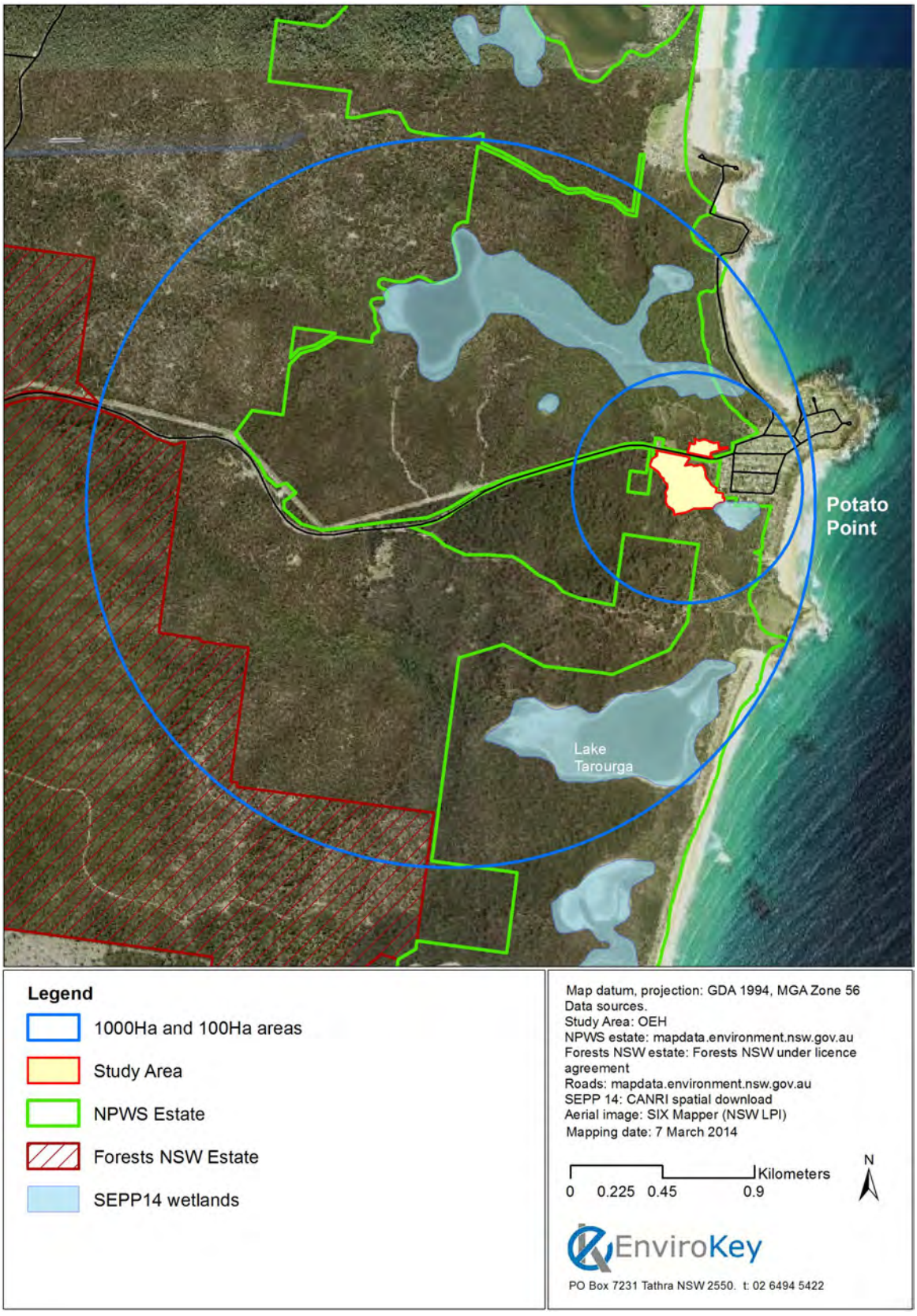
The study area is located completely within the boundaries of Eurobodalla NP. Adjoining the proposed works, land zoning is predominately R2 with minor areas of E4. Several deferred matters as listed by the Eurobodalla Local Environment Plan 2012 occur within the locality (**Map 3**).



Map 3: Land zoning within the vicinity of the study area (Source: Eurobodalla Shire Council)

2.6 LANDSCAPE CONTEXT

The study area occurs within a landscape that is dominated by native vegetation and coastal lakes which is largely characterised by the presence of Eurobodalla NP and Bodalla State Forest (SF). In both 100 hectare and 1,000 hectares assessment circles (as defined in the Biobanking Assessment Methodology (BBAM), native vegetation cover was assessed. In the 100 hectare assessment circle, native vegetation cover comprises approximately 80 percent cover, while at the 1,000 hectare scale, native vegetation cover is around 90 percent (**Map 4**).



Map 4: Landscape assessment based on 100 hectare and 1000 hectare assessment circles.

2.7 ENVIRONMENTAL LEGISLATION

2.7.1 NSW Environmental Planning and Assessment Act 1979

The NSW *Environmental Planning and Assessment Act 1979* (EP&A Act) forms the legal and policy platform for development assessment and approval in NSW and aims to, inter alia, 'encourage the proper management, development and conservation of natural and artificial resources'.

The proposed works will be determined by OEH under Part 5 of the Act, with an REF and SIS as the documents to assist in the determination. NPWS, as the determining authority, must 'examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity' pursuant to Section 111 of the Act. Clause 228 of the *Environmental Planning & Assessment Regulation 2000* (EP&A Regulation) identifies matters that 'must be taken into account concerning the impact of an activity on the environment'.

The decision to prepare a SIS was based on preliminary estimates of potential impacts of the proposed Stage 2 works. Specifically, the proposed works were considered 'likely' to impose 'a significant effect' on SOFF EEC, which is listed under Part 2 of Schedule 1 of the TSC Act (NGH 2013)

This decision is informed by reference to Section 5A of the NSW EP&A Act, which contains seven factors to be considered by determining authorities when considering the significance of impacts on threatened biota associated with activities under Part 5 of the Act (the '7-part test'). Should the 7-part test determine that a 'significant effect' on any threatened biota listed under the TSC Act is likely, then the authority must prepare an SIS.

The EP&A Act provides the framework for environmental planning in NSW and includes provisions to ensure that proposals which have the potential to significantly affect the environment are subject to detailed assessment.

2.7.2 NSW Threatened Species Conservation Act 1995

The NSW *Threatened Species Conservation Act 1995* (TSC Act) provides legal status for biota of conservation significance. The TSC Act aims to, inter alia, 'conserve biological diversity and promote ecologically sustainable development'. It provides for:

- The listing of threatened species, populations and ecological communities.
- The listing of key threatening processes.
- The preparation and implementation of Recover Plans, Threatened Abatement Plans and Priority Action Statements.
- Guidelines for the preparation of SIS.

The TSC Act has been addressed in this report by undertaking database searches and desktop analysis for any threatened species, populations or communities previously recorded within the locality and completed targeted field surveys in accordance with the

DGR. Key threatening processes listed under Schedule 3 of the Act relevant to the proposed works have been identified as part of the assessment of potential impacts.

2.7.3 Commonwealth Environmental Protection and Biodiversity Conservation Act 1999

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) enables the Australian Government to join with the states and territories in providing a national scheme of environment and heritage protection and biodiversity conservation to ensure that actions likely to cause a 'significant impact' on matters of national environmental significance (NES) undergo an assessment and approval process. Under the Act, an action includes a project, undertaking, development or activity.

An action that has, or is likely to have a significant impact on a matter of NES may not be undertaken without the prior approval from the Australian Government Minister for the Environment (DEWHA 2009).

The nine matters of NES that are protected under the EPBC Act are:

- Listed threatened species and ecological communities
- Listed migratory species
- 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.

The Significant Impact Guidelines for the EPBC Act (DEWHA 2009) set out criteria to assist in determining whether an action requires approval and in particular, whether a proposed action is likely to have a 'significant impact' on a matter of NES.

If a proposed action is likely to have a significant impact on a matter of NES, referral of the proposal to the Department of the Environment (DotE) is required to confirm whether the Commonwealth considers the proposal a 'controlled action' and subsequently requiring the Ministers approval under the EPBC Act.

This SIS provides an assessment to ascertain whether the proposed works will require referral to the Commonwealth.

2.7.4 NSW Native Vegetation Act 2003

The NSW *Native Vegetation Act 2003* (NV Act) was established to prevent broad scale clearing, protect native vegetation of high conservation significance and improve the condition of existing native vegetation.

Of relevance to the proposed works, the NV Act specifies that 'The Act does not apply to any clearing of native vegetation that is, or is part of, an activity carried out by a determining authority within the meaning of Part 5 of the EP&A Act, if the determining authority has complied with that part'. Given this, the NV Act does not apply to the proposed works as it will be determined by the NPWS (a determining authority) under Part 5 of the EP&A Act. Nonetheless, Schedule 1, Part 1 of the Act specifies that land reserved under the NSW *National Parks and Wildlife Act 1974* (NP&W Act) is excluded from the Act.

2.7.5 NSW National Parks Wildlife Act 1974

The NSW *National Parks and Wildlife Act 1974* (NP&W Act) is administered by OEH and provides the basis for the legal protection of flora and fauna in NSW. Unless a licence is obtained under the Act (or the TSC Act), it is an offence to harm any animal that is protected or is a threatened species, population or ecological community. It is also an offence to pick any plant that is protected or is a threatened species, population or ecological community. In addition, a person must not, by act or omission, damage any critical habitat. Activities in accordance with a Part 5 Assessment do not require a licence under the Act.

2.7.6 NSW Fisheries Management Act 1994

The NSW *Fisheries Management Act 1994* aims to conserve fish stocks, key habitats, threatened species, populations and ecological communities of fish and marine vegetation. It also aims to promote viable commercial fishing, aquaculture industries and recreational fishing.

Section 7a, section 220A of the Act provides for the conservation of all biological diversity of aquatic and marine vegetation. It also ensures that the impact on any 'action' affecting threatened species, populations or ecological communities of appropriately assessed.

2.7.7 NSW Marine Parks Act 1997

The Batemans Marine Park extends from three nautical mile offshore limit of NSW waters within all rivers, estuaries, bays, lagoons and inlets, and saline and brackish coastal waters from Bermagui to Bawley Point.

The proposed works would be conducted adjacent to waters that are currently defined as General Use Zone and Sanctuary Zone within the Batemans Marine Park.

Clause 20 Development affecting a Marine Park, subclause 3, states:

A determining authority must not carry out, or grant an approval to carry out, an activity on land that is in the locality of a marine park in purported compliance with Part 5 of the EP&A Act unless:

a) The determining authority has taken into consideration the objects of this Act, the regulations and any advice given to it by the Authority on the impact on the marine park of the carrying out of an activity in the locality; and

b) If the determining authority is of the opinion that the proposed activity is likely to have an effect on the plants or animals within the marine park of their habitat, the determining authority has consulted with the authority.

Given this, NPWS would undertake consultation with the Marine Park Authority with regard to the proposed works.

2.7.8 NSW Coastal Protection Act 1979

The *Coastal Protection Act 1979* is the principal legislation relating to coastal management in NSW. Key provisions of the Act including requirements relating to concurrences with the Minister for certain developments in the Coastal Zone.

Division 1, section 6, subclause 1(e) states that for the purpose of this Act, a Coastal Authority is:

- A public authority that is the owner of, or has care, control or management of, land within the coastal zone.

Accordingly, NPWS is the authority of the Eurobodalla NP and therefore, a Coastal Authority to enable determination of the proposed works.

2.7.9 State Environmental Planning Policy No. 14 – Coastal Wetlands

The aim of State Environmental Planning Policy No. 14 – Coastal Wetlands (SEPP 14) is to ensure that coastal wetlands are preserved and protected in the environmental and economic interests of NSW. The majority of vegetation communities known to occur in SEPP 14 wetlands are listed as Endangered Ecological Communities (EEC) under the TSC Act. SEPP 14 wetlands are threatened by coastal development, road construction, erosion and sediment and other forms of pollution and climate change. SEPP 14 wetland No. 136 is located directly adjacent to the proposed works.

While SEPP 14 does not apply to land gazetted under the NP&W Act, the Plan of Management for Eurobodalla NP states that all wetlands, estuarine lakes and creeks will be managed according to the principles of SEPP 14 (NPWS 2000).

2.7.10 State Environmental Planning Policy No. 71 – Coastal Protection

The aim of State Environmental Planning Policy No. 71 – Coastal Protection (SEPP 71) is to ensure that development in the NSW coastal zone is appropriate and suitable located, to

ensure that there is a consistent and strategic approach to coastal planning and management. The application of this policy will ensure there is a clear development assessment framework for the coastal zone (land within one kilometre of a tidal water body or inlet as defined by the NSW *Coastal Protection Act 1979*).

Under Part 2 Matters for Consideration of this SEPP, Clause 7 Application of clause 8 matters, *(b) "are to be taken into account by a consent authority when it determines a development application to carry out development on land to which this policy applies".* NPWS is the consent authority for the proposed works as defined by the EP&A Act, and therefore OEH must take into account *Clause 8 matters for consideration*. Where related to the entities of this SIS, these matters are addressed in the Stage 2 REF.

2.8 SOUTH COAST REGIONAL CONSERVATION PLAN

The key objective of the South Coast Regional Conservation Plan (RCP) is to protect high value environments including coastal lakes, estuaries, threatened species, vegetation communities and habitat corridors by ensuring that new development avoids these important areas and their catchments (DECCW 2010b). The RCP is consistent with a number of federal and state biodiversity strategies including the National Local Government Biodiversity Strategy, Australia's Biodiversity Conservation Strategy, the NSW Biodiversity Strategy, and the Southern Rivers Catchment Action Plan.

Specific to biodiversity, the RCP has the following principles:

- To improve or maintain ecological processes and the dynamics of terrestrial ecosystems in their landscape context.
- To improve or maintain viable examples of terrestrial ecosystems.
- To improve or maintain viable populations.

The RCP also identifies key priorities in relation to maintaining or improving biodiversity values. These being:

- The first priority is to avoid losses to biodiversity and promote protection of biodiversity values insitu.
- Where the first priority is unachievable, the second priority is to mitigate against adverse impacts to biodiversity.
- The last resort is to compensate for unavoidable losses to biodiversity by applying offsets in priority locations identified by the RCP.

2.9 EUROBODALLA NATIONAL PARK PLAN OF MANAGEMENT

A Plan of Management (PoM) for Eurobodalla NP was adopted by the Minister on 23rd August 2000. The park covers 2,220 hectares of coastal land between Moruya and Bermagui and includes 27 hectares of land within the intertidal zone as well as a number of coastal lakes (NPWS 2000).

Specific management objectives relating to biodiversity for Eurobodalla NP are outlined within the PoM. These being:

- The protection of Eurobodalla National Park as part of a regionally important system of national parks and reserves on the south coast of NSW.
- The maintenance of high water quality in the freshwater wetlands and coastal lagoons within the park.
- The management of vegetation to:
  - Maintain natural floristic and structural diversity.
  - Conserve rare, vulnerable or otherwise significant species.
  - Conserve communities of significant that are known to occur.
  - Regenerate disturbed areas that have been cleared or grazed previously.
  - Maximise habitat values for native species.
- Maintenance of fauna diversity with priority given to endangered species including the Glossy Black Cockatoo and White-footed Dunnart.

3 INITIAL ASSESSMENT

Determining authorities have a statutory obligation, under Part 5 of the EP&A Act, to consider whether a proposal is likely to significantly affect threatened species, populations or ecological communities, or their habitats by applying the seven-part test. If the determination is made that there is likely to be a significant effect then either:

- A SIS must be prepared and the concurrence of the Director-General of OEH obtained prior to the consent authority making a determination, or
- The proposal may be modified such that a significant effect on threatened species, populations or ecological communities, or their habitats is unlikely (DEC 2004).

This section of the SIS outlines the process of the initial assessment, the rationale applied to exclude species from further assessment, or include additional species, and the identification of 'target species' which will consequently be the subject of further, more detailed survey and/or assessment.

3.1 SUBJECT SPECIES

Director-Generals Requirements were issued by OEH on the 20th of December 2013 (OEH Reference DOC12/25378) which included a list of 'subject species' (**Table 1**). However, one of the roles of a SIS is to determine which species, population or ecological communities may be utilising, or be present, on a development site and that an initial assessment should be undertaken to determine any additional subject species that may be of relevance. Subsequent sections of chapter 3 undertake this assessment.

Table 1: List of subject species as defined by the DGR.

SPECIES	SCIENTIFIC NAME	STATUS
FAUNA		
Little Eagle	*Hieraaetus morphnoides*	Vulnerable
Square-tailed Kite	*Lophoictinia isura*	Vulnerable
Gang-gang Cockatoo	*Callocephalon lathami*	Vulnerable
Glossy Black-cockatoo	*Calyptorynchus lathami*	Vulnerable
Little Lorikeet	*Glossopsitta pusilla*	Vulnerable
Swift Parrot	*Lathamus discolour*	Endangered
Barking Owl	*Ninox connivens*	Vulnerable
Powerful Owl	*Ninox strenua*	Vulnerable
Masked Owl	*Tyto novaehollandiae*	Vulnerable
Sooty Owl	*Tyto tenebricosa*	Vulnerable

SPECIES	SCIENTIFIC NAME	STATUS
Brown Treecreeper (eastern subspecies)	*Climacteris picumnus victoriae*	Vulnerable
Striated Fieldwren	*Calamanthus fuliginosus*	Endangered
Speckled Warbler	*Chtonicola sagittata*	Vulnerable
Regent Honeyeater	*Anthochaera Phrygia*	Critically Endangered
White-fronted Chat	*Epthianura albifrons*	Vulnerable
Olive Whistler	*Pachycephala olivacea*	Vulnerable
Varied Sittella	*Daphoenositta chrysoptera*	Vulnerable
Pink Robin	*Petrocia rodinogaster*	Vulnerable
Scarlet Robin	*Petrocia boodang*	Vulnerable
Flame Robin	*Petrocia phoenicea*	Vulnerable
Spotted-tailed Quoll	*Dasyurus maculatus*	Vulnerable
White-footed Dunnart	*Sminthopsis leucopus*	Vulnerable
Eastern Pygmy-possum	*Cercartetus nanus*	Vulnerable
Long-nosed Potoroo	*Potorous tridactylus*	Vulnerable
Southern Brown Bandicoot	*Isoodon obesulus obesulus*	Endangered
Yellow-bellied Glider	*Petaurus australis*	Vulnerable
Golden-tipped Bat	*Kerivoula papuensis*	Vulnerable
Yellow-bellied Sheathtail-bat	*Saccolaimus flaviventris*	Vulnerable
Eastern Freetail-bat	*Mormopterus norfolkensis*	Vulnerable
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	Vulnerable
Southern Myotis	*Myotis macropus*	Vulnerable
Greater Broad-nosed Bat	*Scoteanax ruepellii*	Vulnerable
FLORA		
Narrow-leafed Wilsonia	*Wilsonia backhousei*	Vulnerable
Tall Knotweed	*Persicaria elatior*	Vulnerable
Tangled Bedstraw	*Galium australe*	Endangered
Austral Toadflax	*Thesium australe*	Vulnerable
ENDANGERED ECOLOGICAL COMMUNITIES		
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basis and South Easter Corner Bioregions		
Bangalay Sand Forest of the Sydney Basin and South East Corner Bioregions		

3.2 NOMENCLATURE

Flora classification used in this report follows the online version of the Flora of NSW (PlantNET 2014).

Nomenclature for fauna was guided by the following texts: Birds (Morcombe 2004), Mammals (except microchiropteran bats) (Menkhorst and K night 2010), Microchiropteran Bats (Churchill 2008), Frogs (Tyler and Knight 2009) and Reptiles (Swan *et al.* 2004) except where modified by recent taxonomic review (Sass 2011a; b; Swan 2013). Where no common name is provided within these texts, a generally accepted name is used.

3.3 DESKTOP REVIEW OF EXISTING DATABASES

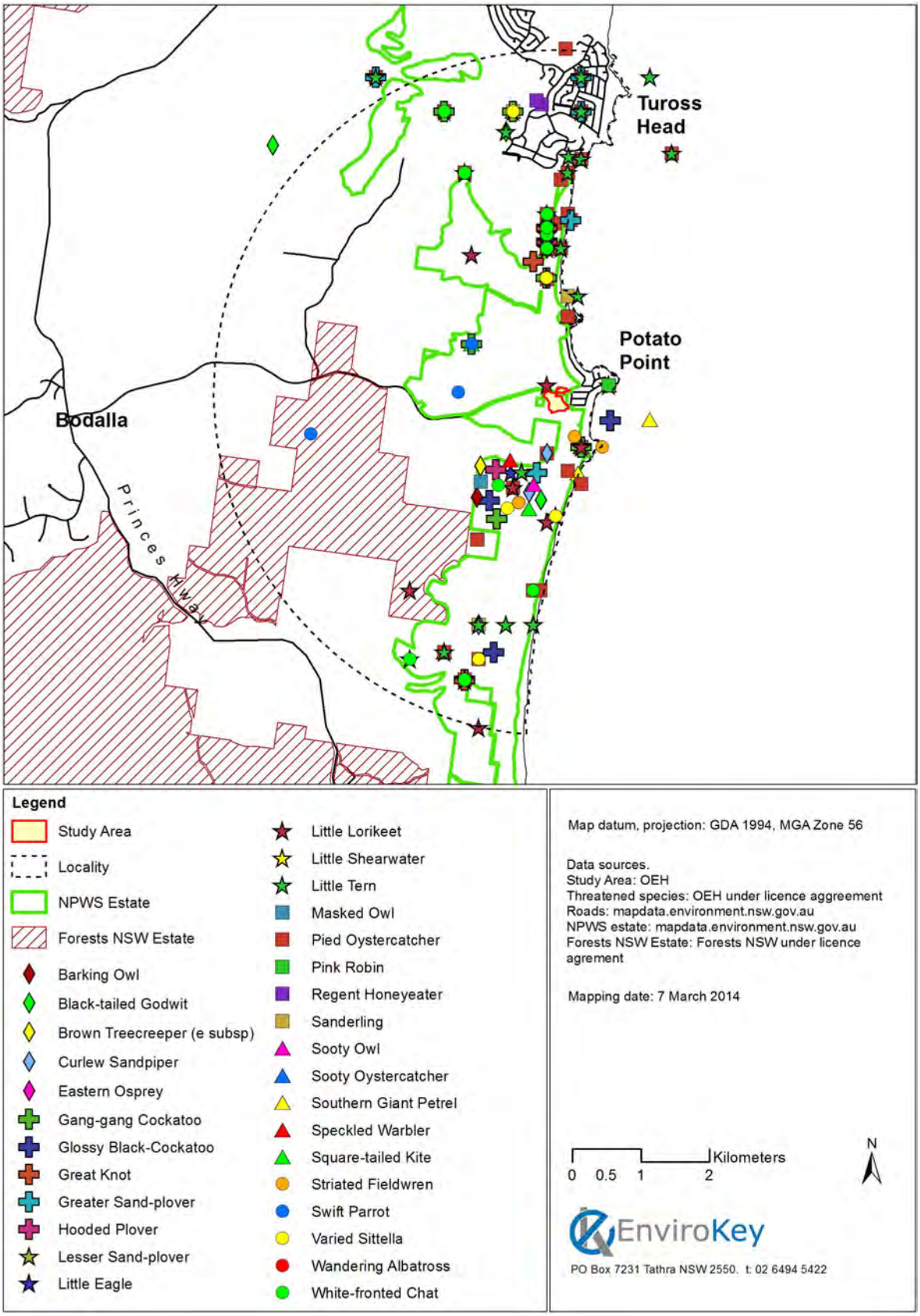
A desktop review was undertaken to identify flora and fauna species that could potentially occur within the study area. Emphasis was placed on any listed threatened species, endangered population or threatened ecological community as listed under the TSC Act and EPBC Act. The desktop review primarily relied upon the following resources:

- OEH Atlas of NSW Wildlife (which includes flora records) using a 5 kilometre radius of the study area as the search area (OEH 2014a).
- OEH Threatened Species Predictor database using the Bateman sub-region of the Southern Rivers CMA as the search parameter (OEH 2014c).
- EPBC Act Protected Matters Reporting Tool using a 5 kilometre buffer of the study area (DotE 2014b).

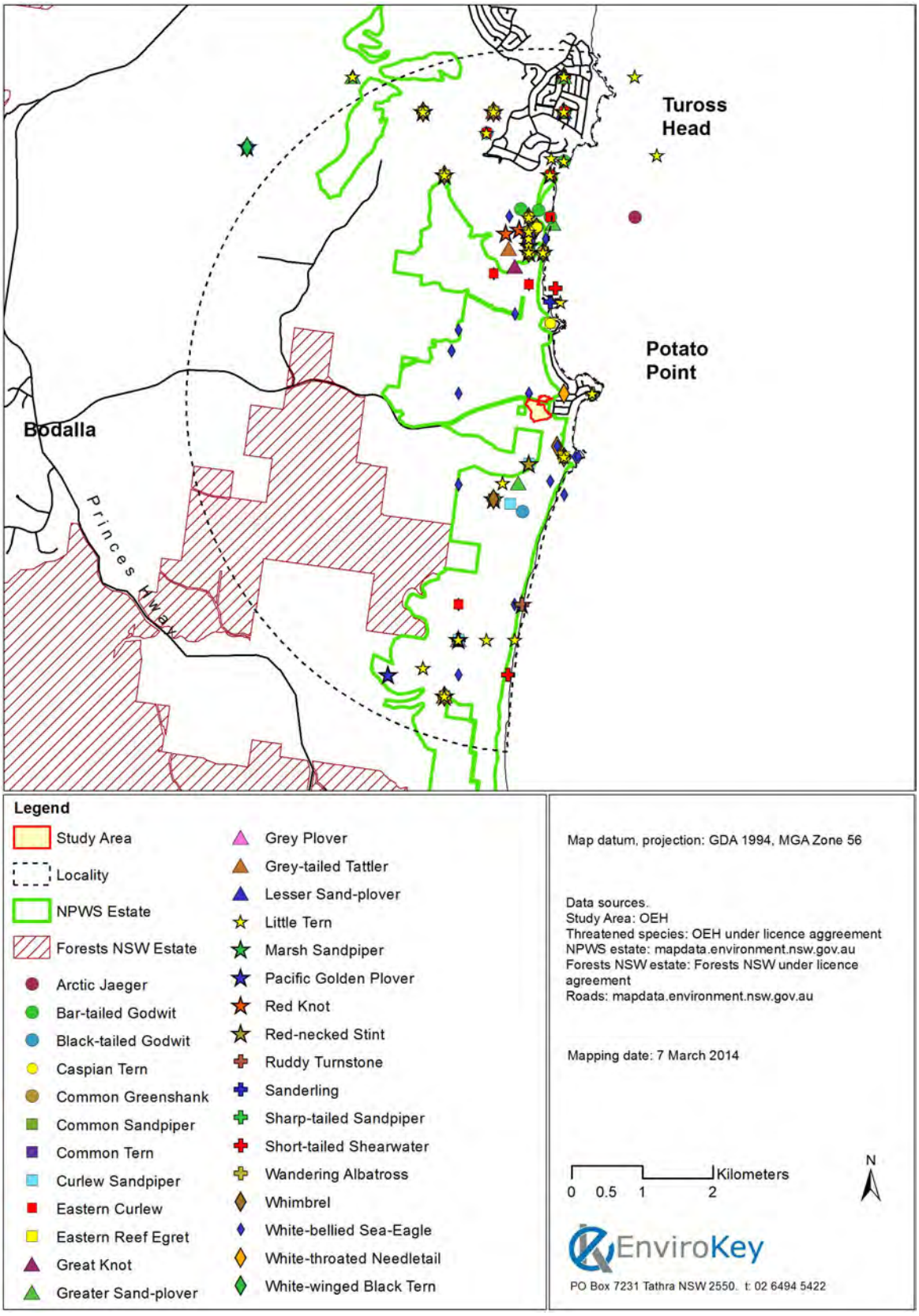
Combined, these searches revealed a total of 124 threatened and migratory biota with some potential to occur across the study area. These comprised:

- Four species of amphibian.
- Nine species of bat.
- 77 species of bird.
- 12 species of mammal.
- One endangered population.
- 16 species of flora.
- Five endangered ecological communities.

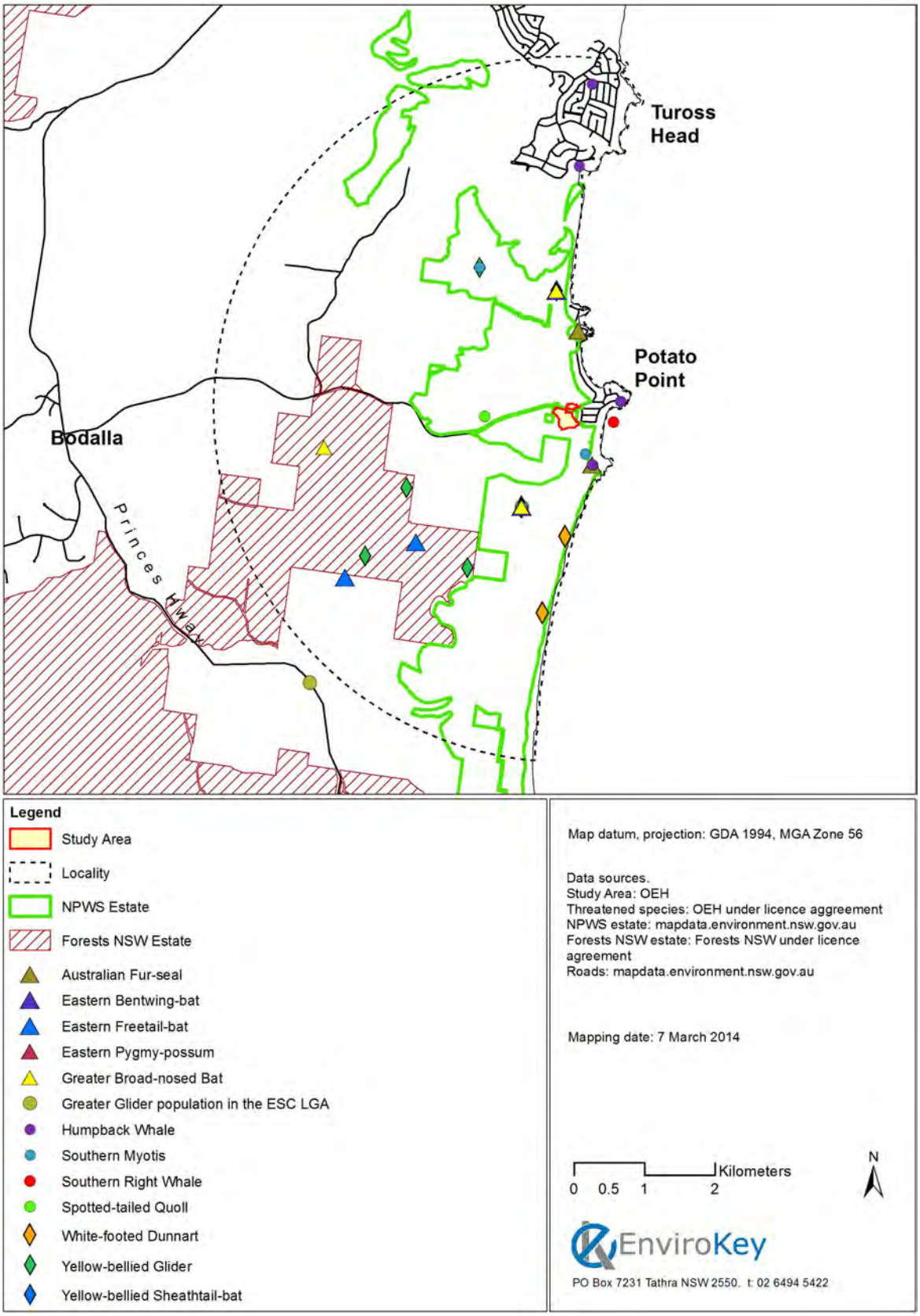
For those threatened and migratory biota recorded within a five kilometre radius of the study area, the spatial locations are shown in **Map 5-8.** It should be not ed that some of these records may be i naccurate given discrepancies in spatial coordinate systems and G PS equipment, and the mapped location should also be c onsidered an i ndication of their presence within the locality, not their actual location of occupancy (for eg, whales are usually sighted from the shoreline and that it where they are recorded from).



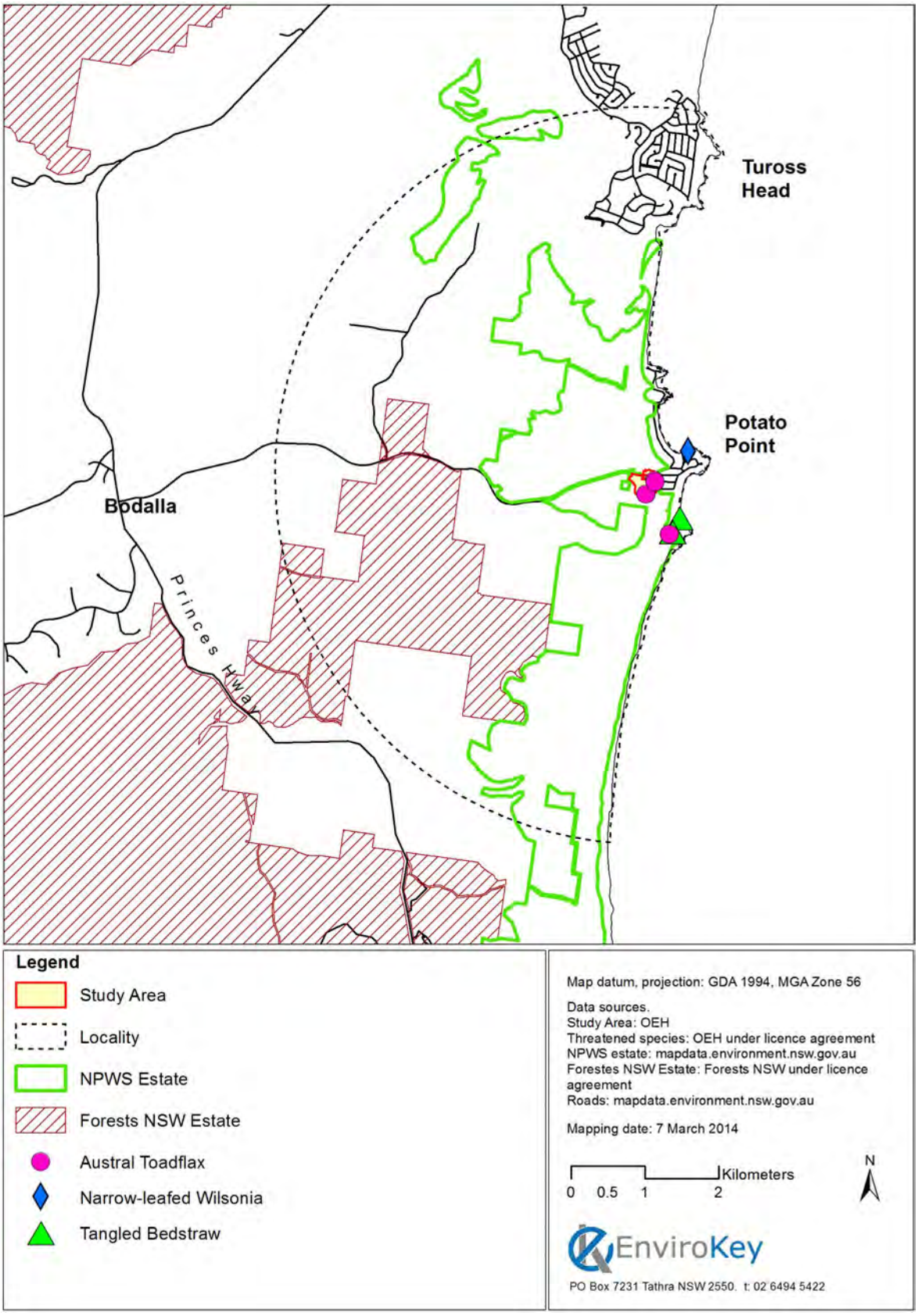
Map 5: Locations of threatened birds previously recorded in the locality.



Map 6: Locations of migratory birds previously recorded in the locality.



Map 7: Locations of other threatened fauna previously recorded in the locality.



Map 8: Locations of threatened flora previously recorded in the locality.

3.4 DESKTOP REVIEW OF EXISTING VEGETATION MAPPING

A desktop review of existing vegetation mapping was undertaken as part of this study. Two relevant sources were identified. These being:

- South Coast – Illawarra Vegetation Integration (SCIVI) (Tozer *et al.* 2006).
- Endangered Ecological Communities of the Eurobodalla LGA (NGH 2007b).

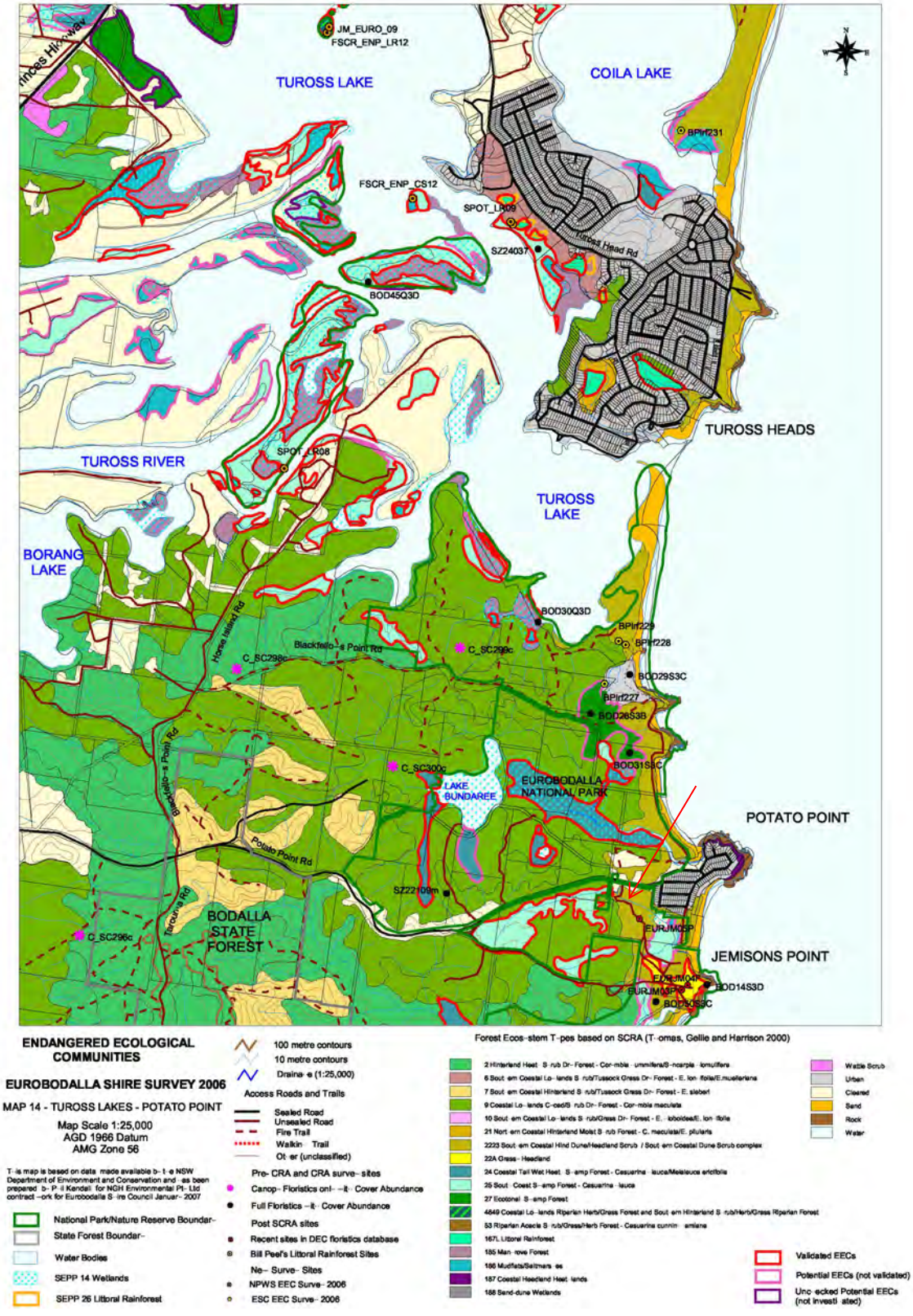
South Coast – Illawarra Vegetation Integration (SCIVI)

The South Coast – Illawarra Vegetation Integration (SCIVI) provides for the classification and descriptions of native vegetation types of southeast NSW, and maps their extant distribution (Tozer *et al.* 2006). SCIVI also aimed to integrate many previous vegetation classification and mapping works to produce a single regional classification and mapping which includes information on the regional conservation status of vegetation types. The distribution of vegetation communities was determined through modelling using data from previous mapping, a hybrid decision-tree/expert system, aerial photograph interpretation (API) and in some instances, ground truthing. A total of 189 vegetation types were identified, and types related to EEC are highlighted.

The REF prepared for Stage 1 of the Potato Point Fire Buffer Construction Works includes a map of the SCIVI vegetation communities within a five kilometre radius of the study area (NGH 2013).

Endangered Ecological Communities of the Eurobodalla LGA

The Endangered Ecological Communities (EEC) of the Eurobodalla LGA were identified and mapped in 2007 (NGH 2007b). A total of 12 EEC were identified and a series of maps were produced for the various localities within the Shire. This included a map of EEC in the Tuross Lake/Potato Point area which included the on-ground validation of EEC (**Map 9**). A review of the mapping presented on the Eurobodalla Shire Council website reveals that NGH did not identify any EEC within the study area in 2007.



Map 9: Endangered Ecological Community mapping completed by NGH Environmental (2007) in the Potato Point/Tuross Heads area (Approximate location of the study area added and shown by red arrow).

3.5 HABITAT ASSESSMENT AND LIKELIHOOD OF OCCURRENCE OF THREATENED BIOTA

This section provide an analysis of the biota that are to be considered 'target species' for the SIS based on the habitat requirements of each, recent records and known distribution in the locality (**Table 2**).

Table 2: Analysis of biota in determining the target species for the SIS.

Species **Scientific Name** **Legal Status**	**Habitat**	**Likelihood Occurrence in Subject Site based on desktop analysis**	**Target Species for SIS**
Giant Burrowing Frog *Heleioporus australiacus* V TSC V EPBC	The Giant Burrowing Frog is distributed in south eastern NSW and Victoria, and appears to exist as two distinct populations: a northern population largely confined to the sandstone geology of the Sydney Basin and extending as far south as Ulladulla, and a southern population occurring from north of Narooma through to Walhalla, Victoria. In these areas, it is found in heath and forest on a variety of soil types except those that are clay based and required 2nd or 3rd order stream for breeding purposes.	No The subject site contains a first order stream leading from a SEPP 14 wetland. No previous records within the locality. No suitable habitat is present.	No
Green and Golden Bell Frog *Litoria aurea* E TSC V EPBC	Inhabits marshes, dams and stream-sides, particularly those containing bulrushes (*Typha* spp.) or spikerushes (*Eleocharis* spp.).	Possible A SEPP 14 wetland is located directly adjacent to the subject site. However, no previous records are known from the locality. The 1st order drainage line extending from the SEPP 14 wetland into the subject site may contain over-wintering refuge habitat.	Yes

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Heath Frog *Litoria littlejohni* V TSC V EPBC	This species breeds in the upper reaches of permanent streams and in perched swamps. Non-breeding habitat is heath based forests and woodlands where it shelters under leaf litter and low vegetation, and hunts for invertebrate prey either in shrubs or on the ground.	No No previous records within the locality. No suitable habitat is present.	No
Stuttering Frog *Mixophyes balbus* E TSC V EPBC	Found in rainforest and wet, tall open forest in the foothills and escarpment on the eastern side of the Great Dividing Range.	No No previous records within the locality. No suitable habitat is present.	No
BATS			
Eastern False Pipistrelle *Falsistrellus tasmaniensis* V TSC	Prefers moist habitats, with trees taller than 20m. Generally roosting in eucalypt hollows, but has also been found under loose bark on trees and buildings.	No No previous records within the locality. No suitable roosting or foraging habitat present.	No
Golden-tipped Bat *Kerivoula papuensis* V TSC	Found in rainforest and adjacent wet and dry sclerophyll forest up to 1000m. Also recorded in tall open forest, *Casuarina*-dominated riparian forest and coastal *Melaleuca* forests.	Yes Habitat provides potential foraging and roosting opportunity. No previous records in the locality	Yes
Eastern Bentwing-bat *Miniopterus orianae oceanensis* V TSC	Caves are the primary roosting habitat, but also use derelict mines, storm-water tunnels, buildings and other man-made structures.	Yes Known from four records in the locality including Eurobodalla National Park. Most recent record is 1997.	Yes
Eastern Freetail-bat *Mormopterus norfolkensis* V TSC	Occur in dry sclerophyll forest, woodland, swamp forests and mangrove forests east of the Great Dividing Range.	Yes Known from three records in the locality including Bodalla State Forest. Most recent record is 1997.	Yes

Species **Scientific Name** **Legal Status**	**Habitat**	**Likelihood Occurrence in Subject Site based on desktop analysis**	**Target Species for SIS**
Southern Myotis *Myotis macropus* V TSC	Generally roost in groups of 10 - 15 close to water in caves, mine shafts, hollow-bearing trees, storm water channels, buildings, under bridges and in dense foliage. Forage over open streams and open pools catching insects and small fish by raking their feet across the water surface.	Yes Known from five records in the locality including one record directly south of the subject site in 1996.	Yes
Grey-headed Flying-fox *Pteropus poliocephalus* V TSC V EPBC	Occur in subtropical and temperate rainforests, tall sclerophyll forests and woodlands, heaths and swamps as well as urban gardens and cultivated fruit crops. Roosting camps are generally located within 20 km of a regular food source and are commonly found in gullies, close to water, in vegetation with a dense canopy.	No No previous records in the locality. No roost camp is present and quality foraging habitat is located in eucalypt dominated communities in Eurobodalla National Park and Bodalla State Forest.	No
Yellow-bellied Sheathtail-bat *Saccolaimus flaviventris* V TSC	Roosts singly or in groups of up to six, in tree hollows and buildings; in treeless areas they are known to utilise mammal burrows.	No Two previous records in the locality including Eurobodalla National Park. An absence of tree hollows in subject site suggests habitat is not present.	No
Greater Broad-nosed Bat *Scoteanax rueppellii* V TSC	Utilises a variety of habitats from woodland through to moist and dry eucalypt forest and rainforest, though it is most commonly found in tall wet forest.	No Ten previous records in the locality including Eurobodalla National Park and Bodalla State Forest. An absence of suitable hollows and eucalypt dominated communities suggests habitat is not present.	No

Species **Scientific Name** **Legal Status**	**Habitat**	**Likelihood Occurrence in Subject Site based on desktop analysis**	**Target Species for SIS**
Large-eared Pied Bat *Chalinolobus dwyeri* V TSC V EPBC	Roosts in caves (near their entrances), crevices in cliffs, old mine workings and in the disused, bottle-shaped mud nests of the Fairy Martin, frequenting low to mid-elevation dry open forest and woodland close to these features.	No No previous records in the locality. No suitable habitat is present on the subject site.	
BIRDS			
Square-tailed Kite *Lophoictinia isura* V TSC	Found in a variety of timbered habitats including dry woodlands and open forests. Shows a particular preference for timbered watercourses.	Yes Three previous records in the locality including within Eurobodalla National Park in 2001. Suitable foraging habitat is present on the subject site.	Yes
Eastern Osprey *Pandion cristatus* V TSC	Favour coastal areas, especially the mouths of large rivers, lagoons and lakes.	No Eight previous records in the locality with all in the vicinity of Tuross Lake. The most recent record being 2005. No suitable habitat is present on the subject site.	No
Sooty Oystercatcher *Haematopus fuliginosus* V TSC	Favours rocky headlands, rocky shelves, exposed reefs with rock pools, beaches and muddy estuaries.	No 21 previous records occur in the locality with the closest at Jemison's Point in 2005. No suitable habitat is present on the subject site.	No

Species **Scientific Name** **Legal Status**	**Habitat**	**Likelihood Occurrence in Subject Site based on desktop analysis**	**Target Species for SIS**
Pied Oystercatcher *Haematopus longirostris* E TSC	Favours intertidal flats of inlets and bays, open beaches and sandbanks. Forages on exposed sand, mud and rock at low tide, for molluscs, worms, crabs and small fish. The chisel-like bill is used to pry open or break into shells of oysters and other shellfish. Nests mostly on coastal or estuarine beaches although occasionally they use saltmarsh or grassy areas.	No 203 previous records occur across the locality with the species being commonly recorded in suitable habitats. No suitable habitat occurs within the subject site.	No
Greater Sand-plover *Charadrius leschenaultia* V TSC	Almost entirely restricted to coastal areas in NSW, occurring mainly on sheltered sandy, shelly or muddy beaches or estuaries with large intertidal mudflats or sandbanks.	No Five previous records occur within the locality with the most recent being in 1997. No suitable habitat is present within the subject site.	No
Lesser Sand-plover *Charadrius mongolus* V TSC	Almost entirely coastal in NSW, favouring the beaches of sheltered bays, harbours and estuaries with large intertidal sandflats or mudflats; occasionally occurs on sandy beaches, coral reefs and rock platforms.	No Four previous records occur within the locality with the most recent being in 2005 at Tuross Lake No suitable habitat is present within the subject site.	No
Pacific Golden Plover *Pluvialis fulva* M EPBC	Usually occur on beaches, mudflats and sandflats (sometimes in vegetation such as mangroves, low saltmarsh such as Sarcocornia, or beds of seagrass) in sheltered areas including harbours, estuaries and lagoons.	No Seven previous records occur within the locality with the most recent being in 2005 at Tuross Lake. No suitable habitat is present within the subject site.	No

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Grey Plover *Pluvialis squatarola* M EPBC	In non-breeding grounds in Australia, Grey Plovers occur almost entirely in coastal areas, where they usually inhabit sheltered embayments, estuaries and lagoons with mudflats and sandflats, and occasionally on rocky coasts with wave-cut platforms or reef-flats, or on reefs within muddy lagoons.	No Seven previous records occur within the locality with the most recent being in 2005 at Tuross Lake. No suitable habitat is present within the subject site.	No
Hooded Plover *Thinornis rubricollis* CE TSC	Hooded Plovers prefer sandy ocean beaches, especially those that are broad and flat, with a wide wave-wash zone for feeding, much beachcast seaweed, and backed by sparsely vegetated sand-dunes for shelter and nesting. Occasionally Hooded Plovers are found on tidal bays and estuaries, rock platforms and rocky or sand-covered reefs near sandy beaches, and small beaches in lines of cliffs.	No Two previous records occur within the locality with the most recent being in 1997 in Eurobodalla National Park. No suitable habitat is present within the subject site.	No
Common Sandpiper *Actitis hypoleucos* M EPBC	The species utilises a wide range of coastal wetlands and some inland wetlands, with varying levels of salinity, and is mostly found around muddy margins or rocky shores and rarely on mudflats.	No Nine previous records occur within the locality with the most recent being in 2003 at Tuross Lake. No suitable habitat is present within the subject site.	No
Ruddy Turnstone *Arenaria interpres* M EPBC	In Australasia, the Ruddy Turnstone is mainly found on coastal regions with exposed rock coast lines or coral reefs. It also lives near platforms and shelves, often with shallow tidal pools and rocky, shingle or gravel beaches. It can, however, be found on sand, coral or shell beaches, shoals, cays and dry ridges of sand or coral.	No 11 previous records occur within the locality with the most recent being in 2005 at Tuross Lake. No suitable habitat is present within the subject site.	No

Species **Scientific Name** **Legal Status**	**Habitat**	**Likelihood Occurrence in Subject Site based on desktop analysis**	**Target Species for SIS**
Sharp-tailed Sandpiper *Calidris acuminate* M EPBC	Prefers muddy edges of shallow fresh or brackish wetlands, with inundated or emergent sedges, grass, saltmarsh or other low vegetation. This includes lagoons, swamps, lakes and pools near the coast, and dams, waterholes, soaks, bore drains and bore swamps, saltpans and hypersaline saltlakes inland.	No Six previous records occur within the locality with the most recent being in 2005 at Tuross Lake. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No
Red Knot *Calidris canutus* M EPBC	Mainly inhabit intertidal mudflats, sandflats and sandy beaches of sheltered coasts, in estuaries, bays, inlets, lagoons and harbours; sometimes on sandy ocean beaches or shallow pools on exposed wave-cut rock platforms or coral reefs. They are occasionally seen on terrestrial saline wetlands near the coast, such as lakes, lagoons, pools and pans, and recorded on sewage ponds and saltworks, but rarely use freshwater swamps.	No 25 previous records occur within the locality with the most recent being in 2005 at Tuross Lake. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No
Sanderling *Calidris alba* M EPBC	Almost always found on the coast, mostly on open sandy beaches exposed to open sea-swell.	No Seven previous records occur within the locality with the most recent being in 2005. No suitable habitat is present within the subject site.	No

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Curlew Sandpiper *Calidris ferruginea* E TSC M EPBC	Curlew Sandpipers mainly occur on intertidal mudflats in sheltered coastal areas, such as estuaries, bays, inlets and lagoons, and also around non-tidal swamps, lakes and lagoons near the coast.	No Nine previous records occur within the locality with the most recent being in 2005. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No
Red-necked Stint *Calidris* ruficollis M EPBC	Mostly found in coastal areas, including in sheltered inlets, bays, lagoons and estuaries with intertidal mudflats, often near spits, islets and banks and, sometimes, on protected sandy or coralline shores. Occasionally they have been recorded on exposed or ocean beaches, and sometimes on stony or rocky shores, reefs or shoals. They also occur in saltmarsh, ephemeral or permanent shallow wetlands near the coast or inland, including lagoons, lakes, swamps, and riverbanks.	No 37 previous records occur within the locality with the most recent being in 2005 at Tuross Lake. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No
Great Knot *Calidris tenuirostris* V TSC M EPBC	The species typically prefers sheltered coastal habitats, with large intertidal mudflats or sandflats.	No Five previous records occur within the locality with the most recent being in 2005 at Tuross Lake. No suitable habitat is present within the subject site.	No
Bar-tailed Godwit *Limosa lapponica* M EPBC	Found mainly in coastal habitats such as large intertidal sandflats, banks, mudflats, estuaries, inlets, harbours, coastal lagoons and bays. It is found often around beds of seagrass and, sometimes, in nearby saltmarsh.	No 64 previous records occur within the locality with the most recent being in 2005. No suitable habitat is present within the subject site.	No

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Black-tailed Godwit *Limosa limosa* V TSC	Primarily a coastal species, the species is usually found in sheltered bays, estuaries and lagoons with large intertidal mudflats and/or sandflats.	No Four previous records occur within the locality with the most recent being in 1997. No suitable habitat is present within the subject site.	No
Eastern Curlew *Numenius madagascariensis* M EPBC	Most commonly associated with sheltered coasts, especially estuaries, bays, harbours, inlets and coastal lagoons, with large intertidal mudflats or sandflats, often with beds of seagrass. Occasionally, the species occurs on ocean beaches (often near estuaries), and coral reefs, rock platforms, or rocky islets.	No 77 previous records occur within the locality with the most recent being in 2006. No suitable habitat is present within the subject site.	No
Whimbrel *Numenius phaeopus* M EPBC	Often found on the intertidal mudflats of sheltered coasts. It is occasionally found on sandy or rocky beaches, on coral or rocky islets, or on intertidal reefs and platforms.	No 41 previous records occur within the locality with the most recent being in 2005 at Tuross Lake. No suitable habitat is present within the subject site.	No
Little Whimbrel *Numenius minutus* M EPBC	Most often found feeding in short, dry grassland and sedgeland, including dry floodplains and blacksoil plains, which have scattered, shallow freshwater pools or areas seasonally inundated.	No No previously records in the locality. No suitable habitat is present within the subject site.	No
Grey-tailed Tattler *Tringa brevipes* M EPBC	Often found on sheltered coasts with reefs and rock platforms or with intertidal mudflats. It can also be found at intertidal rocky, coral or stony reefs as well as platforms and islets that are exposed at low tide.	No Two previous records occur within the locality with the most recent being in 2005 at Tuross Lake. No suitable habitat is present within the subject site.	No

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Common Greenshank *Tringa nebularia* M EPBC	Common Greenshanks are found on the coast in estuaries and mudflats, mangrove swamps and lagoons.	No 13 previous records occur within the locality with the most recent being in 2005 at Tuross Lake. No suitable habitat is present within the subject site.	No
Marsh Sandpiper *Tringa stagnatilis* M EPBC	The Marsh Sandpiper lives in permanent or ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, saltpans, saltmarshes, estuaries, pools on inundated floodplains, and intertidal mudflats and also regularly at sewerage works.	No Two previous records occur within the locality with the most recent being in 1992 at Tuross Lake. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No
White-winged Black Tern *Chlidonias leucopterus* M EPBC	The species mostly inhabits fresh, brackish or saline, and coastal or subcoastal wetlands. Frequent tidal wetlands, such as harbours, bays, estuaries and lagoons, and their associated tidal sandflats and mudflats.	No A single previous record occurs within the locality. This being in 1992 at Tuross Lake. No suitable habitat is present within the subject site.	No
Caspian Tern *Hydroprogne caspia* M EPBC	Mostly found in sheltered coastal embayments (harbours, lagoons, inlets, bays, estuaries and river deltas) and those with sandy or muddy margins are preferred.	No 56 previous records occur within the locality with the majority of these being at Tuross Lake No suitable habitat is present within the subject site.	No

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Common Tern *Sterna hirundo* M EPBC	In Australia, they are recorded in all marine zones, but are commonly observed in near-coastal waters, both on ocean beaches, platforms and headlands and in sheltered waters, such as bays, harbours and estuaries with muddy, sandy or rocky shores.	No A single previous record occurs within the locality. This being in 2000 at Tuross Lake. No suitable habitat is present within the subject site.	No
Little Tern *Sternula albifrons* E TSC	Almost exclusively coastal, preferring sheltered environments; however may occur several kilometres from the sea in harbours, inlets and rivers (with occasional offshore islands or coral cay records).	No 76 previous records occur within the locality with the majority of these being at Tuross Lake. No suitable habitat is present within the subject site.	No
Striated Fieldwren *Calamanthus fuliginosus* E TSC	The Striated Fieldwren is found in coastal swamp heaths and tussock fields of south-eastern NSW, into southern Victoria and the south-east of South Australia. It is also found in Tasmania. There are four recognised subspecies, but only one (albiloris) occurs in NSW.	Yes Three previous records occur within the locality with the most recent being in 1997 at Jemison's Point. Potential habitat occurs within the subject site.	Yes
Fork-tailed Swift *Apus pacificus* M EPBC	Mostly occur over inland plains but sometimes above foothills or in coastal areas. They often occur over cliffs and beaches and also over islands and sometimes well out to sea.	No No records occur within the locality. No suitable habitat is present within the subject site.	No
Speckled Warbler *Chthonicola sagittata* V TSC	The Speckled Warbler lives in a wide range of Eucalyptus dominated communities that have a grassy understorey, often on rocky ridges or in gullies. Large, relatively undisturbed remnants are required for the species to persist in an area.	No A single previous record is known from the locality and this is about 1.5 kms south-west of the subject site. However, no suitable habitat is present within the subject site.	No

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Great Egret *Ardea alba* M EPBC	Great Egrets prefer shallow water, particularly when flowing, but may be seen on any watered area.	No No records occur within the locality. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No
Cattle Egret *Ardea ibis* M EPBC	The Cattle Egret is found in grasslands, woodlands and wetlands, and is not common in arid areas. It also uses pastures and croplands, especially where drainage is poor. It will also forage at garbage dumps, and is often seen with cattle and other stock.	No No records occur within the locality. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No
Brown Treecreeper *Climacteris picumnus victoriae* V TSC	Found in eucalypt woodlands (including Box-Gum Woodland) and dry open forest of the inland slopes and plains inland of the Great Dividing Range; mainly inhabits woodlands dominated by stringybarks or other rough-barked eucalypts, usually with an open grassy understorey, sometimes with one or more shrub species; also found in mallee and River Red Gum (*Eucalyptus camaldulensis*) Usually not found in woodlands with a dense shrub layer, however, fallen timber is an important habitat component for foraging.	No Two records occur within the locality with both within Eurobodalla National Park in 1997. These are located about 1.5kms south-west of the subject site. No suitable habitat is present within the subject site.	No

Species **Scientific Name** **Legal Status**	**Habitat**	**Likelihood Occurrence in Subject Site based on desktop analysis**	**Target Species for SIS**
Australasian Bittern *Botaurus poiciloptilus* V TSC E EPBC	Favours permanent freshwater wetlands with tall, dense vegetation, particularly bullrushes (Typha spp.) and spikerushes (Eleoacharis spp.).	No No records occur within the locality. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No
Gang-gang Cockatoo *Callocephalon fimbriatum* V TSC	In summer, generally found in tall mountain forests and woodlands, particularly in heavily timbered and mature wet sclerophyll forests. In winter, may occur at lower altitudes in drier more open eucalypt forests and woodlands, and often found in urban areas.	Yes 12 records occur within the locality with the most recent being 2007. The subject site may contain some suitable foraging habitat. No suitable nesting habitat is present.	Yes
Glossy Black-Cockatoo *Calyptorhynchus lathami* V TSC	Inhabits open forest and woodlands of the coast and the Great Dividing Range up to 1000 m in which stands of she-oak species, particularly Black She-oak (*Allocasuarina littoralis*), Forest She-oak (*A. torulosa*) or Drooping She-oak (*A. verticillata*) occur.	Yes Nine records occur within the locality with the most recent being 2005. The subject site contains potential foraging habitat. No suitable nesting habitat is present.	Yes
Barking Owl *Ninox connivens* V TSC	Inhabits woodland and open forest, including fragmented remnants and partly cleared farmland. It is flexible in its habitat use, and hunting can extend in to closed forest and more open areas. Sometimes able to successfully breed along timbered watercourses in heavily cleared habitats (e.g. western NSW) due to the higher density of prey on these fertile soils.	Yes Three records occur within the locality with the most recent being 1996 in Eurobodalla National Park. The subject site may contain some suitable foraging habitat. No suitable nesting habitat is present.	Yes

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Powerful Owl *Ninox strenua* V TSC	Inhabits a range of vegetation types, from woodland and open sclerophyll forest to tall open wet forest and rainforest. The Powerful Owl requires large tracts of forest or woodland habitat but can occur in fragmented landscapes as well. The species breeds and hunts in open or closed sclerophyll forest or woodlands and occasionally hunts in open habitats.	No Not previously recorded in the locality. The subject site does not contain potentially suitable foraging or nesting habitat.	No
Olive Whistler *Pachycephala olivacea* V TSC	The Olive Whistler inhabits the wet forests on the ranges of the east coast. Mostly inhabit wet forests above about 500m however, in winter months they may move to lower altitudes.	Yes Not previously recorded in the locality. The subject site may contain suitable habitat, particularly in the winter months.	Yes
Pink Robin *Petroica rodinogaster* V TSC	Inhabits rainforest and tall, open eucalypt forest, particularly in densely vegetated gullies.	Yes Two previous records in the locality; both being in 1996 in Eurobodalla National Park. The subject site may contain suitable habitat.	Yes
Scarlet Robin *Petroica boodang* V TSC	The Scarlet Robin lives in dry eucalypt forests and woodlands as well as She-oak dominated vegetation communities. The understorey is usually open and grassy with few scattered shrubs.	Yes No previous records in the locality. The subject site may contain suitable habitat.	Yes
Flame Robin *Petroica phoenicea* V TSC	Breeds in upland tall moist forests and woodlands often on ridges and slopes. In Winter, birds migrate to more open habitats on the lowlands.	Yes No previous records in the locality. The subject site may contain suitable habitat.	Yes

Species **Scientific Name** **Legal Status**	**Habitat**	**Likelihood Occurrence in Subject Site based on desktop analysis**	**Target Species for SIS**
White-fronted Chat *Epthianura albifrons* V TSC	It occurs mostly in the southern half of the state, in damp open habitats along the coast, and near waterways in the western part of the state. Along the coastline, it is found predominantly in saltmarsh vegetation but also in open grasslands and sometimes in low shrubs bordering wetland areas.	Yes 32 previous records in the locality with the most recent being 2005. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No
Varied Sittella *Daphoenositta chrysoptera* V TSC	The Varied Sittella is sedentary and inhabits most of mainland Australia except the treeless deserts and open grasslands. They inhabit eucalypt woodlands and casuarina thickets and prefer rough-barked trees and mature trees with hollows or dead branches.	Yes Six previous records in the locality with the most recent being 2005. The subject site may contain potentially suitable habitat.	Yes
Eastern Bristlebird *Dasyornis brachypterus* E TSC E EPBC	Occurs in dense, low vegetation including heath and open woodland with a heathy understorey.	No No previous records in the locality. The subject site does not contain suitable habitat.	No
Orange-bellied Parrot *Neophema chrysogaste* CE TSC CE EPBC	On the mainland, the Orange-bellied Parrot spends winter mostly within 3 km of the coast in sheltered coastal habitats including bays, lagoons, estuaries, coastal dunes and saltmarshes. The species also inhabits small islands and peninsulas and occasionally saltworks and golf courses. Birds forage in low samphire herbland or taller coastal shrubland.	No No previous records in the locality. The subject site does not contain suitable habitat.	No

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Latham's Snipe *Gallinago hardwickii* M EPBC	Latham's Snipe are seen in small groups or singly in freshwater wetlands on or near the coast, generally among dense cover.	No No previous records in the locality. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No
Little Lorikeet *Glossopsitta pusilla* V TSC	Forages primarily in the canopy of open Eucalyptus forest and woodland, yet also finds food in Angophoras, Melaleucas and other tree species. Riparian habitats are particularly used, due to higher soil fertility and hence greater productivity.	Yes 11 previous records in the locality including Potato Point and Jemison's Point. Potentially suitable habitat is present within the subject site.	Yes
White-bellied Sea-eagle *Haliaeetus leucogaster* M EPBC	The species is normally seen perched high in a tree, or soaring over waterways and adjacent land, particularly along coastlines, lakes and rivers.	No 214 previous records in the locality. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No
White-throated Needletail *Hirundapus caudacutus* M EPBC	For a time it was commonly believed that they did not land while in Australia. It has now been observed that birds will roost in trees, and radio-tracking has since confirmed that this is a regular activity.	No 33 previous records in the locality with the most recent being 2005. In the absence of trees with hollows, the subject site is unlikely to provide any habitat for this species, with the exception that it may over-fly from time to time.	No

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Little Eagle *Hieraaetus morphnoides* V TSC	Occupies open eucalypt forest, woodland or open woodland. Sheoak or *Acacia* woodlands and riparian woodlands of interior NSW are also used.	Yes Six previous records in the locality including Brou Lake and Tuross Lake. Potentially suitable habitat is present within the subject site.	Yes
Swift Parrot *Lathamus discolour* E TSC E EPBC	Migrates to the Australian south-east mainland between March and October. On the mainland they occur in areas where eucalypts are flowering profusely or where there are abundant lerp (from sap-sucking bugs) infestations. Favoured feed trees include winter flowering species such as Swamp Mahogany *Eucalyptus robusta*, Spotted Gum *Corymbia maculata*, Red Bloodwood *C. gummifera*, Mugga Ironbark *E. sideroxylon*, and White Box *E. albens*.	No Three previous records in the locality with the most recent being in 2009 on Tarouga Road in Bodalla State Forest. The species has also been recorded about 1.25 west of Potato Point. In the absence of suitable foraging tree species, no suitable habitat is present within the subject site.	No
Rainbow Bee-eater *Merops ornatus* M EPBC	It is most often found in open forests, woodlands and shrublands, and cleared areas, usually near water. It will be found on farmland with remnant vegetation and in orchards and vineyards. It will use disturbed sites such as quarries, cuttings and mines to build its nesting tunnels.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Black-faced Monarch *Monarcha melanopsis* M EPBC	They are found in rainforests, eucalypt woodlands, coastal scrub and damp gullies. It may be found in more open woodland when migrating.	No No previous records in the locality. No suitable habitat is present within the subject site.	No

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Satin Flycatcher *Myiagra cyanoleuca* M EPBC	The Satin Flycatcher is found in tall forests, preferring wetter habitats such as heavily forested gullies, but not rainforests.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Australian Painted Snipe *Rostratula australis* E TSC V EPBC	Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	No No previous records in the locality. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No
Painted Snipe *Rostratula benghalensis s. Lat* M EPBC	In NSW, this species has been recorded at the Paroo wetlands, Lake Cowell, Macquarie Marshes and Hexham Swamp. Most common in the Murray-Darling Basin. Prefers fringes of swamps, dams and nearby marshy areas where there is a cover of grasses, lignum, low scrub or open timber.	No No previous records in the locality. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No
Rufous Fantail *Rhipidura rufifrons* M EPBC	A rainforest and wet sclerophyll inhabitant.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Masked Owl *Tyto novaehollandiae* V TSC	Pairs have a large home-range of 500 to 1000 hectares. Lives in dry eucalypt forests and woodlands from sea level to 1100 m. A forest owl, but often hunts along the edges of forests, including roadsides.	Yes A single previous record occurs in the locality. This was in 1996 in Eurobodalla National Park Potentially foraging habitat is present within the subject site.	Yes

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Sooty Owl *Tyto tenebricosa* V TSC	Occurs in rainforest, including dry rainforest, subtropical and warm temperate rainforest, as well as moist eucalypt forests. Roosts by day in the hollow of a tall forest tree or in heavy vegetation; hunts by night for small ground mammals or tree-dwelling mammals such as the Common Ringtail Possum or Sugar Glider.	No Two previous records in the locality. Both in 1997 in Eurobodalla National Park. No suitable habitat is present within the subject site.	No
Regent Honeyeater *Xanthomyza phrygia* CE TSC E EPBC M EPBC	Regent Honeyeaters inhabit woodlands that support a significantly high abundance and species richness of bird species. These woodlands have significantly large numbers of mature trees, high canopy cover and abundance of mistletoe.	Yes Two previous records in the locality from database search. An additional record from a Potato Point resident of two individuals in 2013 (T.Ricketson, NPWS, pers.com). Subject site does not contain any suitable habitat, but given proximity of recent records, included as target species.	Yes
Bush Stone-curlew *Burhinus grallarius* E TSC	Inhabits open forests and woodlands with a sparse grassy groundlayer and fallen timber.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Spotted Harrier *Circus assimilis* V TSC	Occurs in grassy open woodland including remnants of Acacia and mallee remnant, inland riparian woodland, grassland and shrub steppe. Most commonly found in native grassland, this species is also known from agricultural land where it forages over open habitat (incl. inland wetland edges). This species preys mainly on terrestrial mammals, other birds and reptiles.	No No previous records in the locality. No suitable habitat is present within the subject site.	No

Species **Scientific Name** **Legal Status**	**Habitat**	**Likelihood Occurrence in Subject Site based on desktop analysis**	**Target Species for SIS**
Beach Stone-curlew *Esacus magnirostris* CE TSC	Found exclusively along the coast, on a wide range of beaches, islands, reefs and in estuaries. May often be seen at the edges of or near mangroves. They forage in the intertidal zone of beaches and estuaries, on islands, flats, banks and spits of sand, mud, gravel or rock, and among mangroves. Beach Stone-curlews breed above the littoral zone, at the backs of beaches, or on sandbanks and islands, among low vegetation of grass, scattered shrubs or low trees; also among open mangroves.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Grey Falcon *Falco hypoleucos* E TSC	This species is usually restricted to areas of shrubland, grassland and wooded watercourses of regions that are arid to semi-arid. Occasionally it is found in open woodland areas near the coast.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Black Falcon *Falco subniger* V TSC	The Black Falcon is found along tree-lined watercourses and in isolated woodlands, mainly in arid and semi-arid areas. It roosts in trees at night and often on power poles by day.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Black-breasted Buzzard *Hamirostra melanosternon* V TSC	Lives in a range of inland habitats, especially along timbered watercourses which is the preferred breeding habitat. Also hunts over grasslands and sparsely timbered woodlands.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Black Bittern *Ixobrychus flavicollis* V TSC	Inhabits both terrestrial and estuarine wetlands, generally in areas of permanent water and dense vegetation. Where permanent water is present, the species may occur in flooded grassland, forest, woodland, rainforest and mangroves. During the day, roosts in trees or on the ground amongst dense reeds.	No No previous records in the locality. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No

Species **Scientific Name** **Legal Status**	**Habitat**	**Likelihood Occurrence in Subject Site based on desktop analysis**	**Target Species for SIS**
Eastern Ground Parrot *Pezoporus wallicus wallicus* V TSC	The Ground Parrot occurs in high rainfall coastal and near coastal low heathlands and sedgelands, generally below one metre in height and very dense (up to 90 percent projected foliage cover). These habitats provide a high abundance and diversity of food, adequate cover and suitable roosting and nesting opportunities for the Ground Parrot, which spends most of its time on or near the ground. When flushed, birds fly strongly and rapidly for up to several hundred metres, at a metre or less above the ground.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Superb Fruit-Dove *Ptilinopus superbus* V TSC	Inhabits rainforest and similar closed forests where it forages high in the canopy, eating the fruits of many tree species such as figs and palms. It may also forage in eucalypt or acacia woodland where there are fruit-bearing trees.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Diamond Firetail *Stagonopleura guttata* V TSC	Found in grassy eucalypt woodlands, including Box-Gum Woodlands and Snow Gum Eucalyptus pauciflora Woodlands.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Freckled Duck *Stictonetta naevosa* V TSC	Prefers permanent freshwater swamps and creeks with heavy growth of Cumbungi, Lignum or Tea-tree. During drier times they move from ephemeral breeding swamps to more permanent waters such as lakes, reservoirs, farm dams and sewage ponds.	No No previous records in the locality. Potential marginal habitat is present in the SEPP 14 wetland adjacent to the subject site. However, no suitable habitat is present within the subject site.	No
Hooded Robin (south-eastern form) *Melanodryas cucullata cucullata* V TSC	Occurs in Eucalypt, Mallee, Mulga, Heath, inland and drier parts of the coast, and semi cleared farmland.	No No previous records in the locality. No suitable habitat is present within the subject site.	No

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Terek Sandpiper *Xenus cinereus* V TSC	In Australia, has been recorded on coastal mudflats, lagoons, creeks and estuaries. Favours mudbanks and sandbanks located near mangroves, but may also be observed on rocky pools and reefs, and occasionally up to 10 km inland around brackish pools. Generally roosts communally amongst mangroves of dead trees, often with related wader species.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
MAMMALS (EXCLUDING BATS)			
Eastern Pygmy-possum *Cercartetus nanus* V TSC	Found in a broad range of habitats from rainforest through sclerophyll (including Box-Ironbark) forest and woodland to heath, but in most areas woodlands and heath appear to be preferred.	Yes A single previous record occurs in the locality. This being from south of the subject site in Eurobodalla National Park in 1997 Marginally potential suitable habitat is present within the subject site.	Yes
Greater Glider population in the Eurobodalla local government area *Petauroides volans – endangered population* E POP TSC	Feeds exclusively on eucalypt leaves, buds, flowers and mistletoe. Shelter during the day in tree hollows and will use up to 18 hollows in their home range.	No The determination made by the NSW Scientific Committee is specific to a defined area. That area extends from Moruya River in the north to Tuross Lake in the south. The subject site is not located within the boundaries of the gazetted endangered population.	No
Spotted-tailed Quoll *Dasyurus maculatus* V TSC E EPBC	Recorded across a range of habitat types, including rainforest, open forest, woodland, coastal heath and inland riparian forest, from the sub-alpine zone to the coastline.	No A single previous record occurs in the locality. This was in 1980 and is about 1.5kms west of Potato Point in Eurobodalla National Park No suitable habitat is present within the subject site.	No

Species **Scientific Name** **Legal Status**	**Habitat**	**Likelihood Occurrence in Subject Site based on desktop analysis**	**Target Species for SIS**
Southern Brown Bandicoot (eastern) *Isoodon obesulus obesulus* E TSC E EPBC	The species is largely crepuscular (active mainly after dusk and/or before dawn). They are generally only found in heath or open forest with a heathy understorey on sandy or friable soils. They occur in a variety of habitats in south-eastern Australia including heathland, swamp habitat, open forest, dry sclerophyll forest with heathy understorey and grasslands.	Yes No previous records in the locality. Potentially suitable habitat occurs within the subject site.	Yes
Yellow-bellied Glider *Petaurus australis* V TSC	Occur in tall mature eucalypt forest containing hollowing bearing trees and suitable foraging habitat.	No Nine previous records in the locality with the most recent being 2006 within Eurobodalla National Park. No suitable habitat is present within the subject site.	No
Squirrel Glider *Petaurus norfolcensis* V TSC	Inhabits mature or old growth Box, Box-Ironbark woodlands and River Red Gum forest west of the Great Dividing Range and Blackbutt-Bloodwood forest with heath understorey in coastal areas. Prefers mixed species stands with a shrub or Acacia midstorey.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Brush-tailed Phascogale *Phascogale tapoatafa* V TSC	Occurs in dry sclerophyll open forest, with a sparse ground cover of herbs, grasses, shrubs or leaf litter and dependent on presence of large numbers of HBT exist.	No No previous records in the locality. No suitable habitat is present within the subject site.	No

Species **Scientific Name** **Legal Status**	**Habitat**	**Likelihood Occurrence in Subject Site based on desktop analysis**	**Target Species for SIS**
Brush-tailed Rock-wallaby *Petrogale penicillata* E TSC V EPBC	Occupy rocky escarpments, outcrops and cliffs with a preference for complex structures with fissures, caves and ledges, often facing north. Shelter or bask during the day in rock crevices, caves and overhangs and are most active at night.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Koala *Phascolarctos cinereus* V TSC V EPBC	Inhabit eucalypt woodlands and forests. Home range size varies with quality of habitat, ranging from less than two ha to several hundred hectares in size.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Long-footed Potoroo *Potorous longipes* E TSC E EPBC	The Long-footed Potoroo has a very limited distribution and is extremely rare. All known NSW populations now exist entirely within the South East Forests National Park. It typically inhabits moist forest types from montane wet sclerophyll forests over 1000m altitude to lowland forests at 150m.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Long-nosed Potoroo *Potorous tridactylus* V TSC V EPBC	Inhabits coastal heaths and dry and wet sclerophyll forests. Dense understorey with occasional open areas is an essential part of habitat, and may consist of grass-trees, sedges, ferns or heath, or of low shrubs of tea-trees or melaleucas. A sandy loam soil is also a common feature.	No No previous records in the locality. Potentially suitable habitat is present within the subject site.	Yes

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
White-footed Dunnart *Sminthopsis leucopus* V TSC	The White-footed Dunnart is found in a range of different habitats across its distribution, including coastal dune vegetation, coastal forest, tussock grassland and sedgeland, heathland, woodland and forest. In NSW, the species seems to favour vegetation communities with an open understorey structure.	No Ten previous records in the locality with the most recent being 1997 within Eurobodalla National Park. Potentially suitable habitat is present within the subject site.	Yes
New Holland Mouse *Pseudomys novahollandiae* V EPBC	Known to inhabit open heathlands, open woodlands with a heathland understorey and vegetated sand dunes.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
FISH			
Australian Grayling *Prototroctes maraena* V FM V EPBC	Occurs in clear, gravel-bottomed streams with alternating pools and riffles, and granite outcrops.	No Previously recorded in the Tuross River. No suitable habitat is present within the subject site.	No
REPTILES			
Broad-headed Snake *Hoplocephalus bungaroides* E TSC V EPBC	The Broad-headed Snake is largely confined to Triassic and Permian sandstones, including the Hawkesbury, Narrabeen and Shoalhaven groups, within the coast and ranges in an area within approximately 250 km of Sydney. Shelters in rock crevices and under flat sandstone rocks on exposed cliff edges during autumn, winter and spring. Moves from the sandstone rocks to shelters in hollows in large trees within 200 m of escarpments in summer.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
FLORA			

Species **Scientific Name** **Legal Status**	**Habitat**	**Likelihood Occurrence in Subject Site based on desktop analysis**	**Target Species for SIS**
Narrow-leafed Wilsonia *Wilsonia backhousei* V TSC	This is a species of the margins of salt marshes and lakes.	Yes A single previous record occurs in the locality from 2004. Potentially suitable habitat fringes the subject site adjacent to the SEPP 14 wetland.	Yes
Round-leafed Wilsonia *Wilsonia rotundifolia* E TSC	Grows in mud in coastal saltmarsh and inland saline or brackish lake beds.	Yes No previous records in the locality. Potentially suitable habitat fringes the subject site adjacent to the SEPP 14 wetland.	Yes
Australian Saltgrass *Distichlis distichophylla* E TSC	A coloniser of damp saline soils; found at the edges of salt marshes and on low dunes.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Thick-lipped Spider-orchid *Caladenia tessellata* E TSC V EPBC	Generally found in grassy sclerophyll woodland on clay loam or sandy soils, though the population near Braidwood is in low woodland with stony soil.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Tangled Bedstraw *Galium australe* E TSC	In NSW Tangled Bedstraw has been found in moist gullies of tall forest, *Eucalyptus tereticornis* forest, coastal Banksia shrubland, and *Allocasuarina nana* heathland.	Yes Previous records are known from the southern boundary of the subject site and near Jemison's Point. While previous study has failed to located any individuals (NGH 2013), potentially suitable habitat may be present.	Yes

Species **Scientific Name** **Legal Status**	**Habitat**	**Likelihood Occurrence in Subject Site based on desktop analysis**	**Target Species for SIS**
Leafless Tongue Orchid *Cryptostylis hunteriana* V TSC V EPBC	Does not appear to have well defined habitat preferences and is known from a range of communities, including swamp-heath and woodland. The larger populations typically occur in woodland dominated by Scribbly Gum (*Eucalyptus sclerophylla*), Silvertop Ash (*E. sieberi*), Red Bloodwood (*Corymbia gummifera*) and Black Sheoak (*Allocasuarina littoralis*); appears to prefer open areas in the understorey of this community and is often found in association with the Large Tongue Orchid (*C. subulata*) and the Tartan Tongue Orchid (*C. erecta*).	No No previous records in the locality. No suitable habitat is present within the subject site.	No
East Lynne Midge-orchid *Genoplesium vernale* V TSC V EPBC	Grows in 'poorer' dry sclerophyll woodland and forest on the south coast of New South Wales between Mogo and Ulladulla. It is confined to areas with good drainage and shallow, low fertility soils.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Tall Knotweed *Persicaria elatior* V TSC V EPBC	This species normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance.	Yes No previous records in the locality. Potentially suitable habitat may be present within the subject site.	Yes
Warty Zieria *Zieria tuberculata* V TSC V EPBC	Warty Zieria grows in the Mt Dromedary and Tilba Tilba area where it grows in heath amongst rocky outcrops on rain forest edges and in tall forest and shrubland.	No No previous records in the locality. No suitable habitat is present within the subject site.	No

Species **Scientific Name** **Legal Status**	**Habitat**	**Likelihood Occurrence in Subject Site based on desktop analysis**	**Target Species for SIS**
Siah's Backbone *Streblus pendulinus* E EPBC	Found in warmer rainforests, chiefly along watercourses. The altitudinal range is from near sea level to 800 m above sea level. The species grows in well-developed rainforest, gallery forest and drier, more seasonal rainforest	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Austral Toadflax *Thesium australe* V TSC V EPBC	Occurs in grassland or grassy woodland often in association with Kangaroo Grass.	Yes Previous records are known from the southern boundary of the subject site and near Jemison's Point. While the previous study has failed to located any individuals (NGH 2013), potentially suitable habitat may be present.	Yes
Square Raspwort, Wingless Raspwort *Haloragis exalata subsp. Exalata* V TSC V EPBC	Square Raspwort appears to require protected and shaded damp situations in riparian habitats. It occurs in four widely scattered localities in eastern NSW. It is disjunct distributed in the Central Coast, South Coast and North Western Slopes botanical subdivisions of NSW.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Coast Groundsel *Senecio spathulatus* E TSC	Coast Groundsel grows on frontal dunes.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Waterwheel Plant *Aldrovanda vesiculosa* E TSC	Found free-floating in near-coastal shallow freshwater lagoons that are rich in organic matter.	No No previous records in the locality. No suitable habitat is present within the subject site.	No

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Chef's Cap Correa *Correa baeuerlenii* V TSC V EPBC	Occurs in riparian sites within forests of various eucalypts, including Silvertop Ash, Yellow Stringybark, Blue-leafed Stringybark and Spotted Gum or she-oak woodland. It may also be found in near-coastal rocky sites.	No No previous records in the locality. No suitable habitat is present within the subject site.	No
Bodalla Pomaderris *Pomaderris Bodalla* V TSC	On the south coast Pomaderris bodalla occurs in moist open forest along sheltered gullies or along stream banks	No No previous records in the locality. No suitable habitat is present within the subject site.	No
ENDANGERED ECOLOGICAL COMMUNITIES			
Littoral Rainforest and Coastal Vine Thickets of Eastern Australia E TSC CE EPBC	Occurs on sand dunes and on soil derived from underlying rocks. Stands on headlands exposed to strong wind-action may take the form of dense, wind-pruned thickets. Most stands occur within two kilometres of the sea, though are occasionally found further inland within reach of the maritime influence.	No No vegetation consistent with the determination of the NSW Scientific Committee for this EEC occurs within the subject site.	No
Lowland Grassy Woodland E TSC CE EPBC	Lowland Grassy Woodland communities are located in rainshadow areas receiving less rainfall than more elevated terrain that partially surrounds them, with mean annual rainfall typically in the range of 700-1100 mm.	No No vegetation consistent with the determination of the NSW Scientific Committee for this EEC occurs within the subject site.	No
Coastal Saltmarsh in the New South Wales North Coast, Sydney Basin and South East Corner Bioregions E TSC	Species composition varies with elevation and latitude, with Saltmarsh in southern NSW being generally more species-rich than further north.	No No vegetation consistent with the determination of the NSW Scientific Committee for this EEC occurs within the subject site.	No

Species Scientific Name Legal Status	Habitat	Likelihood Occurrence in Subject Site based on desktop analysis	Target Species for SIS
Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregion E TSC	It has a dense to sparse tree layer in which *Casuarina glauca* (swamp oak) is the dominant species northwards from Bermagui. Other trees including *Acmena smithii* (lilly pilly), *Glochidion* spp. (cheese trees) and *Melaleuca* spp. (paperbarks) may be present as subordinate species, and are found most frequently in stands of the community northwards from Gosford. Tree diversity decreases with latitude, and *Melaleuca ericifolia* is the only abundant tree in this community south of Bermagui. The understorey is characterised by frequent occurrences of vines, *Parsonsia straminea, Geitonoplesium cymosum* and *Stephania japonica* var. *discolor*, a sparse cover of shrubs, and a continuous groundcover of forbs, sedges, grasses and leaf litter.	Yes Vegetation within the subject site is consistent with the determination of the NSW Scientific Committee for this EEC.	Yes
Bangalay Sand Forest of the Sydney Basin and South East Corner Bioregion E TSC	Bangalay Sand Forest of the Sydney Basin and South East Corner bioregions typically has a dense to open tree canopy, approximately 5 - 20 m tall, depending on exposure and disturbance history. The most common tree species include Bangalay (*Eucalyptus botryoides*) and Coast Banksia (*Banksia integrifolia* subsp. *integrifolia*), while Blackbutt (*Eucalyptus pilularis*) and Lilly Pilly (*Acmena smithii*)	No No vegetation consistent with the determination of the NSW Scientific Committee for this EEC occurs within the subject site.	No

3.6 TARGET SPECIES

As one of the roles of an S IS is to determine which species, population or ecological communities may be utilising, or be present, on a development site, the previous sections of chapter 3 have completed a detailed initial assessment to determine the 'target species' for this SIS. These are listed within **Table 3**. In summary, the target species comprise:

- 23 species of fauna.
- Five species of flora.
- One endangered ecological community.

Subsequently, the field surveys were designed to specifically target these biota.

Table 3: Target species for this SIS.

SPECIES	SCIENTIFIC NAME	STATUS
FAUNA		
Green and Golden Bell Frog	*Litoria aurea*	Endangered
Golden-tipped Bat	*Kerivoula papuensis*	Vulnerable
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	Vulnerable
Eastern Freetail-bat	*Mormopterus norfolkensis*	Vulnerable
Southern Myotis	*Myotis macropus*	Vulnerable
Square-tailed Kite	*Lophoictinia isura*	Vulnerable
Striated Fieldwren	*Calamanthus fuliginosus*	Endangered
Gang-gang Cockatoo	*Callocephalon lathami*	Vulnerable
Glossy Black-cockatoo	*Calyptorynchus lathami*	Vulnerable
Barking Owl	*Ninox connivens*	Vulnerable
Masked Owl	*Tyto novaehollandiae*	Vulnerable
Olive Whistler	*Pachycephala olivacea*	Vulnerable
Pink Robin	*Petrocia rodinogaster*	Vulnerable
Scarlet Robin	*Petrocia boodang*	Vulnerable
Flame Robin	*Petrocia phoenicea*	Vulnerable
Varied Sittella	*Daphoenositta chrysoptera*	Vulnerable
Little Lorikeet	*Glossopsitta pusilla*	Vulnerable
Little Eagle	*Hieraaetus morphnoides*	Vulnerable
Regent Honeyeater	*Anthochaera Phrygia*	Critically Endangered
Eastern Pygmy-possum	*Cercartetus nanus*	Vulnerable
Southern Brown Bandicoot	*Isoodon obesulus obesulus*	Endangered
Long-nosed Potoroo	*Potorous tridactylus*	Vulnerable
White-footed Dunnart	*Sminthopsis leucopus*	Vulnerable
FLORA		
Narrow-leafed Wilsonia	*Wilsonia backhousei*	Vulnerable
Round-leafed Wilsonia	*Wilsonia rotundifolia*	Endangered

SPECIES	SCIENTIFIC NAME	STATUS
Tangled Bedstraw	*Galium australe*	Endangered
Tall Knotweed	*Persicaria elatior*	Vulnerable
Austral Toadflax	*Thesium australe*	Vulnerable
ENDANGERED ECOLOGICAL COMMUNITIES		
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basis and South East Corner Bioregions		

4 SURVEY

4.1 REQUIREMENT TO SURVEY

Chapter 4 specifically outlines the survey methodology that was used to conduct flora and fauna surveys to address the DGR (**Appendix A**). Surveys were conducted in accordance with the detailed survey methodology and minimum effort provided within the DGR for each target species, and in consideration with the draft Threatened Biodiversity Survey and Assessment: Guidelines for Development and Activities (DEC 2004) with the exception of frogs which is modified by the Threatened Species Survey and A ssessment Guidelines: Field Survey Methods for Fauna – Amphibians (DECC 2009), as well as the Threatened Species Assessment Guidelines: the Assessment of Significance (DECC 2007), and the Biobanking Assessment Methodology (BBAM) (DECCW 2010a).

The aim of all surveys completed was to establish the presence of threatened species, populations and communities as listed under the TSC Act and EPBC Act and within the DGR. It is acknowledged that despite extensive and c omprehensive field surveys, non-detection does not confirm that the species is absent and it is common in any biodiversity survey for false absences or non-detectability to occur (MacKenzie *et al.* 2002). In any case, this SIS applies the precautionary principle when determining whether a threatened species, population and/or community and their habitats are potentially present.

4.2 DOCUMENTATION OF SURVEY EFFORT AND TECHNIQUE

4.2.1 Stratifying the subject site

The field survey design was guided by the stratification of the study area into relatively homogenous units. A site visit was used to inspect the vegetation communities and fauna habitats present prior to the design of the field survey. This approach allowed for the systematic sampling of all vegetation communities and habitats present.

4.2.2 Flora survey techniques and survey sites

Comprehensive flora surveys were completed within the subject site, study area and locality during the following periods:

- 30 January 2014 – 4 February 2014.
- 16 February 2014 – 21 February 2014.

Three survey methods were employed. These being:

- Random meander surveys.
- BBAM Plot-transect surveys.
- Aerial Photograph Intepretation/ Visual Inspection.

Random meander surveys

All flora species encountered along the length of the random meander surveys were identified to genus and species level where practicable. Specimens were collected for species requiring further identification using various references. Vegetation communities were also compared with existing mapping and community descriptions. Particular attention was paid to targeting likely threatened flora species and ecological communities.

BBAM Plot-transect surveys

BBAM Plot-transect surveys were used to collect vegetation data to enable comparison to the BioMetric vegetation type and benchmark databases. At least one plot-transect site was sampled per vegetation type/zone within the study area. One further site was sampled in SOFF EEC outside of the study area to compare condition of SOFF EEC within the study area using BBAM.

Aerial Photograph Interpretation/ Visual Inspection

Flora surveys in the locality were largely restricted to Air Photograph Interpretation (API) and Visual Inspections from a distance. This approach was chosen given that in many portions of the locality, access was difficult or restricted due to land tenure. However, given our knowledge of the Biometric Vegetation Types database and associated Benchmark data which is used to apply vegetation condition, this approach was justified given that virtually all SOFF EEC remnants containing overstorey vegetation within 25 percent of the benchmark, would be in the moderate-good condition rank.

4.2.3 Fauna survey techniques and survey sites

Comprehensive fauna surveys were completed within the subject site, study area and locality during the following periods:

- 30 January 2014 – 4 February 2014.
- 16 February 2014 – 21 February 2014.
- 24 February 2014 – 27 February 2014.
- 1 March 2014 – 5 March 2014.
- 8 March 2014 – 11 March 2014.

Survey methods and effort completed during these survey periods included diurnal bird surveys with occasional diurnal bird call playback, pitfall trapping, elliot trapping, nocturnal surveys including spotlighting, call playback and echolocation call recording, crushed cone surveys, bandicoot digging surveys, herpetofauna surveys, hollow-bearing tree transects and habitat assessments.

Diurnal bird surveys

Surveys to determine the presence of diurnal birds within the study area and locality were completed at 50 locations. The survey methodology was guided by the widely accepted 'standardized method' (Watson 2003) using the point method with the focus being the target

species. Surveys were conducted primarily in the early and mid-morning to coincide with peak bird activity and to avoid the afternoon sea-breeze which heavily influenced the afternoon bird activity. Some surveys were completed prior to dusk. A single observer using the point survey method identified species by sight and by vocalisation during each field survey.

The locations of all diurnal bird surveys are provided for the study area (**Map 10**) and within the locality (**Map 11**). Total survey effort for diurnal bird surveys is detailed within **Table 4**.

Pitfall trapping

Pitfall trapping using 40 centimetre deep plastic buckets was employed to target White-footed Dunnart and Eastern Pygmy-possum. Pitfall buckets were set in clusters of three, with each bucket being around 5 metres apart. A total of five pitfall clusters (ie, 15 buckets) were established along a 200 metre transect.

A total of six transects were established during this SIS. Two of these were located within the subject site, while the remainder were directly adjacent to the subject site and across the locality. The previous work of Korn (1999) guided the selection of transects within the locality. A seventh transect was to be established, however, due to a machinery breakdown, only one cluster (ie 3 buckets) on that transect, were installed and operated. With OEH approval, an additional line of Elliot traps was established as a replacement. A total of 31 pitfall clusters were used during this SIS.

The locations of all pitfall trap clusters are provided for the study area (**Map 10**) and within the locality (**Map 11**). Total survey effort using pitfall trapping in this study is detailed within **Table 4**.

Elliot trapping

Elliot 'Type A' traps were utilised to target White-footed Dunnart and Eastern Pygmy-possum. Each trap was baited with an attractant comprising peanut butter, rolled oats and honey when in operation. Given the small weight and dimensions of the target species, the trigger plates were set at a high level of sensitivity and bent downward to minimise any individuals entering the trap under the trigger plate.

Three separate locations during each survey period were targeted using this method within the study area. At each location, 25 elliot traps were set along a varying length transect or in the case of the northern portion of the study area, a single transect was split into five smaller transects for efficiency and site coverage.

The locations of all Elliot trap surveys are provided for the study area (**Map 10**) and within the locality (**Map 11**). Total survey effort for Elliot trap surveys is detailed within **Table 4**.

Nocturnal surveys

Nocturnal surveys comprising call playback, spotlighting and echolocation call recording were conducted at a total of 20 sites. Each Nocturnal survey commenced with call playback

of target species as well as other species known from the locality. These were Masked Owl, Barking Owl, Powerful Owl, Sooty Owl and Yellow-bellied Glider. Each call was played for about two minutes followed by a listening period of two minutes. Spotlighting was undertaken using a hand-held 50W spotlight by two persons at the conclusion of the call playback, with one of the personnel carrying an Anabat SD1 echolocation call recording unit.

The locations of all Nocturnal surveys are provided for the study area (**Map 10**) and within the locality (**Map 11**). Total survey effort for Nocturnal surveys is detailed within **Table 4**.

Crushed cone surveys

Surveys for the feeding signs of Glossy Black-cockatoo were completed at 38 locations during this study. Surveys were undertaken within both the study area and the locality.

Each survey consisted of an active search for crushed Black She-oak cones using a 10 metre radius for a point location. Each survey searched an area of about 314 m^2 search over a 20 minute period.

The locations of all Crushed cone surveys are provided for the study area (**Map 10**) and within the locality (**Map 11**). Total survey effort for Crushed cone surveys is detailed within **Table 4**.

Digging surveys

Surveys for evidence of ground-dwelling mammals such as bandicoots and potoroos was undertaken at 46 sites in both the study area and the locality.

Each survey consisted of an active search for diggings consistent with those made by bandicoot and potoroos as they search for food resources beneath the ground surface. At each survey point location, the search area extended to a 10 metres radius of each point. Each survey searched an area of about 314 m^2 search over a 10 minute period.

The locations of all Digging surveys are provided for the study area (**Map 10**) and within the locality (**Map 11**). Total survey effort for Digging surveys is detailed within **Table 4**.

Herpetofauna surveys

Herpetofauna surveys were completed at 32 sites within and adjacent to the study area. Each site was systematically searched for a period of 30 minutes for active and inactive animals. Fallen timber, loose bark, tree and ground hollows, and loose soil were extensively searched (Blomberg and Shine 1996).

Where standing water or wetland plants were present, call playback using a pre-recorded call of the Green and Golden Bell Frog was employed. Additionally, searches for tadpoles using a hand-held sweep net were also undertaken wherever water was present. These survey methods are consistent with recommended detection techniques for this species (DECC 2009; DEWHA 2010b).

The locations of all Herpetofauna survey are provided (**Map 10**). Total survey effort for Herpetofauna surveys is detailed within **Table 4**.

Motion activated infrared cameras

Motion-activated Infrared cameras are well known for their efficiency in detecting fauna species without the need to set traditional traps (Claridge *et al.* 2010; Paull *et al.* 2012). RECONYX PC900 HyperFire Professional High Output motion-activated infrared cameras were activated at four locations within the study area between 30 January – 16 February 2014.

Cameras were set on high sensitivity with five images captured per motion detected. Cameras were pointed to three bait stations; one containing a mixture of rolled oats, peanut butter and honey, while the remaining two stations each comprised a sponge soaked in black truffle oil.

The locations of all Motion-activated infrared cameras are provided for the study area (**Map 10**). Total survey effort for this method is detailed within **Table 4**.

Echolocation call recording surveys

In addition to the Nocturnal surveys where a hand-held echolocation call recording unit was employed during spotlighting, stationary Echolocation call recording was also completed at a total of six sites. At each site, a single Anabat SD1 echolocation recording unit was left activated for five consecutive nights. The use of Echolocation call recording units is consistent with state and commonwealth guidelines for surveying microchiropteran bats (DEC 2004; DEWHA 2010a).

The locations of all Echolocation call recording surveys are provided for the study area (**Map 10**) and within the locality (**Map 11**). Total survey effort for Echolocation call recording surveys is detailed within **Table 4**.

All data collected from each Anabat SD1 were then analysed into bat and non-bat origin files. These files were then analysed using the software package AnalookW guided by the 'Bat Calls of New South Wales: Region based guide to echolocation calls of microchiropteran bats' (Pennay *et al.* 2004) and the EnviroKey reference call collection. It should be noted that members of the *Nyctophilus* genus were unable to be identified to species level due to a lack of differentiation between species and are identified to genus level only. Anabat analysis was conducted by Principal Ecologist Steve Sass, who has analysed more than 30,000 files from southern NSW.

A call was defined as a sequence of three or more consecutive pulses of similar frequency. Due to variability in the quality of calls and the difficulty in distinguishing some species the identification of each call was assigned a confidence rating as follows:

D = Definite: Species identification not in doubt.

PR = Probable: Call most likely to represent a particular species, but there exists a low probability of confusion with species of similar call types.

PO = Possible: Call characteristics are comparable with the species, but there exists a reasonable probability of confusion with one or more bat similar species or the quality or length of call prohibits a confident identification.

Those calls unable to be identified due to poor call quality resulting in a lack of diagnostic features were assigned 'Unidentifiable'.

Hollow-bearing tree transects

Transects to document the presence of hollow-bearing trees (HBT) and the diversity of hollows in each, were completed at 13 locations within the study area and locality. The locations of transects was selected in representative habitat to provide an accurate analysis of the presence of HBT. Each transect was about 100 metres in length.

The locations of all HBT transects are provided for the study area (**Map 10**) and within the locality (**Map 11**). Total survey effort for HBT transects is detailed within **Table 4**.

Habitat assessments

A detailed Habitat assessment was undertaken at 30 sites during this study. At each site, a 20 metre by 20 metre quadrat in representative habitat was selected. The Habitat assessment collected data on cover scale, the number and length of varying size classes of fallen timber, shrub height and density, and the presence or absence of mistletoe, hollows, loose bark on trees, soil crevices, and prickly flora. During each Habitat assessment, any scats observed were identified using '*Tracks, Scats and Other Traces: A field guide to Australian Mammals*' (Triggs 2008).

The locations of all Habitat assessment are provided for the study area (**Map 10**) and within the locality (**Map 11**). Total survey effort for Habitat assessments is detailed within **Table 4**.

Table 4: Summary of the total fauna survey methods and effort employed during the SIS.

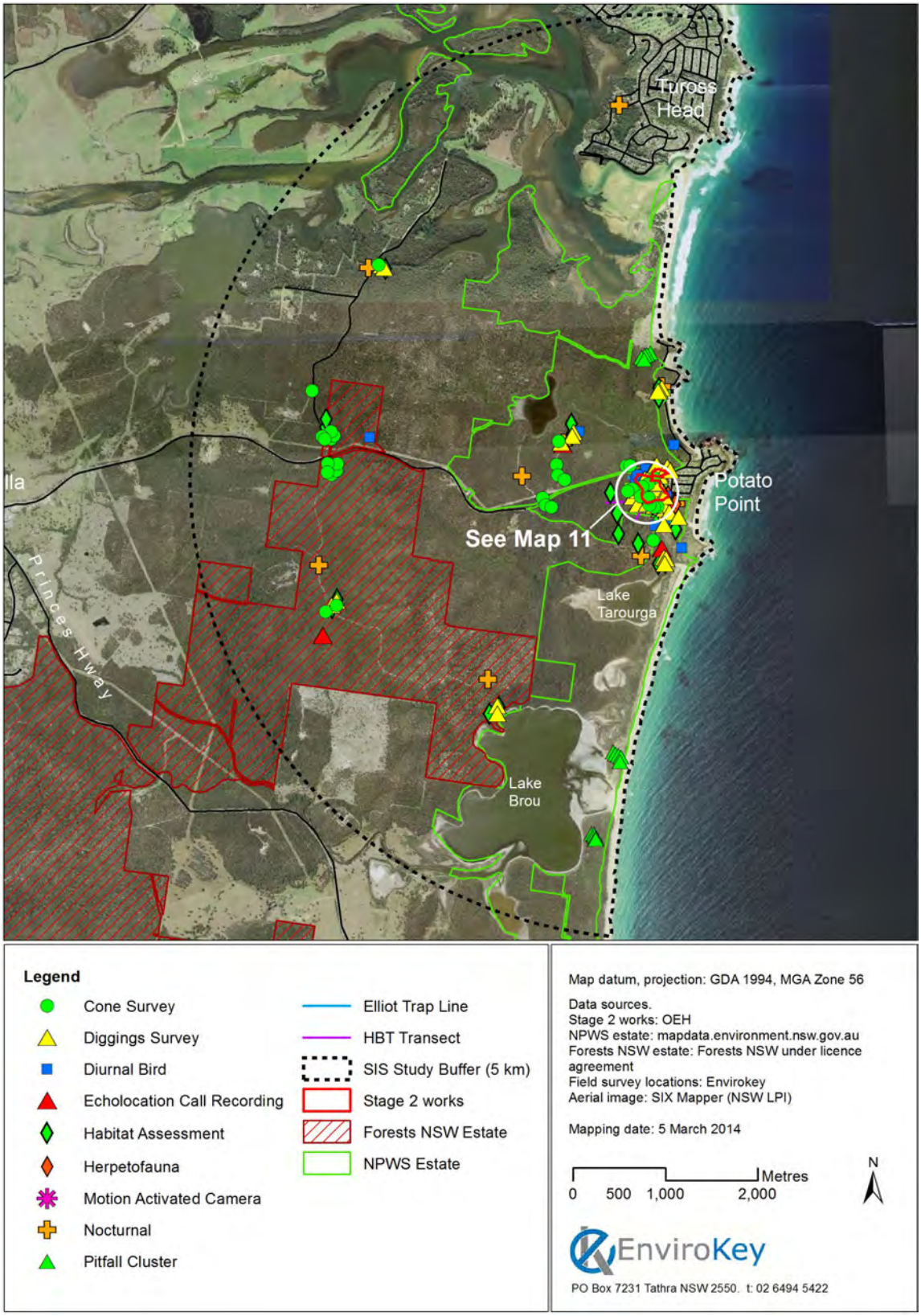
SURVEY METHOD	SURVEY PERIOD	SURVEY SITES	SURVEY EFFORT	TOTAL SURVEY EFFORT
Diurnal bird survey	30 January – 4 February 2014	33 point surveys for 20 minutes each	660 minutes	50 point surveys over 1,000 person minutes
	16 – 21 February 2014	17 point surveys for 20 minutes each	340 minutes	
Pitfall trapping	30 January – 4 February 2014	30 pitfall buckets over five consecutive nights	150 trap nights	1,182 trap nights
	16 – 21 February 2014	30 pitfall buckets over five consecutive nights	150 trap nights	
	24 – 27 February	45 pitfall buckets over	135 trap nights	

SURVEY METHOD	SURVEY PERIOD	SURVEY SITES	SURVEY EFFORT	TOTAL SURVEY EFFORT
	2014	three consecutive nights		
	25-27 February 2014	48 pitfall buckets over two consecutive nights	96 trap nights	
	1 – 5 March 2014	93 pitfall buckets over four consecutive nights	372 trap nights	
	8 – 11 March 2014	93 pitfall buckets over three consecutive nights	279 trap nights	
Crushed cone survey	30 January – 4 February 2014	4 sites using 10 m radius from a point (314 m^2 search area) over 20 minutes each	1,256 m^2 searched over 80 minutes	11,932 m^2 searched over 760 person-minutes
	16 – 21 February 2014	34 sites using a 10 m radius from a point (314 m^2 search area) over 20 minutes each	10,676 m^2 searched over 680 minutes	
Elliot trap survey	30 January – 4 February 2014	25 elliot traps on each transect. Three transects over five consecutive nights	375 trap nights	1,150 trap nights
	16 – 21 February 2014	25 elliot traps on each transect. Three transects over five consecutive nights	375 trap nights	
	25 – 27 February	25 elliot traps on each transect. Two transects over two consecutive nights	100 trap nights	
	1 – 5 March 2014	25 elliot traps on each transect. Two transects over four consecutive nights	200 trap nights	
	9 – 11 March 2014	25 elliot traps on each transect. Two transects over two consecutive nights	100 trap nights	
Nocturnal survey	30 January – 4 February 2014	11 sites conducting call playback, echolocation call recording and spotlighting for 60-person minutes at each site.	660 person-minutes	1,200 person-minutes

SURVEY METHOD	SURVEY PERIOD	SURVEY SITES	SURVEY EFFORT	TOTAL SURVEY EFFORT
	16 – 21 February 2014	9 sites conducting call playback, echolocation call recording and spotlighting for 60-person minutes at each site	540 person-minutes	
Digging survey	30 January – 4 February 2014	15 sites using a 10 m radius from a point (314 m^2 search area) over 10 minutes each	4,710 m^2 searched over 150 minutes	14,444 m^2 searched over 460 person-minutes
	16 – 21 February 2014	31 sites using a 10 m radius from a point (314 m^2 search area) over 10 minutes each	9,734 m^2 searched over 310 minutes	
Herpetofauna survey	30 January – 4 February 2014	32 sites searched for 30 person-minutes each.	960 person-minutes	960 person-minutes
Motion-activated infrared camera	30 January – 16 February 2014	4 sites with one camera at each site for 18 consecutive nights	72 camera nights	72 camera nights
Echolocation call record survey	30 January – 4 February 2014	3 sites with one Anabat SD1 activated at each site for five consecutive nights	15 recording nights	30 recording nights
	16 – 21 February 2014	3 sites with one Anabat SD1 activated at each site for five consecutive nights	15 recording nights	
Hollow-bearing tree transect	16 – 21 February 2014	13 transects each about 100 m in length for about 20 minutes each.	1,300 metres of transects over a period of about 260 person-minutes	1,300 metres of transects over a period of about 260 person-minutes
Habitat assessment	16 – 21 February 2014	25 sites for about 20 minutes at each site.	500 person-minutes	600 person-minutes
	10 March 2014	5 sites corresponding with some of the pitfall clusters used to target White-footed Dunnart. About 20 minutes at each site.	100 person-minutes	


Legend
Cone Survey
Diggings Survey
Diurnal Bird
Echolocation Call Recording
Habitat Assessment
Herpetofauna
Motion Activated Camera
Nocturnal
Pitfall Cluster
Elliot Trap Line
HBT Transect
NPWS Estate
Stage 2 works
Map datum, projection: GDA 1994, MGA Zone 56
Data sources.
Stage 2 works: OEH
NPWS estate: mapdata.environment.nsw.gov.au
Forests NSW estate: Forests NSW under licence agreement
Field survey locations: Envirokey
Aerial image: SIX Mapper (NSW LPI)
Mapping date: 5 March 2014
0 25 50 100 Metres
N
EnviroKey
PO Box 7231 Tathra NSW 2550. t: 02 6494 5422

Map 10: Locations of all fauna surveys within and directly adjacent to the study area.



Map 11: Locations of all fauna surveys in the locality.

4.2.4 Weather conditions during the survey periods

Weather conditions during each of the five fauna survey periods were relatively conducive to threatened species detection with mild temperatures and some precipitation. Data from the nearest weather station (Narooma) reveals that the minimum temperature recorded was 13.0 degrees C on 21 February, while the highest temperature was 27.2 degrees C. Light rainfall was recorded during the later surveys, with the highest rainfall event occurring immediately after the survey team specifically closed all traps on the morning of the 27 February for animal welfare concerns. Later that day, 19 mm of rain was recorded.

Table 5: Weather conditions during each of the fauna survey periods from the Narooma Weather Station.

Date	Temps		Rain	9:00 AM					3:00 PM				
	Min	Max		Temp	RH	Cld	Dir	Spd	Temp	RH	Cld	Dir	Spd
	°C	°C	mm	°C	percent	8th	km/h		°C	percent	8th	km/h	
30-Jan	18.1	24.3	0	21	80	3	NE	13	23.5	73	3	N	26
31-Jan	17.9	25.7	0	21.1	83	3	Calm		25	67	5	S	26
1-Feb	18.2	25.8	1.8	22	74	2	N	9	24.1	75	1	NE	9
2-Feb	19.4	23.4	0	21.1	90	1	N	11	23	76	0	NE	22
3-Feb	18.1	23.5	0	20.9	76	1	NE	24	22.7	70	1	N	24
4-Feb	16.4	20	0.4	18.5	62	8	S	22	19.5	59	8	S	31
16-Feb	18.7	25	8	23.7	79	5	NW	6	22.5	67	8	S	35
17-Feb	15.7	24.6	0	20.2	62	1	SW	4	24	64	1	SE	9
18-Feb	17.4	21.5	0	19.5	82	1	NE	13	21	77	1	NE	24
19-Feb	17.6	23	0	19.4	95	2	NE	9	21.4	93	8	NW	31
20-Feb	16.6	27.2	1.6	19.6	41	2	SW	11	26	24	2	NW	19
21-Feb	13	23	0	17.1	61	0	SW	6	22.2	52	0	E	13
24-Feb	14.9	23.8	0	18.5	81	0	NW	4	22.8	66	0	SE	11
25-Feb	15.8	23.4	0	21.1	79	1	WNW	15	23	79	2	NE	30
26-Feb	19.5	23	0	21.1	81	8	S	22	19.8	85	8	S	13
27-Feb	15.3	19.4	19	16.5	87	8	S	7	19	56	7	E	9
1-Mar	16.2	22	2.8	17.2	98	8	SW	11	21	82	8	NE	6
2-Mar	15.4	24.5	0	18.4	82	1	W	7	24.1	68	1	NE	7
3-Mar	16.2	25.2	0	18.5	90	4	W	9	21.6	77	1	NE	26
4-Mar	17.5	22.3	0	20.6	83	1	NNE	9	22	77	2	NE	35
5-Mar	16.8	24.6	0	19.6	85	2	NNW	9	23.5	75	7	NE	15
8-Mar	17.2	25.9	7.5	20	86	6	W	11	24.5	76	5	NE	15

Date	Temps		Rain	9:00 AM					3:00 PM				
	Min	Max		Temp	RH	Cld	Dir	Spd	Temp	RH	Cld	Dir	Spd
	°C	°C	mm	°C	percent	8th	km/h		°C	percent	8th	km/h	
9-Mar	19.2	25.1	7.8	19.4	95	8	Calm		22.5	82	2	N	22
10-Mar	16.8	24.6	0	20.1	76	1	NE	9	23.5	77	1	N	22
11-Mar	17.2	25.5	0	20	89	1	NNE	11	25	73	4	N	17

4.3 SURVEY RESULTS

4.3.1 General Flora

A total of 107 flora species were recorded from the study area, comprising 95 native species and 12 exotic species. The full flora species list is provided within **Appendix B**.

4.3.2 Biometric Vegetation Types

Vegetation types were identified and mapped with respect to the NSW Vegetation Types database within the Biometric methodology. Much of the vegetation within the study area is ecotonal due to subtle variations in landscape position, soil characteristics and hydrology. Therefore, the vegetation types assigned are a 'best fit', with some sections of each map unit sharing affinities with other vegetation types.

In light of the above, we have mapped the study area into four distinct zones, three of which comprise native vegetation and one which covers existing cleared land. The spatial distribution of each community is presented in **Map 12** and the extent of each detailed within **Table 6**. The three Biometric vegetation types are:

- SR649 Swamp Oak – Prickly Tea-tree – Swamp Paperbark swamp forest on coastal floodplains
- SR642 Spotted Gum – Grey Ironbark – Woollybutt grassy open forest on coastal flats (modified)
- Ecotonal vegetation (SR642 dominant, some affinities with SR649, SR512)

Table 6: Extent of Biometric Vegetation Types within the study area.

Vegetation type	Extent in study area (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	3.88
SR642 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats - Modified	2.21

Vegetation type	Extent in study area (hectares)
Ecotonal vegetation (SR642 dominant, some affinities with SR649, SR512^)	0.93
Cleared land	0.20
Total	7.22

SR649: Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains

Distribution and habitat: Covers all low lying land along drainage-lines where waterlogged and/or brackish soil conditions prevail (topsoil of loam texture, with abundant organic matter, and of dark grey/black colour indicating somewhat anaerobic condition). This community also extends immediately upslope for a short distance before grading into other vegetation types

Vegetation description: Low Forest (to 12 metres high, 45-60 percent foliage cover dominated by Swamp Oak (*Casuarina glauca)* (**Figure 8**). Swamp Paperbark (*Melaleuca ericifolia*) is a co-dominant in minor areas, however it is mostly scattered throughout the (sparse) mid-stratum, as are Hillock Bush (*Melaleuca hypericifolia*) and Veined Mock-olive (*Notelaea venosa*) to a lesser extent. Coast Banksia (*Banksia integrifolia*) is present in the more elevated outer fringes of this map unit.

A thick litter layer from the Swamp Oak covers much of the ground which, along with low light penetration, has resulted in a sparse groundcover layer containing grasses, sedges, rushes, forbs and ferns. Occasional dense thickets of Saw Sedge (*Gahnia* spp.) are present. Dominant groundcover species include Bare Twig-rush (*Baumea juncea*), Spiny-headed Mat-rush (*Lomandra longifolia*), Basket Grass (*Oplismenus imbecillis*), various Saw Sedges (*Gahnia* spp.), Twining glycine (*Glycine clandestina*), Indian Pennywort (*Centella asiatica*) and Kidney Weed (*Dichondra repens*). The shrubs Eastern Nightshade (*Solanum pungetium*) and Devil's Needles (*Solanum stelligerum*) are quite common.

Affinities with other vegetation types: Small patches of vegetation within this map unit share affinities with two other very similar vegetation types as listed in the BioMetric Vegetation Types database. These are: (1) SR650 Swamp Oak swamp forest fringing estuaries, i.e. at the lake margin at the south-eastern end of the subject site where more salt tolerant species occur including Sea Rush (*Juncus kraussii*), Swamp Weed (*Selliera radicans*), Creeping Brookweed (*Samolus repens*), Creeping Monkey-flower (*Mimulus repens*), and Samphire (*Sarcocornia quinqueflora* subsp. *quinqueflora*); and (2) SR651 Swamp Paperbark - Swamp Oak tall shrubland on estuarine flats, which is found in patches along the drainage line proper such as at the road crossing in the centre of the site and near the dam at the western end of the site. SR651 is at least co-dominated by Swamp Paperbark (*Melaleuca ericifolia*). The occurrence of these two vegetation types is limited – therefore it was deemed impractical to map them separately from SR649 (and of no consequence in terms of

threatened ecological communities as all three vegetation types represent the one ecological community).

Condition: Results from the plot/transect survey site and the general flora survey revealed condition in terms of vegetation structure and composition is typical for this vegetation type (i.e. compared to regional vegetation mapping of Tozer *et al*. (2006).

With regard to the Biobanking Assessment Methodology, the vegetation meets the definition of native vegetation that is in 'moderate-good condition' as the canopy cover is >25 percent of the lower benchmark for this vegetation type in the BioMetric benchmarks database. A total of 32 native plant species were recorded within the 20 metre x 20 metre BioMetric plot (the benchmark is seven). No hollow-bearing trees were found in the plot (the benchmark is two) – this is probably due to the lack of eucalypt species within the plot, as Swamp Oak trees do not normally form hollows.

One Blackberry (*Rubus fruticosus* sp. agg.) seedling was recorded within the plot-transect site. Other than this, weeds were only present at the fringes of this map unit where competition from dense vegetation and leaf litter diminishes and disturbance is ongoing, e.g. near roads, mown strips and where garden escapees are present (**Appendix B**).

Historical aerial photography taken in 1981 shows that much of the land surrounding Potato Point comprised cleared farmland (NGH 2013). It is noted, from that photograph however, that much of the land we have mapped as SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains was covered by woody vegetation at that time. By 1999, this area was covered by quite dense woody vegetation. Based on this analysis, the core of trees are greater than 33 years old. Despite previous land use, the vegetation is in good condition when compared to the same vegetation in the wider locality.

BBAM Site Value Score: 60

Figure 8: SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains.

SR642: Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats – Modified

Distribution and habitat: Occurs upslope of drainage depressions, primarily to the west of Jemison's Point Road (**Map 12**). It grades into the Swamp Oak vegetation at its downslope margin, generally quite abruptly, however the patch on the eastern side of Jemison's Point Road at the southern end of the site is ecotonal with the Swamp Oak vegetation.

The soil profile shows a shallow sandy loam topsoil, which abruptly develops into heavy clay subsoil with shale fragments. These are the typical soil characteristics for Spotted Gum dominated vegetation.

Vegetation description: The map unit is defined as a modified variant of SR642 due to (a) the strip to the west of Jemison's Point Road being maintained as an assess protection zone (i.e. maintained in a sparse state) and (b) remaining portions comprising relatively young regrowth (historical aerial photography – page 3 of the Stage 1 REF - shows mostly cleared land in 1981 and fairly sparse regrowth by 1999). The dominant canopy species is Spotted Gum (*Corymbia maculata*) with Grey Ironbark (*Eucalyptus paniculata*) also present (**Figure 9**). A small number of Woollybutt (*Eucalyptus longifolia*) were recorded at the western extremity of this map unit.

A single Bangalay (*Eucalyptus botryoides*) and a single Old-man Banksia (*Banksia serrata*) were recorded in this map unit close to the drainage line on the western side of Jemison's Point Road. The presence of these two individuals growing side by side and the scattered Coast Banksia (*Banksia integrifolia*) may be the reason that this vegetation was considered Coastal Sand Forest using the SCIVI classification in the previous study of NGH (2013). However, our study has shown these species to represent only a very minor component of the vegetation, with Spotted Gum clearly being the dominant canopy species. Further, it is noted that Bangalay is listed as a main associated species for the subject vegetation type (SR642) in the BioMetric vegetation type database.

The mid stratum is very sparse. The main shrub/small trees species present are Black She-Oak (*Allocasuarina littoralis*), various *Acacia* species, Coast Banksia (*Banksia integrifolia*), Finger Hakea (*Hakea dactyloides*) and Narrow-leaved Geebung (*Persoonia linearis*).

The groundcover layer possesses a relatively dense cover of Bracken Fern (*Pteridium esculentum*) which coincides with disturbance created by slashing the area periodically for bushfire protection management. Numerous small native shrubs are present including Rough Guinea Flower (*Hibbertia aspera*), Hoary Guinea Flower (*Hibbertia obtusifolia*) and Slender Rice Flower (*Pimelea linifolia*). Grasses are dominated by Blady Grass (*Imperata cylindrica*), with occasional Three-awn Speargrass (*Aristida vagans*), Wiry Panic (Entolasia stricta), Bushy Hedgehog-grass (*Echinopogon caespitosus*), Tussock grass (*Poa meionectes*), Paddock Lovegrass (*Eragrostis leptostachya*) and Kangaroo Grass (*Themeda australis*). Common Couch (*Cynodon dactylon*) is also present. While this species can compete aggressively in certain disturbed habitats, it is noted that it is gazetted as a native species in NSW (PlantNET 2014) – not an exotic flora species as listed in the Stage 1 REF (NGH 2013). Forbs in this vegetation type include Indian Pennywort (*Centella asiatica*) and

Kidney Weed (*Dichondra repens*). Spiny-headed Mat-rush (*Lomandra longifolia*) and Saw Sedge (*Gahnia radula*) are common in the wetter area to the east of Jemison's Point Road.

Condition: An Asset Protection Zone (APZ) of around 20 metres in width occurs directly to the west of Jemison's Point Road. This is maintained by underscrubbing as well as the canopy layer being thinned. Based on historical air photographs, this vegetation community has been previously cleared. Despite this, weeds are few and mainly only occur next to the existing road. The groundcover layer in the APZ has a relatively dense cover of Bracken Fern (*Pteridium esculentum*) which is a typical response to periodic slashing of the understorey. The portion to the east of the road is not maintained as an APZ. It has a dense understorey but lacks mature trees as it was also previously cleared.

BBAM Site Value Score: 54

Figure 9: SR642 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats - Modified.

Ecotonal vegetation (SR642 dominant, some affinities with SR649, SR512)

This vegetation type is somewhat similar to SR642 as described above, but it does share some affinities with two other vegetation communities (**Figure 10**). It occurs north of Potato Point Road (**Map 12**).

This community occurs upslope of a patch of SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest and is ecotonal with that community. It also shows some affinity with SR512 Bangalay - Old-man Banksia open forest on coastal sands based on the presence of Coast Banksia (*Banksia integrifolia*) (within this map unit) and scattered Bangalay trees nearby the map unit. However, based on the presence of large Spotted Gum tree within this map unit and a Woollybutt tree just beyond the current extent, this vegetation

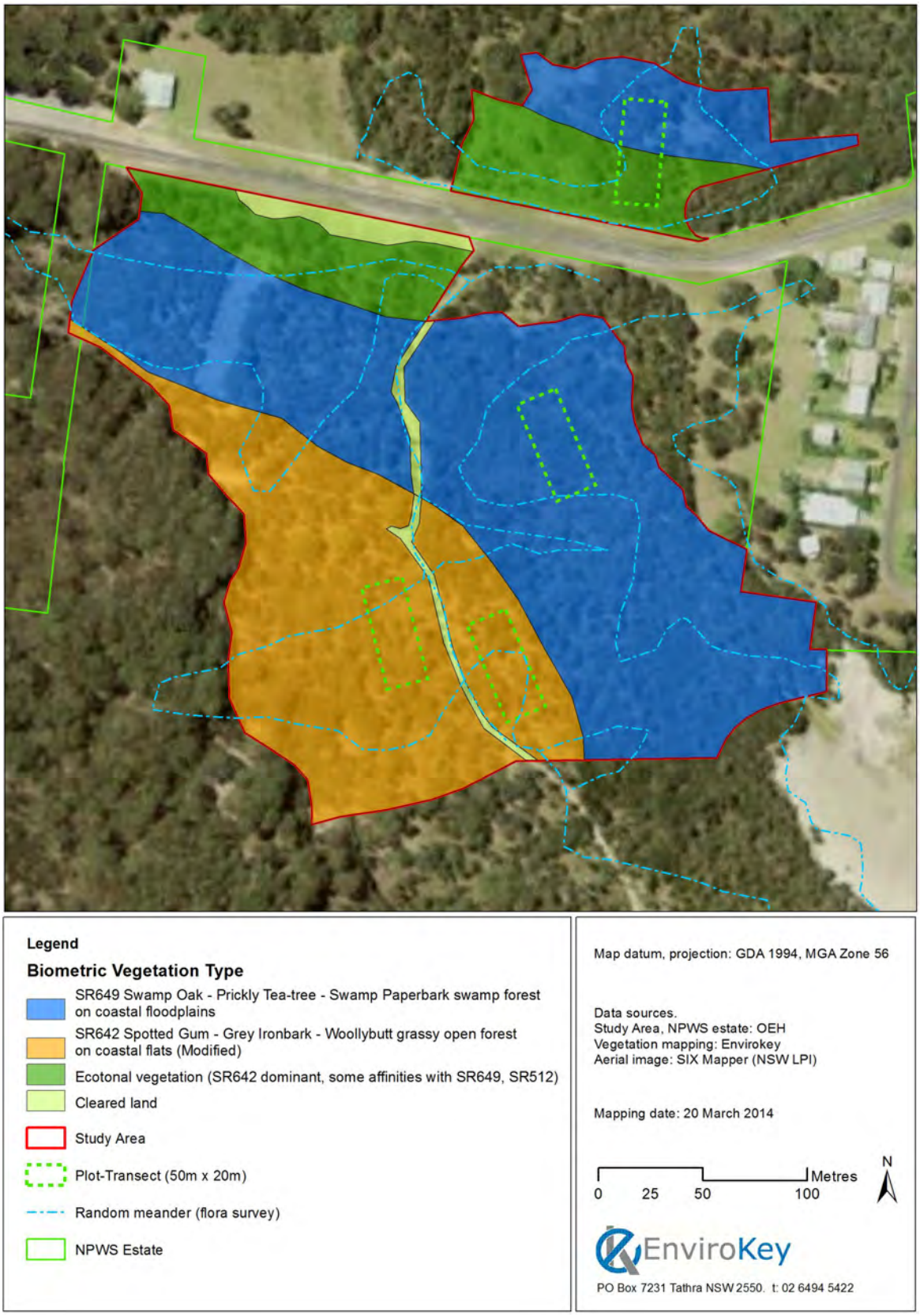
is most closely aligned to SR642. Further, Bangalay is one o f the main associated overstorey species for SR642.

BBAM Site Value Score: 56

Figure 10: Ecotonal vegetation (SR642 dominant, some affinities with SR649 and SR512).

Cleared land

While not a Biometric Vegetation Type, cleared land occurs within the study area (**Map 12**). A small area of existing cleared land occurs in the northern section of the study area, while the footprint of Jemison's Point Road is also consistent with the Biometric definition. Where vegetation is present, these areas comprise grassland, dominated by exotic species covering at least 50 percent. Dominant species include Buffalo Grass (*Stenotaphrum secundatum*), Paspalum (*Paspalum dilatatum*) and Shivery Grass (*Briza minor*). Other exotic flora include Spear Thistle (*Cirsium vulgare*) and Catsear (*Hypochaeris radicata*).



Map 12: Vegetation communities of the study area.

4.3.3 General fauna

The field surveys detected the presence of a total of 111 fauna species in the study area and the locality. These comprised:

- 67 species of bird.
- 28 species of mammal (which includes 14 species of bat and three introduced species).
- nine species of reptile.
- seven species of frog.

Of these 111 species, 89 species were detected within the boundaries of the study area. These comprised:

- 54 species of bird.
- 20 species of mammal.
- nine species of reptile.
- six species of frog.

A full list of the fauna detected during the field surveys and whether this was in the study area of the locality is provided in **Appendix C.**

4.3.4 Threatened species survey results

4.3.4.1 Target flora species

None of the five target flora species were found during the extensive targeted field surveys of the study area.

4.3.4.2 Target fauna species

A total of 11 threatened fauna species were detected during the field surveys of the study area and the locality (**Table 7**). These comprised:

- four species of bird.
- seven species of mammal.

No threatened reptile or frog species were detected.

Target fauna species were recorded opportunistically, during targeted surveys and in the case of Glossy Black-cockatoo, additionally through target searches of their foraging signs.

Table 7: Threatened fauna species detected during the field surveys (* denotes presence).

Common Name	Scientific Name	Study Area	Locality
Glossy Black-cockatoo	*Calyptorhynchus lathami*	*	*
Sooty Owl	*Tyto tenebricosa*		*
Square-tailed Kite	*Lophoictinia isura*	*	
Striated Fieldwren	*Calamanthus fulginosus*	*	

Common Name	Scientific Name	Study Area	Locality
Eastern Bentwing Bat	*Miniopterus orianae oceanensis*	*	*
Eastern False Pipistrelle	*Falsistrellus tasmaniensis*		*
Grey-headed Flying-fox	*Pteropus poliocephalus*		*
Large-footed Myotis	*Myotis macropus*	*	*
White-footed Dunnart	*Sminthopsis leucopus*	*	*
Yellow-bellied Glider	*Petaurus australis*		*
Yellow-bellied Sheathtail Bat	*Saccolaimus flaviventris*		*

Glossy Black-cockatoo was regularly recorded within the study area. The presence of both adult and last season juveniles (identified by begging) feeding on the relative mature Black Sheoak confirms the presence of a likely important feeding area for this species. Similar densities of both foraging signs and birds could not be located within the locality.

Three migratory species as listed under the EPBC Act were also detected. These being Satin Flycatcher, Black-faced Monarch and White-throated Needletail. Only the later species was detected in the study area with a number of individuals flying over prior to a storm front. This is typical behaviour for this widely occurring species.

The spatial locations of threatened and migratory fauna detected during the field surveys is provided for the study area (**Map 13**) and the locality (**Map 14**).

4.3.4.3 Target endangered ecological communities

Swamp Oak Floodplain Forest EEC was confirmed to occur within the study area and locality. A total of 3.88 hectares was mapped in the study area while validation of existing mapping, API and limited ground-truthing identified a total of 231 hectares in the locality.

A detailed community description is provided in section 4.3.2 of this SIS.

4.3.5 Habitat mapping

An assessment of habitats within the study area and locality was conducted. A total of 25 habitat assessments and 13 hollow-bearing tree transects were completed.

The study area comprises four general habitat types. These being:

- Casuarina Forest
- Wetland
- Forest
- Cleared Land

The spatial extent of habitats within the study area with threatened and migratory fauna records overlain is provided in **Map 15**.

No hollow-bearing trees were identified within the study area.

For the six threatened fauna species recorded within the study area, species-specific habitat mapping is also provided (**Maps 16-21**).

Casuarina Forest & Wetland

Casuarina Forest and Wetland habitat as mapped for fauna corresponds with the Biometric Vegetation Type SR649: Swamp Oak – Prickly Tea-tree – Swamp Paperbark swamp forest on coastal floodplains. It also corresponds with the extent of SOFF EEC.

Extensive use of this habitat by bandicoots was noted during the field survey, with Digging surveys and Motion-activated cameras only detecting the presence of Long-nosed Bandicoot. No Southern Brown Bandicoot were detected by cameras, nor the cyclindrical diggings or images of Long-nosed Potoroo were recorded.

Generally, this habitat type provides connectivity across the study area from the SEPP 14 wetland to the east across to the Spotted Gum forest in the west. A number of threatened fauna including Striated Fieldwren and Square-tailed Kite was detected only in this habitat type.

All Habitat Assessment data is provided in **Appendix D**.

Forest

Forest habitat as mapped for fauna corresponds with the Biometric Vegetation Type SR642 Spotted Gum – Grey Ironbark – Woollybutt grassy open forest on coastal flats (modified). This habitat type is generally dominated by Spotted Gum and has been subject to considerable disturbance over time, particularly in the existing APZ. No hollow-bearing trees are present in this habitat.

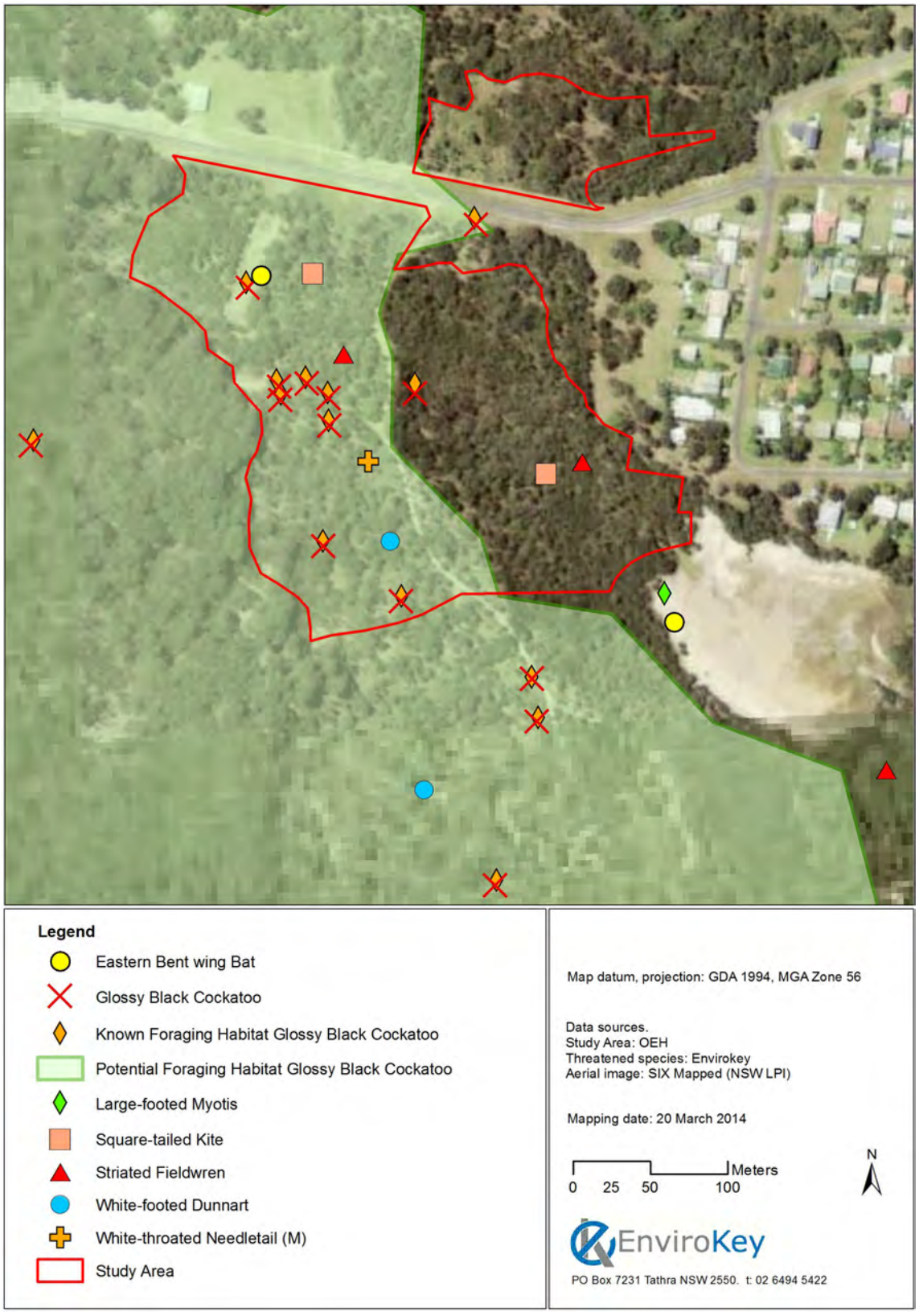
Extensive foraging signs as well as individual Glossy Black-cockatoo were detected in this habitat. The presence of both adult and last season juveniles (identified by begging) feeding on the relative mature Black She-oak confirms the presence of a likely important feeding area for this species. Similar densities of both foraging signs and birds could not be located within the locality.

Potential foraging habitat for Glossy Black-cockatoo was defined as continuous areas containing where Black She-oak (regardless of age) was present.

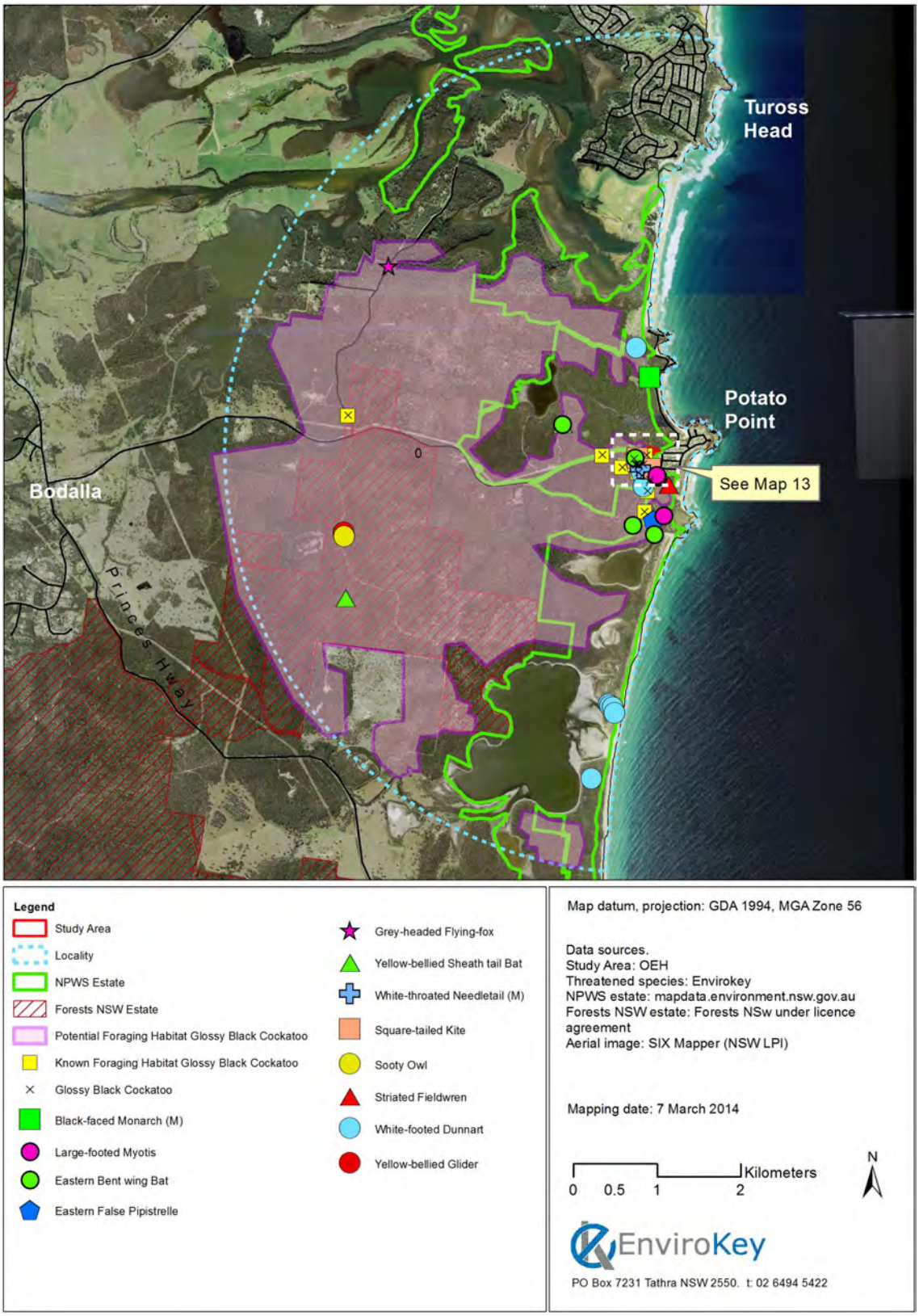
All Habitat Assessment data is provided in **Appendix D**.

Cleared Land

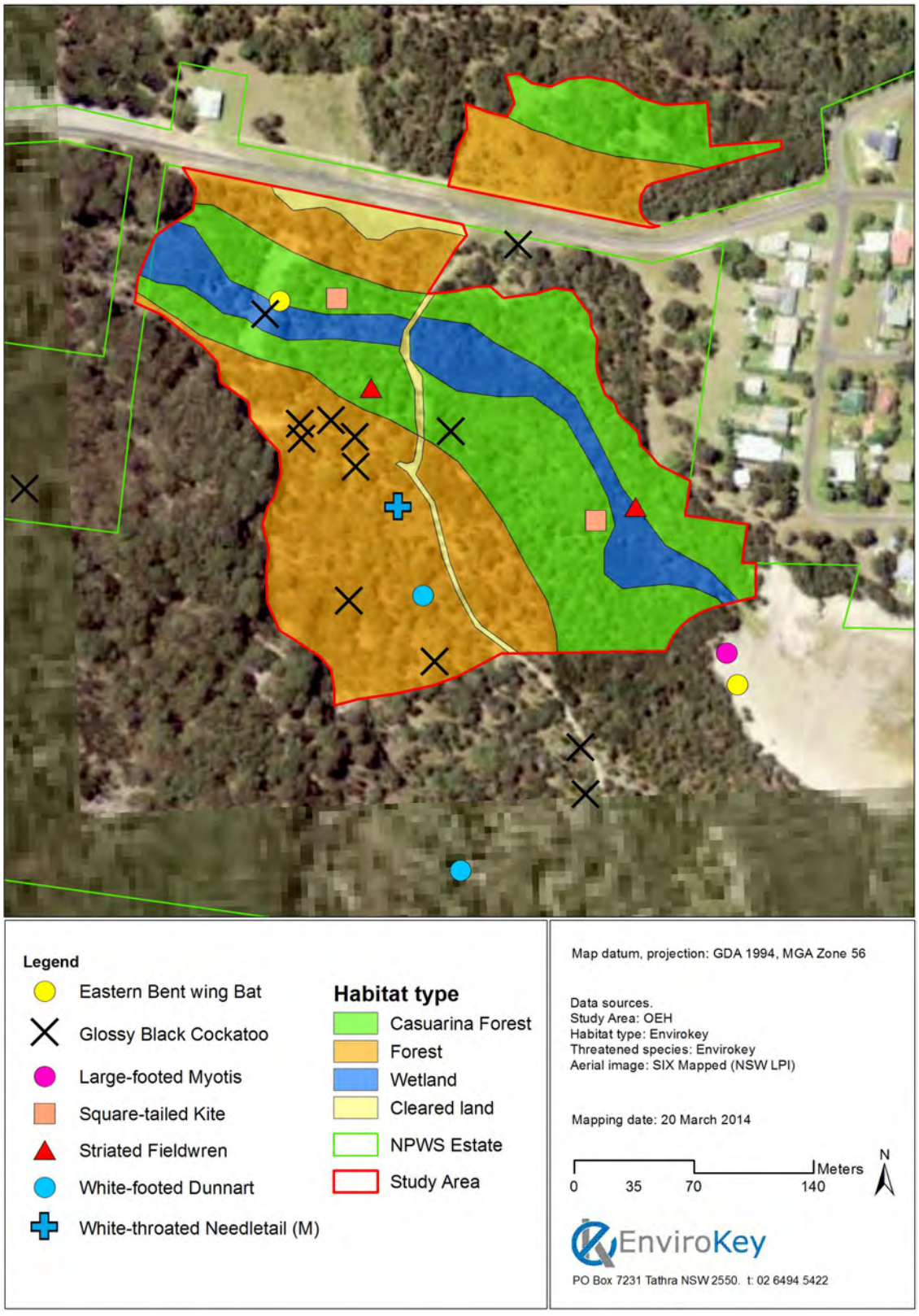
Cleared Land habitat as mapped for fauna corresponds with the Cleared land description provided in Section 4.3.2. Generally, cleared land provides little or no habitat of importance to threatened or migratory species due to an absence of suitable resources (ie, foraging or breeding).



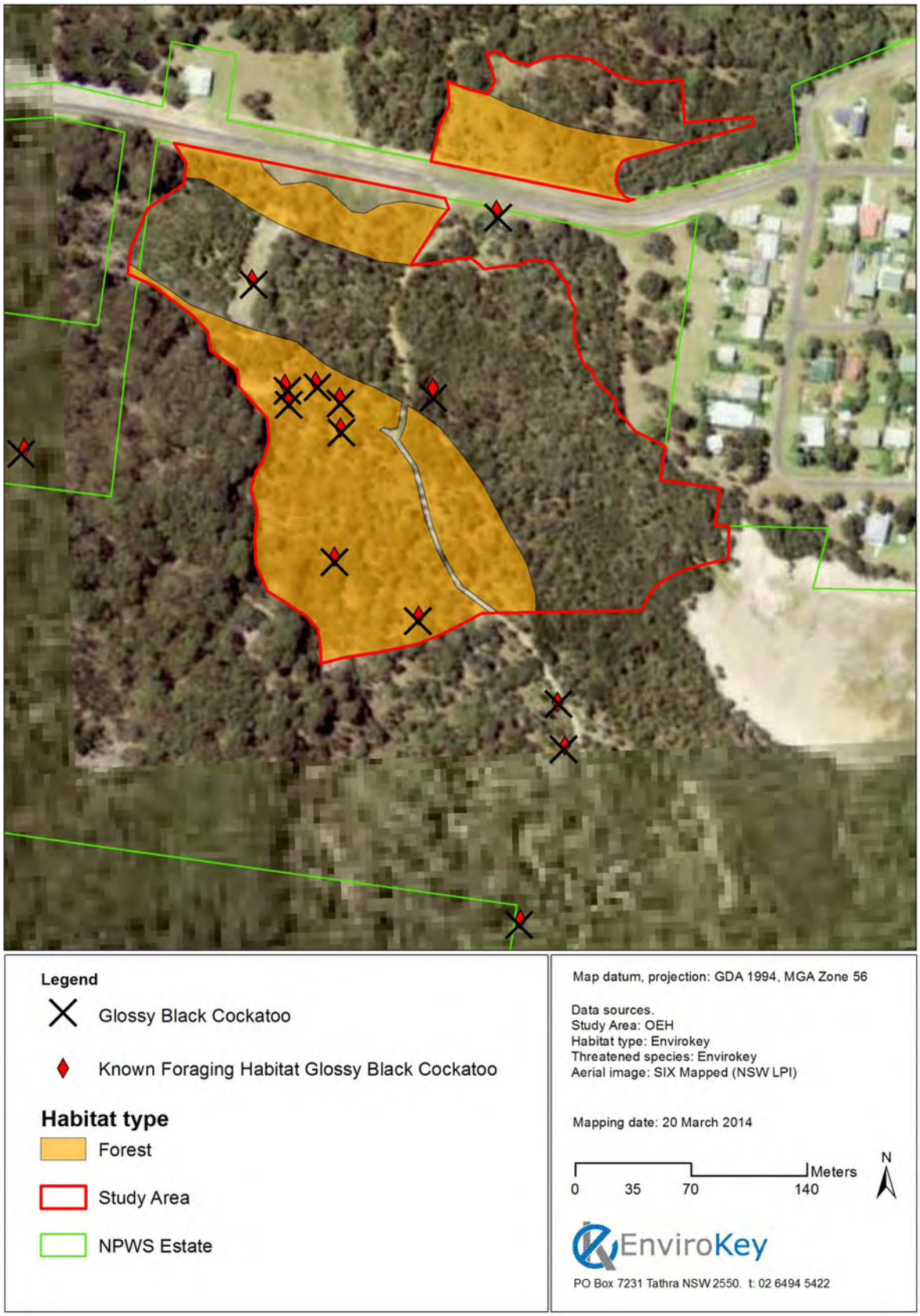
Map 13: Threatened and migratory fauna species recorded within the study area including known and potential foraging habitat for Glossy Black-cockatoo.



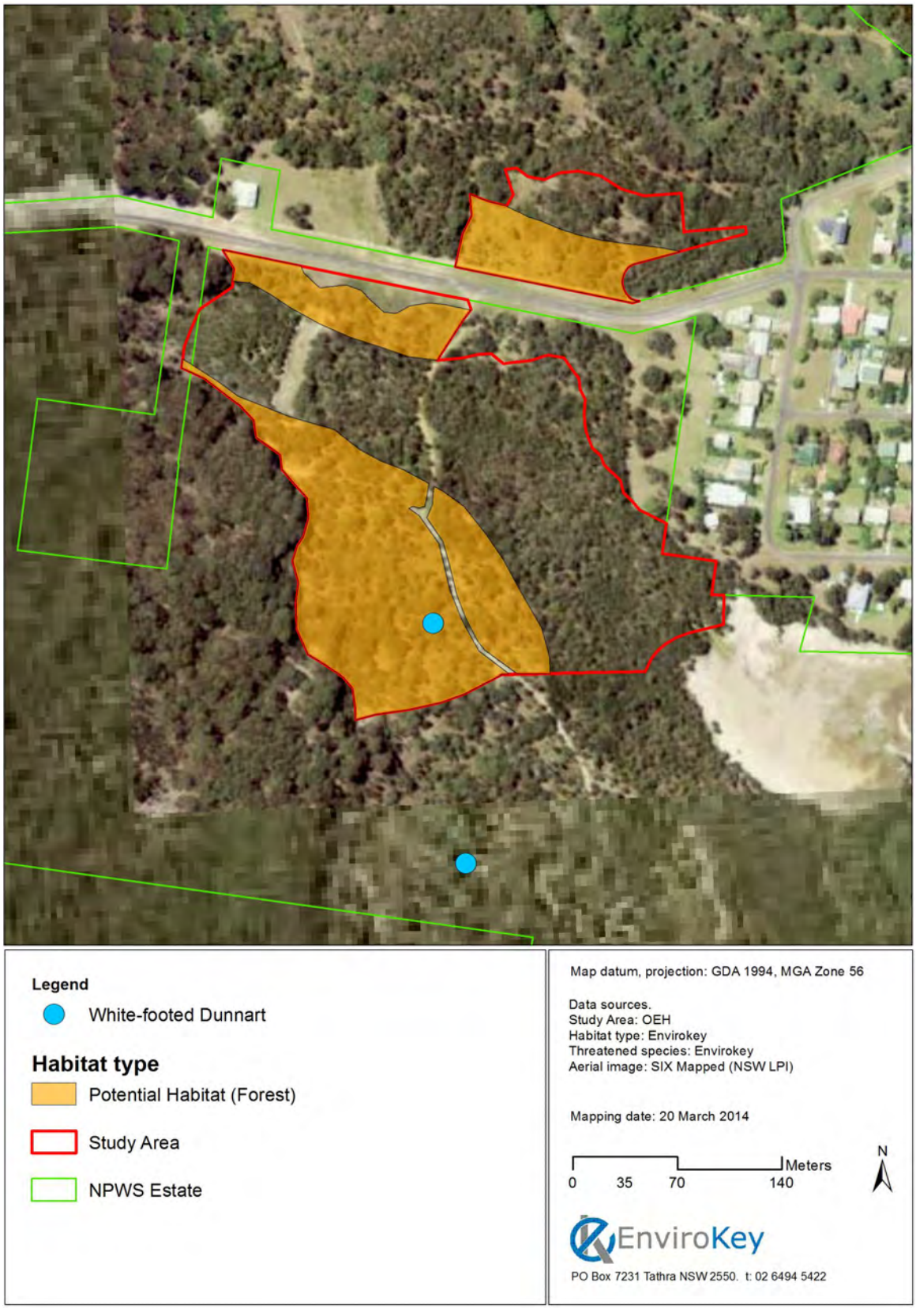
Map 14: Threatened and migratory fauna species recorded within the locality including known and potential foraging habitat for Glossy Black-cockatoo.



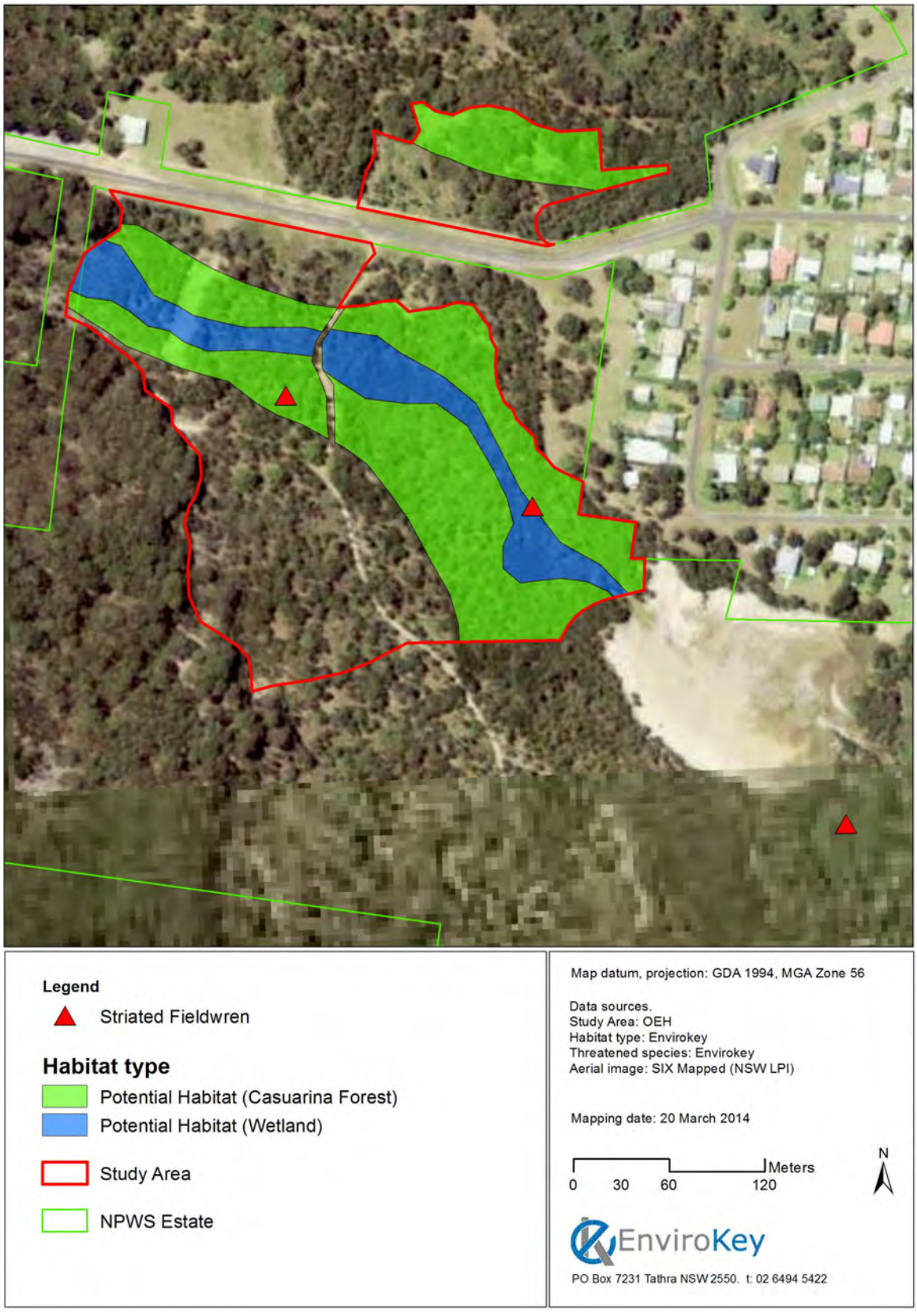
Map 15: Fauna habitats of the study area.



Map 16: Glossy Black-cockatoo habitat mapping within the study area.



Map 17: White-footed Dunnart habitat mapping within the study area.



Map 18: Striated Fieldwren habitat mapping within the study area.

Map 19: Large-footed Myotis habitat mapping within the study area.

Map 20: Eastern Bentwing Bat habitat mapping within the study area.

Map 21: Square-tailed Kite habitat mapping within the study area.

4.3.6 Survey limitations

A common limitation of many biodiversity studies is the short period of time in which they are conducted. When combined with a lack of seasonal sampling this can lead to either low detection rates or false absences being reported. This is also particularly relevant to highly mobile species that may not have been in the study area at the time of the survey. In this instance it should be recognised that it may be impossible to rule out species absence for some species during field surveys. Given this, analysis was conducted to evaluate which threatened and migratory biota were likely to occur within the study area and this is detailed within section 3.5.

5 ASSESSMENT OF LIKELY IMPACTS ON THREATENED SPECIES AND POPULATIONS

5.1 IMPACTS OF THE PROPOSED ACTIVITY

5.1.1 Clearing of vegetation and associated habitat loss

Vegetation clearing as defined by OEH, refers to the cutting down, felling, thinning, logging or removing native vegetation (DEC 2004). The clearing of native vegetation affects threatened species, population and communities as well as common native species. There are a number of potential impacts as a result of clearing any native vegetation which include:

- Destruction of habitat resulting in a loss of biodiversity.
- Isolation of populations resulting in limited gene flow between small fragmented populations.
- Reduced potential to adapt to environmental change.
- Erosion leading to sedimentation that can affect both terrestrial and aquatic biota.
- Disturbed habitat may encourage the establishment and spread exotic flora or pioneer species that may displace local native flora.
- Loss of leaf litter which provides habitat for vertebrate and invertebrate fauna.

With regarded to the proposed works, vegetation clearing would be directly associated with the treatment areas. The treatment areas will be subject to a regime of thinning of overstorey vegetation (removal of 80 percent of the overstorey) and the removal of mid-strata and groundcover vegetation.

Based on spatial analysis, a total of 1.47 hectares of native vegetation would be removed. All vegetation communities and the extent of each to be modified by the proposed works are shown in **Table 8**.

Table 8: Extent of each vegetation to be removed by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	TSC Status	Extent within the subject site (extent to be cleared) (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	3.88	Swamp Oak Floodplain Forest EEC	1.03
SR642 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats - Modified	2.21	-	0.44

Biometric Vegetation Type	Extent within the study area (hectares)	TSC Status	Extent within the subject site (extent to be cleared) (hectares)
Ecotonal vegetation (SR642 dominant, some affinities with SR649, SR512)	0.93	-	0
Cleared land	0.20	-	-
Total	7.22	-	1.47

5.1.2 Habitat fragmentation

Habitat connectivity provides essential movement pathways for biota at the local and regional scale and plays an important role in maintaining long term genetic viability. **Map 4** identifies that the locality is well vegetated and this configuration of vegetation is likely to contribute to landscape scale movement of biota in a north-south direction.

Given that the subject site is located adjacent to the village of Potato Point and in the context of the vegetation existing within the landscape, the proposed works are not considered to have a significant negative effect on the movement of flora or fauna that are known from the region.

5.1.3 Indirect impacts

Indirect impacts as defined by OEH occur "when project-related activities affect species, populations or ecological communities in a manner other than direct loss". Indirect impacts include loss of individuals through starvation, exposure, predation by domestic and/or feral animals, loss of breeding opportunities, loss of shade/shelter, deleterious hydrological changes, increased soil salinity, erosion, inhibition of nitrogen fixation, weed invasion, fertilizer drift or increased human activity within or directly adjacent to sensitive habitat areas" (DECC 2007).

Based on this definition, it is anticipated that the clearing of vegetation associated with the proposed works will result in a number of cumulative or secondary effects relating to edge effects, soil erosion and weed invasion. These indirect impacts are considered under separate headings below.

5.1.4 Edge effects

The removal of vegetation can often result in edge effects; the creation of new environmental conditions that have the potential to have negative impacts on ecological processes along the edges of cleared environments particularly those that originally contained canopy vegetation. Edge effects generally promote the invasion of exotic flora (weeds) and may also promote increased visitation by Red foxes and Feral Cats (Edwards *et al.* 2001; Lindenmayer and Fischer 2006; Miles 2006a; b; Priddel *et al.* 2007).

In general, potential edge effects associated with the proposed works are likely to include:

- Changes in microclimate (eg. temperature, wind, light).
- Creation of new ecotones.
- Invasion by exotic flora.
- Improved access for feral predators.
- Isolation of populations resulting in limited gene flow between small fragmented populations.
- Reduced potential to adapt to environmental change.

A holistic approach to assessing edge effects is not possible given that edge effects can vary between species and communities. Given this, edge effects are discussed on an individual basis in Section 8.

5.1.5 Soil erosion

Potential impacts as a result of soil erosion may include, but are not restricted to:

- Topsoil runoff into the drainage line and SEPP 14 wetland number 136.
- Alterations to habitat.
- Topsoil and native seedbank loss during heavy rainfall.
- Invasion of weeds.

The greatest potential impact is considered topsoil runoff into the drainage line and adjacent SEPP 14 wetland. The layout of the proposed works has been designed with consideration of best-practice with the retention of a vegetated buffer of the drainage line to minimise the potential for sediment to flow into SEPP 14 wetland number 136.

Design features (as detailed above) and a series of mitigation measures are likely to avoid or limit the potential impacts of soil erosion. Mitigation measures are detailed within Section 7.

5.2 IMPACTS ON OEH ESTATE AND OTHER NATIONALLY IMPORTANT AREAS

Eurobodalla NP comprises 16 geographically discrete areas containing a series of coastal and fringing forests, dune complexes, wetlands, coastal lakes and intertidal zones and a total area of 2,200 hectares (NPWS 2000). Tuross Lake, a nationally important wetland, also occurs nearby.

The proposed works would result in the removal of some native vegetation and habitat from Eurobodalla NP. As detailed in Section 5.1.1, 1.47 hectares of native vegetation from within the boundaries of Eurobodalla NP would be removed by the proposed works. This equates to less than 0.07 percent of the total area of Eurobodalla NP.

Impacts on potential movement corridors for threatened biota within and adjacent to Eurobodalla NP are discussed for each species or community in Section 5.4, Section 6 and Section 8.

The catchment within the study area does not flow to Tuross Lake. Tuross Lake is located about 2 kilometres north of the proposed works. Given the relatively minor nature of the proposed works and its geographical location, this nationally important wetland is unlikely to be affected by the proposed works.

5.3 ASSESSMENT OF AFFECTED SPECIES

With consideration of the field surveys completed within the study area and locality, a review of the available literature and vegetation mapping, and consideration of the likely impacts identified, the list of target species identified in Section 3.6 has been refined to a list of affected subject species. Affected subject species are those considered to have some potential to be impacted by the proposed works as they are either known to occur within the study area, or have a high potential to occur within the study area based on available habitat but went undetected. Affected species are identified in **Table 9**.

Table 9: Refinement of target species to affected species by the proposed works.

SPECIES	LIKELIHOOD OF OCCURRENCE WITHIN THE STUDY AREA & POTENTIAL TO BE AFFECTED BY THE PROPOSED WORKS	AFFECTED SPECIES? CONSIDERED FURTHER
Green and Golden Bell Frog	No. The study area was surveyed during suitable conditions for detection, and no adults, metamorphs or tadpoles of this species were identified. Therefore, it is unlikely that this species would be affected by proposed activity.	No
Golden-tipped Bat	Possible. While the field survey did not detect the presence of this species, potential foraging and roosting habitat within the wetland and casuarina forest was confirmed.	Yes
Eastern Bentwing-bat	Yes. The species was detected during the field survey.	Yes
Eastern Freetail-bat	Possible. While the field survey did not detect the presence of this species, potential foraging habitat was confirmed.	Yes
Southern Myotis	Yes. The species was detected during the field survey.	Yes
Square-tailed Kite	Yes. The species was detected during the field survey. No nest site was identified, so the study area is likely to form part of a home range and known foraging habitat.	Yes
Striated Fieldwren	Yes. The species was detected during the field survey. Known habitat within the Wetland and Casuarina forest was confirmed.	Yes
Gang-gang Cockatoo	Possible. While the field survey did not detect the	Yes

SPECIES	LIKELIHOOD OF OCCURRENCE WITHIN THE STUDY AREA & POTENTIAL TO BE AFFECTED BY THE PROPOSED WORKS	AFFECTED SPECIES? CONSIDERED FURTHER
	presence of this species, potential foraging habitat was confirmed in the Forest habitat.	
Glossy Black-cockatoo	Yes. The species was detected on numerous occasions during the field survey foraging within the study area. This included the presence of juvenile birds.	Yes
Barking Owl	Possible. While the field survey did not detect the presence of this species, potential foraging habitat was confirmed in the Forest and Casuarina Forest.	Yes
Masked Owl	Possible. While the field survey did not detect the presence of this species, potential foraging habitat was confirmed in the Forest and Casuarina Forest.	Yes
Olive Whistler	Possible. While the field survey did not detect the presence of this species, potential foraging habitat was confirmed in the Forest and Casuarina Forest.	Yes
Pink Robin	Possible. While the field survey did not detect the presence of this species, potential foraging habitat was confirmed in the Forest and Casuarina Forest.	Yes
Scarlet Robin	Possible. While the field survey did not detect the presence of this species, potential foraging habitat was confirmed in the Forest and Casuarina Forest.	Yes
Flame Robin	No. It is unlikely that the habitats present within the study area would provide potential habitat to this species. Generally, Flame Robin occur in more open habitats in winter and the study area does not currently contain habitat considered suitable. Therefore, it is unlikely that this species would be affected by the proposed activity.	No
Varied Sittella	No. The field survey did not detect the presence of this species, and potential habitat is not considered present within the subject site.	No
Little Lorikeet	Possible. While the field survey did not detect the presence of this species, potential foraging habitat was confirmed in the Forest and Casuarina Forest.	Yes
Little Eagle	Possible. While the field survey did not detect the presence of this species, potential foraging habitat was confirmed in the Forest and Casuarina Forest.	Yes
Regent Honeyeater	Possible. While the field survey did not detect the presence of this species, the species was recently recorded in Potato Point.	Yes
Eastern Pygmy-possum	No. It is unlikely that the habitats present within the study area would provide potential habitat to	No

SPECIES	LIKELIHOOD OF OCCURRENCE WITHIN THE STUDY AREA & POTENTIAL TO BE AFFECTED BY THE PROPOSED WORKS	AFFECTED SPECIES? CONSIDERED FURTHER
	this species. Banskia and other myrtaceous shrubs are sparse, and at best, it is likely to be considered only marginal habitat. Therefore, it is unlikely that this species would be affected by the proposed activity.	
Southern Brown Bandicoot	Possible. While the field survey did not detect the presence of this species, potential foraging habitat was confirmed in the Casuarina Forest.	Yes
Long-nosed Potoroo	Possible. While the field survey did not detect the presence of this species, potential foraging habitat was confirmed in the Casuarina Forest.	Yes
White-footed Dunnart	Yes. The species was detected within the study area and directly adjacent to the southern boundary.	Yes
Narrow-leafed Wilsonia	In NSW this species is found on the coast between Mimosa Rocks National Park and Wamberal north of Sydney (Nelson's Lake, Potato Point, Sussex Inlet, Wowly Gully, Parramatta River at Ermington, Clovelly, Voyager Point, Wollongong and Royal National Park). It grows in all southern states. The nearest population occurs in Potato Point about 750 m north east of the study area growing among rocks, northwards along the rocky headland from the boat ramp. The next nearest record is at Dalmeny about 6 k m south of the study area. The species occurs at the margins of salt marshes and lakes. Only a very small amount of such habitat falls within the study area (where the Swamp Oak vegetation meets the lake margin, however a s ubstantial amount occurs directly adjacent to it. The entire SEPP 14 wetland was searched comprehensively and the target species was not found. There are no previous records for this species within or adjacent to the study area, despite it having been found elsewhere locally. Therefore, it is unlikely that this species would be affected by the proposed activity.	No
Round-leafed Wilsonia	The species is known from coastal saltmarshes and inland saline sites, having somewhat similar habitat requirements to Narrow-leafed Wilsonia. In coastal New South Wales it is known from four coastal populations at Lake Wollumboola, Swan Lake, Meringo Lagoon and Coila Lake. The total number of plants in coastal sites is only a few hundred. It occurs in mid marsh, mixed with	No

SPECIES	LIKELIHOOD OF OCCURRENCE WITHIN THE STUDY AREA & POTENTIAL TO BE AFFECTED BY THE PROPOSED WORKS	AFFECTED SPECIES? CONSIDERED FURTHER
	Sporobolus virginicus and *Sarcocornia quinqueflora*. The nearest record for this species occurs at Coila Lake (about 5 km north of the site). The entire SEPP 14 wetland was searched comprehensively and the target species was not found. There are no previous records for this species within or adjacent to the study area. The nearest record is at Coila Lake (about 5 km north of the site). Therefore, it is unlikely that this species would be affected by the proposed activity.	
Tangled Bedstraw	Once regarded as presumed extinct in NSW, *Galium australe* is now known from the Towamba Valley near Bega, Lake Yarrunga near Kangaroo Valley, Cullendulla Creek Nature Reserve near Batemans Bay, Conjola National Park, Swan Lake near Swanhaven and the Big Hole in Deua National Park. It was recorded historically from the Clyde River near Batemans Bay and the Mongarlowe area near Braidwood. The species also occurs beside Lake Windemere in the Australian Capital Territory at Jervis Bay. In NSW Tangled Bedstraw has been found in moist gullies of tall forest, *Eucalyptus tereticornis* forest, coastal *Banksia* shrubland, and *Allocasuarina nana* heathland. In other States the species is found in a range of near-coastal habitats, including sand dunes, sand spits, shrubland and woodland. The Jemison's Point record (i.e. in NSW Wildlife Atlas) is now regarded as doubtful (Jackie Miles pers. comm. in NGH 2013). Based on t his, the nearest record is north of Batemans Bay. The species was not recorded during the current study. Field surveys did not reveal the presence of this species. Based on these factors, it is unlikely that this species would be af fected by the proposed activity.	No
Tall Knotweed	Tall Knotweed normally grows in damp places, especially beside streams and lakes. Occasionally in swamp forest or associated with disturbance. The nearest record for this species is from about 1 km south of the study area. Very small areas of suitable habitat are present along the creekline (the swamp habitat possesses very few pools – is mainly broad floodplain). Areas of suitable habitat were searched comprehensively during this study. The subject species was not found. There are no previous records for this species within or adjacent to the study area. The nearest record is about 1 km	No

SPECIES	LIKELIHOOD OF OCCURRENCE WITHIN THE STUDY AREA & POTENTIAL TO BE AFFECTED BY THE PROPOSED WORKS	AFFECTED SPECIES? CONSIDERED FURTHER
	away. Therefore, it is unlikely that this species would be affected by the proposed activity.	
Austral Toadflax	Austral Toadflax is found in very small populations scattered across eastern NSW, along the coast, and from the Northern to Southern Tablelands. It is also found in Tasmania and Queensland and in eastern Asia. This species occurs in grassland on coastal headlands or grassland and grassy woodland away from the coast. It is a root parasite that takes water and some nutrient from other plants, especially Kangaroo Grass (*Themeda australis*). Austral Toadflax has previously been recorded within the study area, however regrowth vegetation has altered most of the site the habitat from grassland to woodland/shrubland. According to the NSW Wildlife Atlas database, the most recent record within the study area is from 2004. The Stage 1 REF failed to find the species within the Stage 1 study area (NGH 2013). Similarly, a site inspection conducted by OEH ROG, concluded that the habitat on the subject site is not considered suitable for this species and the local Potato Point population is known to be confined to the grassy headland at Jemison's Point (Briggs and Noak, 16 October 2013). Within the study area, very little grassland remains following regrowth of woody vegetation. Some grassy areas are present where the APZ is maintained, however Kangaroo Grass cover is patchy and sparse. Areas of suitable habitat were searched comprehensively during this study, with particular attention given to areas containing the often associated species, Kangaroo Grass. The target species was not found. As described above, two previous targeted surveys failed to find this species. Therefore, it is unlikely that Austral Toadflax would be affected by proposed activity.	No
Swamp Oak Floodplain Forest of the New South Wales North Coast, Sydney Basin and South Eastern Corner Bioregions Endangered Ecological Community	Yes. Field surveys confirmed the presence of this EEC.	Yes

5.4 AFFECTED SPECIES

Affected species were determined through the detection of a species within the study area or the identified of potentially suitable habitat. However, it should be noted that the affected fauna species are not necessarily significantly impacted by the proposed activity. Assessments of Significance have been conducted for each of the affected fauna species to determine the significance of any potential impacts. These are provided in Section 8.

5.4.1 Golden-tipped Bat

5.4.1.1 Discussion of local and regional abundance

Discussion of other known populations

The Golden-tipped Bat occurs along the east coast of Australia in scattered locations from Cape York to the Victorian/NSW border (Churchill 2008). In NSW, Golden-tipped Bat are known from 1,049 records (OEH 2014a) from the following catchment management authority (CMA) regions: Border Rivers – Gywdir, Hawksberry – Nepean, Hunter – Central Rivers, Northern Rivers, Sydney Metro and Southern Rivers (OEH 2014c).

In the Southern Rivers CMA, 48 records are known with 17 of these within the Bateman CMA sub-region. The species has not been recorded within the Eurobodalla NP, however, there are nine previous records within Bodalla SF (OEH 2014a). Both Eurobodalla NP and Bodalla SF contain the largest areas of potential foraging habitat that provide long term security for the species within the region.

Golden-tipped Bat was not recorded during the EnviroKey field surveys both within the study area and the locality and it has not been previously recorded within the locality. Given this, the relative significance of habitat within the study area is considered to be low.

Discussion of habitat utilisation

Golden-tipped Bat are known from a range of habitats including rainforest, forest, Casuarina dominated riparian forest and coastal melaleuca forest (Churchill 2008). Riparian rainforest is likely to provide key roosting habitat for this species where they primarily roost within abandoned Brown Gerygone and Yellow-throated Scrubwren nests (Law and Chidel 2004). They feed mostly on orb-weaving spiders which have been known to form up to 99 percent of stomach contents (Churchill 2008). In the study area, Golden-tipped Bat is only likely to utilise Casuarina Forest and Wetland should it occur there.

Foraging Golden-tipped Bat range up to 2.1 kilometres from their roosting sites and recent study confirms that they forage regularly on the upper slopes away from riparian or rainforest areas (Law and Chidel 2004).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south and east-west movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Golden-tipped Bat are unlikely to be significant given the relatively mobile nature of this species and its foraging ecology. Golden-tipped Bat forages along riparian areas and on upper slopes away from rainforest and riparian areas (Law and Chidel 2004), and as such, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.1.2 Assessment of habitat

Description of habitat values

Potential roosting and foraging habitat for the Golden-tipped Bat occurs within the study area across the fauna habitat mapped as Wetland and C asuarina Forest (**Map 15**). The distribution of these fauna habitat types corresponds with the vegetation community descriptions provided within Section 4.3.2.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

As detailed within **Table 10**, 1.03 hectares of potential roosting and foraging habitat for the Golden-tipped Bat will be affected by the proposed works. This represents 26.6 percent of the potential habitat available for Golden-tipped Bat within the study area.

Table 10: Potential habitat for the Golden-tipped Bat that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	3.88	1.03
Total	3.88	1.03

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on t he NSW south coast (DECCW 2010b). In the locality, Eurobodalla National Park and Bodalla State Forest comprise 43.3 percent of land within a 5 kilometre radius of the proposed works. Both extend beyond the locality and are likely to contribute significantly to the long term security of habitat at a regional scale.

In general, habitat condition within Eurobodalla National Park and Bodalla State Forest shows similarities with that of the study area with the exception of hollow-bearing trees. Hollow-bearing trees were absent from the study area and this is due to both the vegetation community types present and the age of the vegetation. In the locality, hollow-bearing trees were regularly recorded and even within Bodalla State Forest where logging occurs, these habitat features are offered some level of protection.

Current management prescriptions within all NSW state forests ensures the continued exclusion of logging from rainforest and r iparian zones; key habitat features for Golden-tipped Bat (Law and Chidel 2004).

5.4.1.3 Discussion of conservation status

The Golden-tipped Bat is listed as vulnerable under the TSC Act.

Golden-tipped Bat was not recorded during the EnviroKey field surveys within the study area or the locality and it has not been previously recorded within the locality.

According to OEH (2014c), the Golden-tipped Bat is threatened by the following:

- Loss of riparian rainforest for roosting.
- Loss of understorey habitat on upper slopes for foraging.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Golden-tipped Bat and are considered relevant to the proposed works:

- Predation by feral cats - clearing and m aintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and i ncrease predation rates.
- Clearing of native vegetation – the proposed works will involve the clearing of 1.03 hectares of potential foraging and roosting habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Golden-tipped Bat and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

To date, no recovery plan or threat abatement plan have been prepared for the Golden-tipped Bat. Through the Saving Our Species conservation program, the Golden-tipped Bat has been assigned as a landscape-managed species as the primary threats to this species are the loss, degradation and fragmentation of wet forest habitat across the landscape (OEH 2014b). OEH is currently developing a targeted approach to managing this species, however, in the interim, six management actions have been identified for the species (OEH 2014b). These are outlined as follows:

- Investigate the effectiveness of logging prescriptions such as rainforest and riparian buffers.
- Prepare guidelines which address retention of hollow bearing trees maintaining diversity of age groups, species diversity & structural diversity, giving priority to largest hollow bearing trees.
- Determine impacts of different fire regimes on the habitat of this species.
- Undertake long-term monitoring of populations cross tenure in conjunction with other bat species to document changes.
- Identify the effects of fragmentation on the species in a range of fragmented landscapes.
- Study the ecology, habitat requirements and susceptibility to logging and other forestry practices of this little-known species.

5.4.2 Eastern Bentwing Bat

5.4.2.1 Discussion of local and regional abundance

Discussion of other known populations

The Eastern Bentwing Bat occurs along the east coast of Australia from the coastal plain and into the Great Dividing Range with only a handful of records west of the Great Dividing Range (Churchill 2008; Dwyer 1968). In NSW, Eastern Bentwing Bat are known from 11,493 records (OEH 2014a) and are known from the following CMA regions: Border Rivers – Gywdir, Central West, Hawksbury – Nepean, Hunter – Central Rivers, Lachlan, Murray, Murrumbidgee, Namoi, Northern Rivers, Sydney Metro and Southern Rivers (OEH 2014c).

In the Southern Rivers CMA, 393 records are known with 36 of these within the Bateman CMA sub-region. The species has been previously recorded within Eurobodalla NP (7 records) and Bodalla SF (18 records) (OEH 2014a). Both Eurobodalla NP and Bodalla SF contain the largest areas of potential foraging and roosting habitat that provides long term security for the species within the region.

Eastern Bentwing Bat was recorded during the EnviroKey field surveys both within the study area and the locality through echolocation call recording. Roosting habitat is not present within the study area determined through a lack of caves, derelict mine shafts and other suitable features. Given this, the relative significance of habitat is with regard to foraging only and given their relatively high mobility, is considered to be low.

Discussion of habitat utilisation

Eastern Bentwing Bat is an insectivorous cave-dwelling bat (Baudinette *et al.* 1994; Churchill 2008; Slade and Law 2007; Wilson 2003). Throughout their range, caves represent the primary roosting habitat, however, they are known to use derelict mine shafts (as in Mogo SF), culverts, bridges and buildings. Populations aggregate during spring and summer in maternity caves (Dwyer 1968; Wilson 2003) then disperse to smaller roosts up to 300 kilometres away during winter and autumn (OEH 2014c).

Foraging habitat for the Eastern Bentwing Bat occurs within the study area and given their relative high mobility, the species is likely to forage through all habitats when it occurs there (**Map 20**). During this study, Eastern Bentwing Bat was detected by echolocation call recording at a site adjacent to SEPP 14 wetland no. 136 and in the western end of the study area near the dam. These detections may be the result of individuals using these habitats for drinking, rather than foraging *per se*. Nonetheless, this study assumes that Eastern Bentwing Bat forages within the study area as they have been regularly recorded in similar vegetation types across the south coast (Lesryk 2008; NGH 2011).

Man-made structures are widespread throughout the locality, and Eastern Bentwing Bat is likely to roost within these structures from time to time.

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south and west-east movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Eastern Bentwing Bat are unlikely to be significant given the relatively mobile nature of this species and its foraging ecology. Eastern Bentwing Bat forages across a wide range and as such, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.2.2 Assessment of habitat

Description of habitat values

Known foraging habitat for the Eastern Bentwing Bat occurs within the study area within all fauna habitats (**Map 20**). The distribution of these fauna habitat types corresponds with the vegetation community descriptions provided within Section 4.3.2.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

As detailed within **Table 11**, 1.47 hectares of known foraging habitat for the Eastern Bentwing Bat will be affected by the proposed works. This represents 20.36 percent of the known foraging habitat available for Eastern Bentwing Bat within the study area.

Table 11: Known foraging habitat for the Eastern Bentwing Bat that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	3.88	1.03
SR642 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats - Modified	2.21	0.44
Ecotonal vegetation (SR642 dominant, some affinities with SR649, SR512)	0.93	0
Cleared land	0.2	-
Total	7.22	1.47

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on the NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works. Both extend beyond the locality and are likely to contribute significantly to the long term security of habitat at a regional scale.

In general, potential foraging habitat for Eastern Bentwing Bat occurs within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) as it shows similarities with that of the study area. Roosting habitat is known to occur in Mogo SF at the derelict Bimbimbie Mine while old buildings, shed, culverts and bridges are widespread in the region providing potential roosting habitat.

5.4.2.3 Discussion of conservation status

The Eastern Bentwing Bat is listed as vulnerable under the TSC Act.

Eastern Bentwing Bat was recorded during the EnviroKey field surveys, both within the study area and the wider locality.

According to OEH (2014c), the Eastern Bentwing Bat is threatened by the following:

- Disturbance by recreational cave climbers and general public accessing the cave and adjacent areas particularly during winter or breeding.
- Loss of foraging habitat.

- Loss of food resources and indirect poisoning of individuals from nearby use of herbicides / insecticides.
- Predation by feral cats and foxes.
- Introduction of exotic pathogens, specifically known White-nosed fungus.
- Threat of cave entrances being blocked for human safety reasons. Also, vegetation encroaching and blocking cave entrances.
- Potential for large scale wildfire to impact on resource availability in surrounding habitat. Direct threats at caves from fire.
- Weeds (blackberry) encroaching over cave entrances restrict access; need to ensure sympthetic control techniques for blackberry.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Eastern Bentwing Bat and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Clearing of native vegetation – the proposed works will involve the clearing of 1.47 hectares of known foraging habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Eastern Bentwing Bat and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

To date, no recovery plan or threat abatement plan have been prepared for the Eastern Bentwing Bat. Through the Saving Our Species conservation program, the Eastern Bentwing Bat has been assigned as a site-managed species (OEH 2014b). The current conservation project was developed by experts in their field, who have identified the minimum number of necessary management sites and conservation actions required to conserve the species. No management sites for the Eastern Bentwing Bat are located within the study area, or the locality.

5.4.3 Eastern Freetail Bat

5.4.3.1 Discussion of local and regional abundance

Discussion of other known populations

The Eastern Freetail Bat occurs along the coastal plain and adjoining Great Dividing Range from southern QLD to southern NSW (Churchill 2008). In NSW, Eastern Freetail Bat are known from 1,127 records (OEH 2014a) and are known from the following CMA regions: Hawkesbury – Nepean, Hunter – Central Rivers, Northern Rivers, Sydney Metro and Southern Rivers (OEH 2014c).

In the Southern Rivers CMA, 119 records are known with 30 of these within the Bateman CMA sub-region. The species has been previously recorded within Eurobodalla NP (2 records) and Bodalla SF (3 records) (OEH 2014a). Both Eurobodalla NP and Bodalla SF contain the largest areas of potential foraging and roosting habitat that provide long term security for the species within the region.

Eastern Freetail Bat was not recorded during the EnviroKey field surveys both within the study area or the locality. Given this, the relative significance of habitat within the study area is considered to be low.

Discussion of habitat utilisation

Eastern Freetail Bat are known from a range of habitats but are most often recorded from dry eucalypt forest and woodland on the coastal side of the Great Dividing Range where they show an apparent preference for open spaces (Churchill 2008). Eastern Freetail Bat roost in tree hollows, usually in large spouts, but occasionally buildings.

Should they occur in the study area, Eastern Freetail Bat are likely to forage in open areas, particularly those associated with Jemison's Point Road and the existing asset protection zone given the apparent preference for open spaces. The species is known to forage up to 6 kilometres from their roost site (Churchill 2008).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Eastern Freetail Bat are unlikely to be significant given the relatively mobile nature of this species and its foraging ecology. Eastern Freetail Bat forages in open areas where flyways are large such as on upper slopes rather than riparian areas (Churchill 2008) and as such, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.3.2 Assessment of habitat

Description of habitat values

Potential foraging habitat for the Eastern Freetail Bat occurs within the study area across all habitat types, but predominately where more open areas are present. The distribution of fauna habitat types corresponds with the vegetation community descriptions provided within Section 4.3.2.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

As detailed within **Table 12**, 1.47 hectares of potential foraging habitat for the Eastern Freetail Bat will be affected by the proposed works. This represents 26.6 percent of the potential habitat available for Eastern Freetail Bat within the study area.

Table 12: Potential foraging habitat for the Eastern Freetail Bat that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	3.88	1.03
SR642 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats - Modified	2.21	0.44
Ecotonal vegetation (SR642 dominant, some affinities with SR649, SR512)	0.93	0
Cleared land	0.2	-
Total	7.22	1.47

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on t he NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works. Both extend beyond the locality and are likely to contribute significantly to the long term security of habitat at a regional scale.

In general, habitat condition within Eurobodalla NP and Bodalla SF shows similarities with that of the study area with the exception of hollow-bearing trees. Hollow-bearing trees were absent from the study area and this is due to both the vegetation community types present and the age of the vegetation. In the locality, hollow-bearing trees were regularly recorded and even within Bodalla SF where logging occurs, these habitat features are offered some level of protection.

Potential foraging habitat occurs within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares).

5.4.3.3 Discussion of conservation status

Eastern Freetail Bat is listed as vulnerable under the TSC Act.

Eastern Freetail Bat was not recorded during the EnviroKey field surveys within the study area or the locality.

According to OEH (2014c), Eastern Freetail Bat is threatened by the following:

- Loss of hollow-bearing trees.
- Loss of foraging habitat.
- Application of pesticides in or adjacent to foraging areas.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Eastern Freetail Bat and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and i ncrease predation rates.
- Clearing of native vegetation – the proposed works will involve the clearing of 1.47 hectares of potential foraging habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Eastern Freetail Bat and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

To date, no r ecovery plan or threat abatement plan have been prepared for the Eastern Freetail Bat. Through the Saving Our Species conservation program, the Eastern Freetail Bat has been assigned as a data-deficient species as little is known of the distribution and population size (OEH 2014b). The main objective for this species is to conduct targeted surveys for this species in known habitats and census all populations.

5.4.4 Large-footed Myotis

5.4.4.1 Discussion of local and regional abundance

Discussion of other known populations

Large-footed Myotis, is found primarily in coastal environments from the Kimberley region in WA around the coast into NT, QLD, NSW and Victoria with some inland populations following major rivers including the Murray and M urrumbidgee River (Churchill 2008). In NSW, Large-footed Myotis are known from 3,969 records (OEH 2014a) and are known from the following CMA regions: Border Rivers – Gywdir, Hawkesbury – Nepean, Hunter – Central Rivers, Lachlan, Murray, Murrumbidgee, Northern Rivers, Sydney Metro and Southern Rivers (OEH 2014c).

In the Southern Rivers CMA, 203 records are known with 26 of these within the Bateman CMA sub-region. The species has been previously recorded within the Eurobodalla NP (6

records). Both Eurobodalla NP and Bodalla SF contain the largest areas of potential foraging and roosting habitat that provides long term security for the species within the region.

Large-footed Myotis was recorded during the EnviroKey field surveys adjacent to the study area at the SEPP 14 wetland and within the locality. Given this, the relative significance of habitat within the study area is considered to be high.

Discussion of habitat utilisation

Large-footed Myotis have a strong association with streams, permanent waterways and wetlands and are recorded most frequently at low elevations (Churchill 2008). No apparent preference is shown for vegetation type provided it is close to water.

Large-footed Myotis generally roosts in small groups of up to 15 individuals in hollow-bearing trees, caves, mine shafts, bridges, buildings or culverts (OEH 2014c). They are known to forage over water bodies, catching insects and small fish which they do so by raking their feet across the surface of the water (OEH 2014c).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Large-footed Myotis are unlikely to be significant given the relatively mobile nature of this species and its foraging ecology given that no vegetation will be cleared around the periphery of the SEPP 14 wetland no. 136. As such, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.4.2 Assessment of habitat

Description of habitat values

Known foraging habitat for Large-footed Myotis occurs within the study area across the fauna habitat mapped as Wetland and Casuarina Forest (**Map 19**). The distribution of these fauna habitat types corresponds with the vegetation community descriptions provided within Section 4.3.2.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

As detailed within **Table 13**, 1.03 hectares of known foraging habitat for the Large-footed Myotis will be affected by the proposed works. This represents 26.6 percent of the known habitat available for Large-footed Myotis within the study area.

Table 13: Known foraging habitat for the Large-footed Myotis that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	3.88	1.03
Total	3.88	1.03

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on the NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works. Both extend beyond the locality and are likely to contribute significantly to the long term security of habitat at a regional scale. SEPP 14 wetlands are likely to provide the most significant habitat for Large-footed Myotis at the regional scale. Within the locality, around 244 hectares of SEPP 14 wetland are mapped, with the majority of these adjoining large areas of native vegetation.

In general, habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) shows similarities with that of the study area with the exception of hollow-bearing trees. Hollow-bearing trees were absent from the study area and this is due to both the vegetation community types present and the age of the vegetation. In the locality, hollow-bearing trees were regularly recorded and even within Bodalla SF where logging occurs, these habitat features are offered some level of protection.

5.4.4.3 Discussion of conservation status

Large-footed Myotis is listed as vulnerable under the TSC Act.

Large-footed Myotis was recorded during the EnviroKey field surveys, both within the study area and the wider locality.

According to OEH (2014c), Large-footed Myotis is threatened by the following:

- Loss or disturbance of roosting sites.
- Clearing adjacent to foraging areas.
- Application of pesticides in or adjacent to foraging areas.
- Reduction in stream water quality affecting food resources.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Large-footed Myotis and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Alteration to the natural flow regimes of rivers and streams and their floodplains and wetlands – clearing in the vicinity of SEPP 14 wetland no. 136 has the potential to result in increased sedimentation reducing water quality and potential food resources.
- Clearing of native vegetation – the proposed works will involve the clearing of 1.03 hectares of known foraging habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Large-footed Myotis and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

To date, no recovery plan or threat abatement plan have been prepared for the Large-footed Myotis. Through the Saving Our Species conservation program, the Large-footed Myotis has been assigned as a landscape-managed species as the primary threats to this species are generally related to water quality and occur at the landscape scale (OEH 2014b).

5.4.5 Square-tailed Kite

5.4.5.1 Discussion of local and regional abundance

Discussion of other known populations

Square-tailed Kite is known to occur in northern Australia, QLD, NSW and Victoria (NPWS 1999b; OEH 2014c). In NSW, scattered records occur across the state and they are considered resident in northern part of the state while a summer breeding migrant in the southern part of the state (OEH 2014c). In NSW, Square-tailed Kite are known from 787 records (OEH 2014a) and are known from all CMA regions (OEH 2014c).

In the Southern Rivers CMA, 170 records are known with 46 of these within the Bateman CMA sub-region. The species has been previously recorded within Eurobodalla NP (5 records) and Bodalla SF (4 records) (OEH 2014a). Both managed lands contain the largest areas of potential foraging habitat that provides long term security for the species within the region.

Square-tailed Kite was recorded during the EnviroKey field surveys within the study area. On two occasions, a single bird was observed flying slowly across the top of the tree canopy presumably hunting small birds. Extensive searches failed to reveal any evidence of a current or past nest site within the study area. Given this, the relative significance of habitat within the study area is considered to be moderate to high.

Discussion of habitat utilisation

Square-tailed Kite are known from a variety of habitats ranging from dry open woodlands to open forests with an apparent preference for timbered watercourses (NPWS 1999b). They are known to occupy large foraging ranges with up to 100 km^2 being reported (OEH 2014c).

Square-tailed Kite are known for their specialist hunting of small birds with a preference for honeyeaters which they prey on from the outer foliage within the canopy (OEH 2014c).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Square-tailed Kite are unlikely to be significant given the high mobile nature of this species and its foraging ecology. As such, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.5.2 Assessment of habitat

Description of habitat values

Known foraging habitat for Square-tailed Kite occurs within the study area (**Map 21**). The distribution of these fauna habitat types corresponds with the vegetation community descriptions provided within Section 4.3.2.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

Additionally, other foraging habitat is likely to occur within the study area and beyond the boundaries of the study area. This is a sound assumption given that Square-tailed Kite appear to be associated with Spotted Gum and Woollybutt forests (NPWS 1999b) and that pairs are known to forage over an area of greater than 100km^2 (OEH 2014c). No nesting site, past or present, was identified within the study area.

As detailed within **Table 14**, 1.03 hectares of potential foraging habitat for the Square-tailed Kite will be affected by the proposed works. This represents 26.6 percent of the known foraging habitat available for Square-tailed Kite within the study area.

Table 14: Known foraging habitat for the Square-tailed Kite that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	3.88	1.03
Total	3.88	1.03

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on the NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works and Square-tailed Kite has been previously recorded in both. Both managed lands extend beyond the locality and are likely to contribute significantly to the long term security of habitat at a regional scale.

In general, habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) shows similarities with that of the study area and given the previous records of Square-tailed Kite, both provide known habitat.

5.4.5.3 Discussion of conservation status

Square-tailed Kite is listed as vulnerable under the TSC Act.

Square-tailed Kite was recorded during the EnviroKey field surveys within the study area.

According to OEH (2014c), Square-tailed Kite is threatened by the following:

- Clearing, logging, burning, and grazing of habitats resulting in a reduction in nesting and feeding resources.
- Disturbance to or removal of potential nest trees near watercourses.
- Illegal egg collection and shooting.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Square-tailed Kite and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Removal of dead wood and dead trees – the proposed works will result in the removal of some dead trees which could provide potential nest sites in the future.

- Clearing of native vegetation – the proposed works will involve the clearing of 1.03 hectares of known foraging habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Square-tailed Kite and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

To date, no recovery plan or threat abatement plan have been prepared for the Square-tailed Kite. Through the Saving Our Species conservation program, the Square-tailed Kite has been assigned as a landscape-managed species as the primary threats generally act at the landscape scale (ie, habitat loss) rather than at distinct, definable locations. OEH is currently developing a targeted approach to managing this species, however, in the interim, three management actions have been identified for the species (OEH 2014b). These are outlined as follows:

- Ensure implementation of management strategies that reduce disturbance of riparian areas.
- Identify and protect nest trees, and monitor reproduction.
- Liaise with local field ornithologists to obtain data on the Square-tailed Kite where it occurs.

5.4.6 Striated Fieldwren

5.4.6.1 Discussion of local and regional abundance

Discussion of other known populations

Striated Fieldwren occurs in south-eastern NSW, southern Victoria, south-east South Australia and Tasmania (Morcombe 2004). In NSW, Striated Fieldwren occurs south of Wollongong with most records occurring in the Nadgee Nature Reserve/Ben Boyd NP area and in Morton NP (OEH 2014c). Previous records of Striated Fieldwren in NSW total 161 (OEH 2014a) and they are known primarily from the Southern Rivers CMA region (OEH 2014c).

In the Southern Rivers CMA, 139 records are known withfive of these within the Bateman CMA sub-region. All of these records are from within Eurobodalla NP (OEH 2014a). Given this, it would be likely that Eurobodalla NP (and potentially other coastal vegetation) contains the largest areas of habitat that provide long term security for the species within the region.

Striated Fieldwren was recorded during the EnviroKey field surveys within the study area and adjacent areas. On three separate occasions, a single bird was heard and observed. It is uncertain if these three records were the same individuals, two or three individuals. Given this and the low mobility of this species, the relative significance of habitat within the study area is considered to be high.

Discussion of habitat utilisation

Striated Fieldwren utilise coastal heathlands, tussock grasslands, the margins of swamps and wetland vegetation and areas of low shrubby vegetation in the vicinity of these habitats (OEH 2014c). In these habitats, Striated Fieldwren will forage through the undergrowth for insects and small seeds. During this study, individuals were observed in swamp oak vegetation with a dense understorey.

The species is known for its extended breeding season, with eggs recorded between July and January (OEH 2014c). Little is known of the social organisation of this species as birds have been observed solitarily, in pairs, or in family groups of adults and dependent young post-fledging (NSWSC 2008c). Striated Fieldwren are thought to maintain exclusive breeding territories ranging between 0.2 hectares and 0.8 hectares with neighboring males as little as 50 metres apart (NSWSC 2008c).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south and east-west movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Striated Fieldwren are unlikely to be significant given that no vegetation will be cleared around the periphery of SEPP 14 wetland no. 136. As such, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.62 Assessment of habitat

Description of habitat values

Known habitat for Striated Fieldwren occurs within the study area in Wetland and Casuarina Forest habitat (**Map 18**) and east of the SEPP 14 wetland where an individual was also recorded. The distribution of these fauna habitat types corresponds with the vegetation community descriptions provided within Section 4.3.2.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

With exclusive breeding territories ranging between 0.2 hectares and 0.8 hectares, it is likely that at least two, possibly three breeding territories are present within the study area based on the location of each individual sighted..

As detailed within **Table 15**, 1.03 hectares of known habitat for the Striated Fieldwren will be affected by the proposed works and at least one (possibly two) breeding territories. This

represents 26.6 percent of the potential habitat available for Striated Fieldwren within the study area.

Table 15: Known habitat for the Striated Fieldwren that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	3.88	1.03
Total	3.88	1.03

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on the NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works. Both extend beyond the locality and are likely to contribute significantly to the long term security of habitat at a regional scale. SEPP 14 wetlands and the vegetation adjoining them are likely to provide the most significant habitat for Striated Fieldwren at the regional scale. Within the locality, around 244 hectares of SEPP 14 wetland are mapped, with the majority of these adjoining large areas of native vegetation.

The loss of tussock grasslands in the locality due to an absence of fire is likely to have had some negative effect on regional habitats.

5.4.6.3 Discussion of conservation status

Striated Fieldwren is listed as endangered under the TSC Act.

Striated Fieldwren was recorded during the EnviroKey field surveys, both within the study area and directly adjacent to it.

According to OEH (2014c), Striated Fieldwren is threatened by the following:

- Loss of swampy heath and tussock habitats due to clearing for urban and agricultural development.
- Heavy grazing and trampling by stock causing habitat degradation through root damage, prevention of seedling establishment and erosion.
- Habitat degradation as a result of weed invasion.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Striated Fieldwren and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Loss and degradation of native plant and animal habitat by invasions of escaped garden plants, including aquatic plants – the proposed works will increase edge effects resulting in the likely invasion of garden plants.
- Clearing of native vegetation – the proposed works will involve the clearing of 1.03 hectares of known foraging habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Striated Fieldwren and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

To date, no recovery plan or threat abatement plan have been prepared for the Striated Fieldwren. Through the Saving Our Species conservation program, the Striated Fieldwren has been assigned as a landscape-managed species as the primary threats to this species are generally at the landscape scale (ie, habitat loss) rather than definable locations. OEH is currently developing a targeted approach to managing this species, however, in the interim, four management actions have been identified for the species (OEH 2014b). These are outlined as follows:

- Using current records and literature on habitat requirements determine the current distribution and identify areas of potential habitat to undertake survey and management actions.
- Undertake studies on the biology, habitat requirements and potential threats on the species, and incorporate results into future management actions.
- Determine, through research, the ecological requirements of the species, particularly in regard to fire, and incorporate the information into Regional and Local Fire Plans.
- Undertake an annual monitoring program within identified habitat within both OEH reserves and other tenures, to determine the distribution and abundance of the species, particularly in areas where management actions are being undertaken.

5.4.7 Gang-gang Cockatoo

5.4.7.1 Discussion of local and regional abundance

Discussion of other known populations

Gang-gang Cockatoo occurs in NSW, Victoria, far south-east of South Australia and northern Tasmania (Morcombe 2004; NSWSC 2008a). In NSW, the species is regularly

recorded from the south-east corner to the Hunter area and inland to the Central Tablelands, South-west Slopes (OEH 2014c). Previous records of Gang-gang Cockatoo in NSW total 3,923 (OEH 2014a) and they are known from the following CMA regions: Central West, Hawkesbury – Nepean, Hunter – Central Rivers, Lachlan, Murray, Murrumbidgee, Namoi, Northern Rivers, Sydney Metro and Southern Rivers (OEH 2014c).

In the Southern Rivers CMA, 1,526 records are known with 126 of these within the Bateman CMA sub-region. The species has been previously recorded within Eurobodalla NP (15 records) and Bodalla SF (13 records). Both managed lands contain the largest areas of potential foraging and roosting habitat that provides long term security for the species within the region. In 2008, an estimate for the NSW population was proposed at around 5,000 mature individuals remaining (NSWSC 2008a).

No Gang-gang Cockatoo were recorded during the EnviroKey field surveys either within the study area or within the locality. Given this, the relative significance of habitat within the study area is considered to be low.

Discussion of habitat utilisation

Gang-gang Cockatoo have a strong affinity to open forest and woodlands with an acacia understory (NSWSC 2008a). They are a highly mobile species and are considered a partial or altitudinal migrant with individuals known to breed in moist highland forests while in winter, moving to more open habitats at lower elevations (NSWSC 2008a).

Gang-gang Cockatoo occur in pairs, family groups and small flocks. Fidelity to nesting locations is considered strong (NSWSC 2008a). It is thought that most of the breeding population (and sites) now exist within either OEH estate or State Forests (NSWSC 2008a).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south and west-east movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Gang-gang Cockatoo are unlikely to be significant given the highly mobile nature of this species. As such, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.7.2 Assessment of habitat

Description of habitat values

Portions of the study area may contain potential foraging habitat for Gang-gang Cockatoo. This would be confined to areas containing Spotted Gum and Eucalypt species. Discussion

of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area is generally in moderate to good condition despite the absence of hollow-bearing trees; an element critical to breeding Gang-gang Cockatoo.

As detailed within **Table 16**, 0.44 hectares of potential foraging habitat for the Gang-gang Cockatoo will be affected by the proposed works. This represents 19.9 percent of the potential foraging habitat available for Gang-gang Cockatoo within the study area.

Table 16: Potential foraging habitat for Gang-gang Cockatoo that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR642 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats - Modified	2.21	0.44
Total	2.21	0.44

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on the NSW south coast (DECCW 2010b) and likely to be of regional importance to breeding populations of Gang-gang Cockatoo (NSWSC 2008a). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works and Gang-gang Cockatoo has been previously recorded in both. Both managed lands extend beyond the locality and are likely to contribute significantly to the long term security of habitat at a regional scale.

In general, habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) shows similarities with that of the study area with the exception of hollow-bearing trees. Hollow-bearing trees were absent from the study area and this is due to both the vegetation community types present and the age of the vegetation. In the locality, hollow-bearing trees were regularly recorded and even within Bodalla SF where logging occurs, these habitat features are offered some level of protection.

5.4.7.3 Discussion of conservation status

Gang-gang Cockatoo is listed as vulnerable under the TSC Act. An endangered population also occurs in the Hornsby and Ku-ring-gai Local Government Areas (OEH 2014c).

Gang-gang Cockatoo was not recorded during the EnviroKey field surveys in the study area, or the locality.

According to OEH (2014c), Gang-gang Cockatoo is threatened by the following:

- Clearing of vegetation and degradation of habitat may reduce the abundance of optimal foraging and roosting habitat.
- Individual pairs show high fidelity to selected nesting trees (choosing nesting hollows of particular shape, position and structure), with clearing and frequent fire posing a threat to continued successful breeding.
- Climate change may alter the extent and nature of its preferred habitat (cool temperate vegetation).
- Susceptible to Psittacine cirovirus disease (PCD) which is spread through contaminated nest chambers. PCD is known to have increased near Bowral in the southern highlands of New South Wales over the past decade and constitutes a further threat to the species.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Gang-gang Cockatoo and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Clearing of native vegetation – the proposed works will involve the clearing of 0.44 hectares of potential foraging habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Gang-gang Cockatoo and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

To date, no recovery plan or threat abatement plan have been prepared for the Gang-gang Cockatoo. Through the Saving Our Species conservation program, the Gang-gang Cockatoo has been assigned as a landscape-managed species as the primary threats occur at a landscape scale (ie, habitat loss and degradation). OEH is currently developing a targeted approach to managing this species, however, in the interim, 11 management actions have been identified for the species (OEH 2014b). These are outlined as follows:

- Provide input to National Park and local bushfire management plans to minimise impacts of fire on critical resources.
- Determine the status of representative local populations distributed across the species range.
- Investigate the impacts of wildfire and hazard reduction burns on foraging and nesting resources.
- Investigate the breeding biology of selected populations to improve understanding of threatening processes.
- Model the impact of global warming and develop mitigation strategies.

- Identify important nesting habitat on public lands.
- Negotiate management agreements and covenants over important areas of habitat.
- Prepare and distribute information to decision makers.
- Determine the disease status of selected populations.
- Increase landholder and public awareness of status, threats and priority actions.
- Investigate movement patterns of selected populations.

5.4.8 Glossy Black-cockatoo

5.4.8.1 Discussion of local and regional abundance

Discussion of other known populations

Glossy Black-cockatoo occurs in Queensland, New South Wales and Victoria (Morcombe 2004) with a subspecies known from South Australia (NSWSC 2008b). In New South Wales, it occurs in the eastern one-third of the state and includes populations on the western slopes and plains. A small, isolated population is known from the Riverina which is now listed as an endangered population under the TSC Act (OEH 2014c). Previous records of Glossy Black-cockatoo in NSW total 14,313 (OEH 2014a) and they are known from the following CMA regions: Border Rivers – Gywdir, Central West, Hawkesbury – Nepean, Hunter – Central Rivers, Lachlan, Murray, Murrumbidgee, Namoi, Northern Rivers, Sydney Metro, Western and Southern Rivers (OEH 2014c).

In the Southern Rivers CMA, 2,987 records are known with 411 of these within the Bateman CMA sub-region. Glossy Black-cockatoo have been previously recorded within Eurobodalla NP (8 records) and Bodalla SF (87 records). Both managed lands contain the largest areas of potential foraging and roosting habitat that provides long term security for the species within the region.

On nine occasions, Glossy Black-cockatoo was recorded foraging during the EnviroKey field surveys within the study area. This included an adult pair with a single juvenile that was regularly sighted within the study area that was foraging within the relatively mature Black She-oak. This species generally shows a preference for younger Black She-oak, but will forage within older trees if younger trees become unreliable food sources (Cameron 2007). Few foraging signs and individual birds were recorded within the locality, these being within Bodalla SF. Given these factors, the relative significance of habitat within the study area is considered to be high.

Discussion of habitat utilisation

Glossy Black-cockatoo was regularly recorded in the south-west and west of the study area, where Black She-oak becomes common. Foraging signs and individual birds foraging were present. Cameron (2007) states that Black She-oak is the primary food resource for Glossy Black-cockatoo, and while individuals can move up to 12 kilometres in search of food, individuals tend to forage closer to their nest site. Given the regular foraging activity within

the study area, and the absence of hollow-bearing trees, it is hypothesised that a nest site is within relatively close proximity to the study area. This was not confirmed by this SIS.

Individuals were observed foraging within the SOFF EEC (**Map 16**). However, on closer inspection, the tree was in fact a single Black She-oak that was growing amongst the SOFF EEC.

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Glossy Black-cockatoo are unlikely to be significant given the highly mobile nature of this species (individuals can forage up to 12 kilometres) and that the species has been recorded crossing cleared land (Cameron 2007). As such, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.8.2 Assessment of habitat

Description of habitat values

Known foraging habitat for Glossy Black-cockatoo occurs within the study area across the fauna habitat mapped as Forest (**Map 16**) while potential and known foraging habitat in the locality is detailed on **Map 14**. The distribution of these fauna habitat types corresponds with the vegetation community descriptions provided within Section 4.3.2.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

As detailed within **Table 17**, 0.44 hectares of potential foraging habitat for the Glossy Black-cockatoo will be affected by the proposed works. This represents 19.9 percent of the potential foraging habitat available for Glossy Black-cockatoo within the study area. However, no known foraging habitat will be affected by the proposed works. All known feeding locations are away from the proposed works area, with the closest around 20 metres from the clearing boundary.

Table 17: Potential foraging habitat for Glossy Black-cockatoo that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR642 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats - Modified	2.21	0.44
Total	2.21	0.44

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on the NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works. Inspections of both managed lands confirm the presence of potential foraging habitat which is detailed within **Map 14**. However, there is a paucity of known foraging habitat within the locality and extensive field surveys failed to reveal a similar density of foraging signs to that of the study area. Nonetheless, both reserves extend beyond the locality and are likely to contribute significantly to the long term security of habitat at a regional scale.

In general, habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) shows similarities with that of the study area with the exception of hollow-bearing trees. Hollow-bearing trees were absent from the study area and this is due to both the vegetation community types present and the age of the vegetation. In the locality, hollow-bearing trees were regularly recorded and even within Bodalla SF where logging occurs, these habitat features are offered some level of protection.

5.4.8.3 Discussion of conservation status

Glossy Black-cockatoo is listed as vulnerable under the TSC Act. There is an endangered population in the Riverina, but the study area is well beyond the boundaries of this listing.

Glossy Black-cockatoo (and their foraging signs) was recorded during the EnviroKey field surveys within the study area as well as the locality.

According to OEH (2014c), Glossy Black-cockatoo is threatened by the following:

- Reduction of suitable habitat through clearing for development.
- Decline of hollow bearing trees over time due to land management activities.
- Excessively frequent fire which eliminates sheoaks from areas, prevents the development of mature sheoak stands, and destroys nest trees.
- Firewood collection resulting in loss of hollow bearing trees, reduced recruitment of hollow bearing trees, and disturbance of breeding attempts.

- Decline in extent and productivity of she-oak foraging habitat due to feral herbivores.
- Limited information on the location of nesting aggregations and the distribution of high quality breeding habitat.
- Disturbance from coal seam gas and open cut coal mining causing loss of foraging and breeding habitat as well as disturbing reproductive attempts.
- Forestry activity resulting in loss of hollow bearing trees, reduced recruitment of hollow bearing trees, degradation of foraging habitat, and disturbance of breeding attempts.
- Decline in extent and productivity of she-oak foraging habitat caused by moisture stress due to climate change.
- Grazing can degrade foraging habitat and limit the capacity of she-oak stands to regenerate following fire or drought.
- Illegal bird smuggling and egg-collecting.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Glossy Black-cockatoo and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Clearing of native vegetation – the proposed works will involve the clearing of 0.44 hectares of potential foraging habitat (no known foraging habitat would be removed).

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Glossy Black-cockatoo and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

To date, no recovery plan or threat abatement plan have been prepared for the Glossy Black-cockatoo. Through the Saving Our Species conservation program, the Glossy Black-cockatoo has been assigned as a site-managed species (OEH 2014b). Two sites have been identified for conservation activity; neither of which are located within the Southern Rivers CMA region.

5.4.9 Barking Owl

5.4.9.1 Discussion of local and regional abundance

Discussion of other known populations

Barking Owl occurs across all Australian states with the exception of Tasmania (Morcombe 2004). In NSW, Barking Owl is known from 1,326 previous records (OEH 2014a) and they

are known from all CMA regions (OEH 2014c). There are no published estimates for the abundance or population densities in NSW (NPWS 2003).

In the Southern Rivers CMA, 56 previous records are known with five of these within the Batemans CMA sub-region. Four of these previous records are from within Eurobodalla NP which is likely to contain the largest area of habitat that provides long term security for this species within the region.

Barking Owl was not recorded during the EnviroKey field surveys both within the study area and the locality. Given this, the relative significance of habitat within the study area is considered to be low.

Discussion of habitat utilisation

Barking Owl usually occurs in forests and woodlands where it will roost in dense foliage often in riparian areas or wetlands and most often in *Acacia* or *Casuarina* species (NPWS 2003; Shelly 2006). In the study area, Barking Owl would only be likely to utilise the Casuarina Forest or Wetland as potential roosting habitat, should it occur there. Extensive searches failed to reveal the presence of this species, or a past roost site often characterised by 'white- wash'.

Barking Owl typically occupies a traditional and permanent territory where they breed in later winter or spring (NPWS 2003). Radio tracking of females has revealed mixed results in relation to home range, with one female in north-east Victoria having a home range of 225 hectares (NPWS 2003) while an individual in Goonoo State Forest was found to have a home range of around 6,000 hectares (Schedvin *et al.* 2001).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Barking Owl are unlikely to be significant given the relatively mobile nature of this species. As such, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.9.2 Assessment of habitat

Description of habitat values

Potential roosting and foraging habitat for the Barking Owl occurs as Wetland and Casuarina Forest habitat within the study area (**Map 15**). The distribution of these fauna habitat types corresponds with the vegetation community descriptions provided within Section 4.3.2.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

As detailed within **Table 18**, 1.03 hectares of potential roosting and foraging habitat for the Barking Owl will be affected by the proposed works. This represents 26.6 percent of the potential habitat available for Barking Owl within the study area. No hollow-bearing trees would be removed by the proposed works.

Table 18: Potential habitat for the Barking Owl that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	3.88	1.03
Total	3.88	1.03

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on the NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works. Both managed lands extend beyond the locality and are likely to contribute significantly to the long term security of habitat at a regional scale.

In general, habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) shows similarities with that of the study area with the exception of hollow-bearing trees. Hollow-bearing trees were absent from the study area and this is due to both the vegetation community types present and the age of the vegetation. In the locality, hollow-bearing trees were regularly recorded and even within Bodalla SF where logging occurs, these habitat features are offered some level of protection.

5.4.9.3 Discussion of conservation status

Barking Owl is listed as vulnerable under the TSC Act.

Barking Owl was not recorded within the study area or the wider locality during the EnviroKey field surveys despite it being known from Eurobodalla NP.

According to OEH (2014c), Barking Owl is threatened by the following:

- Clearing and degradation of habitat, mostly through cultivation, intense grazing and the establishment of exotic pastures.

- Inappropriate forest harvesting practices that remove old, hollow-bearing trees and change open forest structure to dense regrowth.
- Firewood harvesting resulting in the removal of fallen logs and felling of large dead trees.
- Too-frequent fire leading to degradation of understorey vegetation which provides shelter and foraging substrates for prey species.
- Disturbance of nesting and excessive disturbance of foraging by inappropriate use of call-playback surveys.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Barking Owl and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Clearing of native vegetation – the proposed works will involve the clearing of 1.03 hectares of potential foraging and roosting habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Barking Owl and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

A draft recovery plan was prepared for Barking Owl in 2003 (NPWS 2003). The draft recovery plan outlines recovery objectives, criteria and actions. Recent changes to threatened species recovery in NSW saw the development of the Saving our Species conservation program. Through the program, the Barking Owl has been assigned as a landscape-managed species as the primary threats to this species generally occur at the landscape scale (ie, habitat loss and degradation) (OEH 2014b). OEH is currently developing a targeted approach to managing this species, however, in the interim, 17 management actions have been identified for the species (OEH 2014b). These are outlined as follows:

- Assess the size, viability and status in NSW using existing survey data and known information on distribution, preferred habitat, home range size and population density.
- Establish a program to monitor the NSW population and study its demographics, including the development, trial and establishment of a protocol for high-quality surveys to monitor the Barking Owl across land tenures and habitat types in NSW.
- Investigate conservation management strategies that act to manage known threats and restore habitat.

- Support biological and ecological studies e.g. preferred diet, reproductive strategies, home range, population viability.
- Support population genetics studies.
- Investigate the cultural and historic significance of the Barking Owl.
- Develop and distribute the Barking Owl information package. This will contain the species profile, environment assessment guidelines and pr escriptions to minimise potential impacts.
- Prepare a poster and undertake a community survey and media campaign in rural and regional NSW to raise community awareness of the Barking Owl. The importance of each individual owl, and par ticularly breeding sites will be stressed.
- Establish formal conservation arrangements for properties with Barking Owls, which can be used to protect wildlife habitat.
- Negotiate with individual land managers to achieve appropriate measures to protect all known Barking Owl nest sites. Protection will need to address threats such as human disturbance, collision with wires, and secondary poisoning from chemicals.
- Assess forestry prescriptions and Threatened Species Licences for their effectiveness in conserving the Barking Owl in State Forests.
- Incorporate the consideration of Barking Owl habitat and pot ential habitat as a high priority in the assessment of property for reserve establishment.
- Research is required into the effects of agricultural poisons upon the species.
- Maintain the threatened owl working group and links with owl researchers.
- Facilitate the establishment and maintenance of links with community involved in Barking Owl conservation.
- Coordinate the implementation of the recovery plan.
- Complete the final recovery plan for Barking Owls by 2006.

5.4.10 Masked Owl

5.4.10.1 Discussion of local and regional abundance

Discussion of other known populations

Masked Owl occurs in all Australian states and territories (Morcombe 2004). The population in NSW (in 2006) was estimated to be between 1,500 and 4,000 pairs but was suspected to be in decline given that the current distribution had declined by as much as 50 percent (DECC 2006a). Nonetheless, the eastern NSW population is continuous (DECC 2006a). In NSW, Masked Owl is known from 2,377 previous records (OEH 2014a) and they are known from all CMA regions (OEH 2014c).

In the Southern Rivers CMA, there are 519 previous records with 137 of these within the Batemans CMA sub-region. Masked Owl has been recorded in Eurobodalla NP (2 records)

and Bodalla SF (15 records) (OEH 2014a). Given this, it would be likely that both managed lands contain the largest areas of known habitat that provide long term security for the species within the region.

Masked Owl was not recorded during the EnviroKey field surveys within the study area or the locality. Given this, the high mobility of the species and the absence of hollow-bearing trees within the study area, the relative significance of habitat within the study area is considered to be low.

Discussion of habitat utilisation

Masked Owl occurs in eucalypt forests and woodlands across their range where they roost in dense foliage, tree hollows or caves and breed in tree hollows in either dead or live trees (DECC 2006a; Kavanagh and Bamkin 1995; Kavanagh and Murray 1996). In the study area, there are no hollow-bearing trees, confirming that Masked Owl would not breed within the existing habitats.

The species has a large home range, varying between 400 and 1, 000 hectares (DECC 2006a) and despite being common in landscapes that have some level of fragmentation, large, continuous forested landscapes within the home range of a breeding pair is considered critical to long-term survival (NGH 2010).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Masked Owl are unlikely to be significant given the relatively mobile nature of this species. As such, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.10.2 Assessment of habitat

Description of habitat values

Potential roosting and foraging habitat for the Masked Owl occurs across all habitats of the study area (**Map 15**). The distribution of these fauna habitat types corresponds with the vegetation community descriptions provided within Section 4.3.2.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

As detailed within **Table 19**, 1.47 hectares of potential foraging habitat for the Masked Owl will be affected by the proposed works. This represents 20.36 percent of the potential foraging habitat available for Masked Owl within the study area. No hollow-bearing trees would be removed by the proposed works.

Table 19: Potential habitat for the Masked Owl that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	3.88	1.03
SR642 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats - Modified	2.21	0.44
Ecotonal vegetation (SR642 dominant, some affinities with SR649, SR512)	0.93	0
Cleared land	0.2	-
Total	7.22	1.47

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on the NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works. Both extend beyond the locality and are likely to contribute significantly to the long term security of habitat at a regional scale.

In general, habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) shows similarities with that of the study area with the exception of hollow-bearing trees. Hollow-bearing trees were absent from the study area and this is due to both the vegetation community types present and the age of the vegetation. In the locality, hollow-bearing trees were regularly recorded and even within Bodalla SF where logging occurs, these habitat features are offered some level of protection.

5.4.10.3 Discussion of conservation status

Masked Owl is listed as vulnerable under the TSC Act.

Masked Owl was not recorded within the study area or the wider locality during the EnviroKey field surveys despite it being known from Eurobodalla NP and Bodalla SF.

According to OEH (2014c), Masked Owl is threatened by the following:

- Loss of mature hollow-bearing trees and changes to forest and woodland structure, which leads to fewer such trees in the future.

- Clearing of habitat for grazing, agriculture, forestry or other development.
- A combination of grazing and regular burning is a threat, through the effects on the quality of ground cover for mammal prey, particularly in open, grassy forests.
- Secondary poisoning from rodenticides.
- Being hit by vehicles.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Masked Owl and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Clearing of native vegetation – the proposed works will involve the clearing of 1.47 hectares of potential foraging and roosting habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Masked Owl and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

A final recovery plan was prepared for Large Forest Owls (which includes Masked Owl) in 2006 (DECC 2006a). The final recovery plan outlines recovery objectives, criteria and actions. Recent changes to threatened species recovery in NSW saw the development of the Saving our Species conservation program. Through the program, the Masked Owl has been assigned as a landscape-managed species as the primary threats to this species generally occur at the landscape scale (ie, habitat loss and degradation) (OEH 2014b). OEH is currently developing a targeted approach to managing this species, however, in the interim, 20 management actions have been identified for the species (OEH 2014b). These are outlined as follows:

- Prepare guidelines addressing issues associated with habitat protection and management and survey and assessment on private lands.
- Encourage CMA investment in actions that actively manage and/or conserve large forest owl habitat as part of their Catchment Action Plans.
- Encourage private landholders to undertake management options to conserve and/or actively manage forest owl habitat.
- Prepare environmental impact assessment guidelines to assist consent and determining authorities and environmental consultants to assess impacts of developments.
- Monitor and report on effectiveness of concurrence and licence conditions previously applied to reduce impacts of development on Masked Owls and their

habitats, by recording conditions, picking case studies and checking owl presence post development.

- Use records of concurrence and licence conditions to develop a set of prescriptive guidelines that may be used to mitigate the impacts of developments on the Masked Owl outside conservation reserves and State forests.
- Update and refine existing Masked Owl habitat models using the best available information and map the amount of modelled habitat across forested land in NSW.
- Design a sampling strategy to test the modelled habitat for the presence of Masked Owls and undertake field validation.
- Estimate amount of mapped modelled habitat for Masked Owls that is occupied (based on proportion of sample sites with owls in them). Use this to further estimate number of owl territories within different land tenures (based on home range data).
- Develop a sampling methodology stratified across different land tenures and disturbance histories, as well as a set of standardised regional monitoring protocols.
- Investigate and pursue the cooperative involvement of other agencies, researchers and the community in the implementation of the regional monitoring program.
- Implement a regional monitoring program. This will be undertaken once owl habitat models have been refined, validated and sampling strategy developed.
- Investigate the implementation of the forestry threatened species licence owl prescriptions by carrying out proactive audits targeting these prescriptions and through IFOA monitoring and reporting.
- Carry out post harvest surveys in locations where Masked Owls were detected prior to logging to determine if they are continuing to occupy the habitat.
- Encourage student radio tracking projects examining the use of logged and unlogged forest by the Masked Owl species.
- Make an assessment of the implementation and effectiveness of forestry owl prescriptions and if necessary refine the prescriptions and negotiate changes to the forestry threatened species licences.
- Seek an ARC Linkage Grant or other joint funding opportunity to initiate research into identified key areas of the biology and ecology of the three large forest owls.
- Convene a threatened owl workshop with relevant experts and stakeholders to reassess the state conservation status of the Masked Owl.

- Provide up to date and accurate large forest owl and habitat information in the PVP Developer - Threatened Species Tool'.
- Provide up to date information and data for the Biobanking assessment methodology.

5.4.11 Olive Whistler

5.4.11.1 Discussion of local and regional abundance

Discussion of other known populations

Olive Whistler is known from the wet forests of the Great Dividing Range in NSW, Victoria, south-east South Australia and Tasmania (Morcombe 2004). In NSW, it is known from 723 previous records (OEH 2014a) and occurs within the following CMA regions: Central West, Hawkesbury – Nepean, Hunter – Central Rivers, Murray, Murrumbidgee, Namoi, Northern Rivers and Southern Rivers (OEH 2014c).

In the Southern Rivers CMA, 338 records are known with 12 of these within the Bateman CMA sub-region. No previous records are known from the locality, however, there is a single record in Bodalla SF.

No Olive Whistler were recorded during the EnviroKey field surveys either within the study area or within the locality. Given this, the relative significance of habitat within the study area is considered to be low.

Discussion of habitat utilisation

Olive Whistler are mostly known from wet forest habitats above 500 metres elevation (OEH 2014c). However, during the winter months, individuals are known to move to lower altitudes, and in some instances, can be found within1 kilometre of the coastline where it can occupy dense vegetation (EnviroKey 2011). At best, the Wetland and Casuarina forest of the study area may provide potential winter habitat for Olive Whistler.

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south movement as well as west-east which may be of importance for Olive Whistler when migrating to lower altitudes in winter.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Olive Whistler are unlikely to be significant given the highly mobile nature of this species. As such, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.11.2 Assessment of habitat

Description of habitat values

Potential winter habitat for Olive Whistler occurs within the study area in the Wetland and Casuarina Forest habitat (**Map 15**). The distribution of these fauna habitat types corresponds with the vegetation community descriptions provided within Section 4.3.2.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

As detailed within **Table 20**, 1.03 hectares of potential winter habitat for Olive Whistler will be affected by the proposed works. This represents 26.6 percent of the potential habitat available for Olive Whistler within the study area.

Table 20: Potential winter habitat for the Olive Whistler that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	3.88	1.03
Total	3.88	1.03

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on t he NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works and while Olive Whistler has not been recorded in the locality, the extent of both suggests that they are likely to contribute significantly to the long term security of habitat at a regional scale.

In general, habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) shows similarities with that of the study area and are considered in moderate to good condition.

5.4.11.3 Discussion of conservation status

Olive Whistler is listed as vulnerable under the TSC Act.

Olive Whistler was not recorded during the EnviroKey field surveys within the study area or the locality. There are no previous records of Olive Whistler in the locality.

According to OEH (2014c), Olive Whistler is threatened by the following:

- Clearing and fragmentation of habitat.
- Fire that is too intense, widespread or frequent resulting in changed vegetation structure and composition.
- Predation by foxes and cats.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Olive Whistler and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Clearing of native vegetation – the proposed works will involve the clearing of 1.03 hectares of potential winter habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Olive Whistler and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

To date, no recovery plan or threat abatement plan have been prepared for the Olive Whistler. Through the Saving Our Species conservation program, the Olive Whistler has been assigned as a landscape-managed species as the primary threats generally act at the landscape scale (ie, habitat loss) rather than at specific locations. OEH is currently developing a targeted approach to managing this species, however, in the interim, a management action has been identified for the species (OEH 2014b). This action is as follows:

- Reserve Fire Management Strategy(s) to include operational guidelines that protect dense gully vegetation and rainforest.

5.4.12 Pink Robin

5.4.12.1 Discussion of local and regional abundance

Discussion of other known populations

Pink Robin is known from NSW, Victoria, South Australia and Tasmania (Morcombe 2004). In NSW, Pink Robin is known from 83 previous records (OEH 2014a) and it occurs within the following CMA regions: Murray, Murrumbidgee and Southern Rivers (OEH 2014c).

In the Southern Rivers CMA, 37 records are known with two of these within the Bateman CMA sub-region. Both of these records are from within the locality, but not within Eurobodalla NP or Bodalla SF.

Pink Robin was not recorded during the EnviroKey field surveys within the study area or the locality. Given these factors, the relative significance of habitat within the study area is considered to be low.

Discussion of habitat utilisation

Pink Robin inhabits rainforest and tall, open eucalypt forest with an apparent preference for densely vegetated gullies (OEH 2014c). Pink Robin breed between October and January and can produce two nests in a single season. There is some level of movement of the population associated with winter seasons. Pink Robin are known to disperse north and west into more open habitats in winter (OEH 2014c).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south movement as well as east-west which may be relevant should Pink Robin move from the coast into the mountains as part of winter movement patterns.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. As such, the proposed works are unlikely to represent a physical barrier for Pink Robin. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.12.2 Assessment of habitat

Description of habitat values

Potential habitat for Pink Robin is most likely within the Wetland and Casuarina Forest habitat as this is the most similar to a densely vegetated forest. The distribution of these fauna habitat types corresponds with the vegetation community descriptions provided within Section 4.3.2.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

As detailed within **Table 21**, 1.03 hectares of potential habitat for the Pink Robin will be affected by the proposed works. This represents 26.6 percent of the potential habitat available for Pink Robin within the study area.

Table 21: Potential habitat for the Pink Robin that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark	3.88	1.03

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
swamp forest on coastal floodplains		
Total	3.88	1.03

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on t he NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works. While Pink Robin has not been recorded in either, the extent of both managed lands suggests that they are likely to contribute significantly to the long term security of habitat at a regional scale.

In general, habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) shows similarities with that of the study area and are considered in moderate to good condition.

5.4.12.3 Discussion of conservation status

Pink Robin is listed as vulnerable under the TSC Act.

Pink Robin was not recorded during the EnviroKey field surveys within the study area or the locality.

According to OEH (2014c), Pink Robin is threatened by the following:

- Clearing of rainforest and tall, wet forest habitat, particularly near gullies.
- The impact of fire on this species is unknown, but regular fires are assumed to not be beneficial.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Pink Robin and are considered relevant to the proposed works:

- Predation by feral cats - clearing and m aintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and i ncrease predation rates.
- Clearing of native vegetation – the proposed works will involve the clearing of 1.03 hectares of potential habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Pink Robin and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

To date, no recovery plan or threat abatement plan have been prepared for the Pink Robin. Through the Saving Our Species conservation program, the Pink Robin has been assigned as a landscape-managed species as the primary threats generally act at the landscape scale (ie, habitat loss) rather than at specific locations. OEH is currently developing a targeted approach to managing this species, however, in the interim, four management actions has been identified for the species (OEH 2014b). These are outlined as follows:

- Using current records and literature on habitat requirements determine the current distribution and identify areas of potential habitat to undertake survey and management actions.
- Determine, through research, the ecological requirements of the species, particularly in regard to fire, and incorporate the information into Regional and Local Fire Plans.
- Use management agreements and incentives on private and leasehold land to manage total grazing pressure through such actions as removal of artificial water points and feral and native herbivore control.
- Review existing forestry operations in wet sclerophyll forest in State Forests and private land to determine overall impact on the value of habitat for this species, amend licensing prescriptions if necessary and/or identify areas where no harvesting should occur.

5.4.13 Scarlet Robin

5.4.13.1 Discussion of local and regional abundance

Discussion of other known populations

Scarlet Robin is known from all Australian mainland states and Tasmania (Morcombe 2004). It is also known from the ACT. In NSW, Scarlet Robin is known from 3,316 previous records and it is known from all CMA regions (OEH 2014c). In the Southern Rivers CMA, 580 records are known with three of these within the Bateman CMA sub-region.

Scarlet Robin has not previously been recorded within the locality, but there are existing records within Bodalla SF (3 records) (OEH 2014a). Given this, Bodalla SF is likely to contain the largest area of potential habitat that provides long term security for Scarlet Robin within the region.

Scarlet Robin was not recorded during the EnviroKey field surveys in the study area or the locality. The relative significance of habitat is considered to be low.

Discussion of habitat utilisation

Scarlet Robin is known from dry eucalypt forests and woodlands. The understory is generally open with a sparse understory and it can be found in mature or regrowth vegetation (OEH

2014c; Watson *et al.* 2001). Where they occur, they are usually resident, with dispersal occurring with juvenile birds and some adults to more open habitats in autumn and winter (OEH 2014c). Scarlet Robin can be found in pairs or occasionally small groups, likely to be juvenile birds from the last breeding season.

Scarlet Robin generally breed between the months of July and January and a pair will maintain a breeding territory. They are known to produce up to three clutches of eggs in a single season (OEH 2014c).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south and west-east movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. Given this, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.13.2 Assessment of habitat

Description of habitat values

Portions of the study area may contain potential habitat for Scarlet Robin. This would be confined to areas containing Spotted Gum and Eucalypt species mapped as Forest. Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

As detailed within **Table 22**, 0.44 hectares of potential habitat for the Scarlet Robin will be affected by the proposed works. This represents 19.9 percent of the potential habitat available for Scarlet Robin within the study area.

Table 22: Potential habitat for the Scarlet Robin that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR642 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats - Modified	2.21	0.44
Total	2.21	0.44

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on t he NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works. Both managed lands extend beyond the locality and given the previous records of Scarlet Robin in Bodalla SF both are likely to contribute significantly to the long term security of habitat at a regional scale.

In general, habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) shows similarities with that of the study area.

5.4.13.3 Discussion of conservation status

Scarlet Robin is listed as vulnerable under the TSC Act.

Scarlet Robin was not recorded during the EnviroKey field surveys in the study area or the locality.

According to OEH (2014c), Scarlet Robin is threatened by the following:

- Historical habitat clearing and degradation.
- Habitat modification due to overgrazing.
- Reduction of size of remnant patches.
- Reduction in the structural complexity of habitat, including reductions in canopy cover, shrub cover, ground cover, logs, fallen branches and leaf litter.
- Reduction of the native ground cover in favour of exotic grasses.
- Loss of nest sites, food sources and foraging sites, such as standing dead timber, logs and coarse woody debris from depletion by grazing, firewood collection and ‘tidying up’ of rough pasture.
- Predation by over-abundant populations of Pied Currawong which are supported by planted exotic berry-producing shrubs; this pressure, is addition to that from other native and exotic predators, may be a potentially severe threat to the breeding success of Scarlet Robin populations.
- Predation by feral cats.
- Robbing of nests and predation of fledglings by rats.
- Isolation of patches of habitat, particularly where these patches are smaller than 30 hectares, and in landscapes where clearing has been heavy or where remnants are surrounded by cropping or stock grazing.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Scarlet Robin and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Removal of dead wood and trees – clearing and maintenance will reduce the quantity of dead wood at ground level resulting in decreased food supply.
- Clearing of native vegetation – the proposed works will involve the clearing of 0.44 hectares of potential habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Scarlet Robin and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

To date, no recovery plan or threat abatement plan have been prepared for the Scarlet Robin. Through the Saving Our Species conservation program, the Scarlet Robin has been assigned as a landscape-managed species as the primary threats occur at a landscape scale (ie, habitat loss and degradation). OEH is currently developing a targeted approach to managing this species, however, in the interim, five management actions have been identified for the species (OEH 2014b). These are outlined as follows:

- Implement a cool patch burning regime in appropriate habitat.
- Identify and secure appropriate habitat and improve management by erecting fences, adding supplementary planting, managing or reducing grazing, increasing size of habitat patches, planting stepping-stone linking patches and encourage the retention or placement of fallen logs, coarse woody debris and standing dead trees.
- Remove berry-bearing exotic plantings from farms (as these encourage increased Pied Currawong populations) and replant using locally indigenous species, especially wattles (Acacia spp.).
- Implement feral cat control at priority sites.
- Implement rodent control at priority sites.

5.4.14 Little Lorikeet

5.4.14.1 Discussion of local and regional abundance

Discussion of other known populations

Little Lorikeet is known from Queensland, NSW, Victoria and South Australia (Courtney and Debus 2006; Morcombe 2004). However, NSW provides the core of the habitat for this species with individuals recorded as far west as Dubbo and Albury when food availability is high (OEH 2014c). In NSW, previous records of Little Lorikeet total 2,822 (OEH 2014a) and

they are known from all CMA regions with the exception of Lower Murray-Darling and Western (OEH 2014c).

In the Southern Rivers CMA, 180 records are known with 65 of these within the Bateman CMA sub-region. The species has been previously recorded within Eurobodalla NP (11 records) and Bodalla SF (2 records). Both managed lands contain the largest areas of habitat that is likely to provide long term security for the species within the region.

No Little Lorikeet were recorded during the EnviroKey field surveys either within the study area or within the locality. Given this, the relative significance of habitat within the study area is considered to be low.

Discussion of habitat utilisation

Little Lorikeet are primarily associated with open eucalypt forest and woodland (Courtney and Debus 2006). However, they are also known to utilise habitats where Angophora, Melaleuca and other tree species occur. Their apparent preference for riparian habitats is likely to due to greater soil fertility which influences productivity of flowering species (OEH 2014c).

Little Lorikeet are a relatively mobile species utilising isolated flowering trees in paddocks, roadside vegetation and urban areas. Little Lorikeet nest in tree hollows typically in smooth-barked eucalypts in close proximity to feeding areas (OEH 2014c). On the south coast, Blackbutt is a commonly utilised nesting tree (pers.obs).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south and west-east movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Little Lorikeet are unlikely to be significant given the relatively mobile nature of this species. As such, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.14.2 Assessment of habitat

Description of habitat values

The study area contains various habitat features that Little Lorikeet may utilise from time to time. These occur in all habitats present. This includes Eucalypts and Melaleuca when flowering, but an absence of any hollow-bearing trees precludes breeding activity within the study area.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area is generally in moderate to good condition despite the absence of hollow-bearing trees; an element critical to breeding Little Lorikeet.

As detailed within **Table 23**, 1.47 hectares of potential foraging habitat for the Little Lorikeet will be affected by the proposed works. This represents 20.36 percent of the known foraging habitat available for Little Lorikeet within the study area.

Table 23: Potential foraging habitat for the Little Lorikeet that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	3.88	1.03
SR642 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats - Modified	2.21	0.44
Ecotonal vegetation (SR642 dominant, some affinities with SR649, SR512)	0.93	0
Cleared land	0.2	-
Total	7.22	1.47

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on the NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works. The species has been previously recorded within Eurobodalla National Park (11 records) and Bodalla State Forest (2 records). Both managed lands extend beyond the locality and are likely to contribute significantly to the long term security of habitat at a regional scale.

In general, potential habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) shows similarities with that of the study area with the exception of hollow-bearing trees. Hollow-bearing trees were absent from the study area and this is due to both the vegetation community types present and the age of the vegetation. In the locality, hollow-bearing trees were regularly recorded and even within Bodalla SF where logging occurs, these habitat features are offered some level of protection.

5.4.14.3 Discussion of conservation status

Little Lorikeet is listed as vulnerable under the TSC Act.

Little Lorikeet were not recorded during the EnviroKey field surveys in the study area, or the locality.

According to OEH (2014c), Little Lorikeet is threatened by the following:

- Habitat loss and degradation.
- Loss of hollow-bearing trees.
- Increased competition with native and exotic species for hollows.
- Competition with the introduced honeybee for both nectar and hollows.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Little Lorikeet and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Clearing of native vegetation – the proposed works will involve the clearing of 1.47 hectares of potential foraging habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Little Lorikeet and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

To date, no recovery plan or threat abatement plan have been prepared for the Little Lorikeet. Through the Saving Our Species conservation program, the Little Lorikeet has been assigned as a landscape-managed species as the primary threats occur at a landscape scale (ie, habitat loss and degradation). OEH is currently developing a targeted approach to managing this species, however, in the interim, two management actions have been identified for the species (OEH 2014b). These are outlined as follows:

- Encourage retention of old-growth and hollow-bearing trees through community engagement and other mechanisms including PVPs, BioBanking and EIA.
- Avoid burning woodland with old-growth and hollow-bearing trees.

5.4.15 Little Eagle

5.4.15.1 Discussion of local and regional abundance

Discussion of other known populations

Little Eagle occurs across Australia in all mainland states and territories (Morcombe 2004). In NSW, Little Eagle is known from 1,672 previous records (OEH 2014a) and is widespread, occurring in all CMA regions (OEH 2014c). Little Eagle is known as a single population in NSW (OEH 2014c).

In the Southern Rivers CMA, 92 records are known with 15 of these within the Bateman CMA sub-region. The species has been previously recorded within the locality (6 records) including Eurobodalla NP (2 records) (OEH 2014a). Both Eurobodalla NP and Bodalla SF contain the largest areas of habitat that provide long term security for the species within the region.

No Little Eagle were recorded during the EnviroKey field surveys either within the study area or within the locality. Given this, the relative significance of habitat within the study area is considered to be low.

Discussion of habitat utilisation

Little Eagle are known to utilise open eucalypt forest and woodland (OEH 2014c). Little Eagle build a large stick nest in winter usually within a live tree where they will lay two or three eggs during spring (OEH 2014c). Young generally fledge in summer with generation length estimated at 10 years (OEH 2014c).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south and west-east movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Little Eagle are unlikely to be significant given the highly mobile nature of this species. As such, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.15.2 Assessment of habitat

Description of habitat values

The study area in its entirety is likely to provide potential habitat for Little Eagle. Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

As detailed within **Table 24**, 1.47 hectares of potential habitat for Little Eagle will be affected by the proposed works. This represents 20.36 percent of the known foraging habitat available for Little Eagle within the study area.

Table 24: Potential habitat for the Little Eagle that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	3.88	1.03
SR642 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats - Modified	2.21	0.44
Ecotonal vegetation (SR642 dominant, some affinities with SR649, SR512)	0.93	0
Cleared land	0.2	-
Total	7.22	1.47

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on t he NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works and there are six previous records of Little Eagle within the locality. Both managed lands extend beyond the locality and are likely to contribute significantly to the long term security of habitat at a regional scale.

In general, habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) shows similarities with that of the study area.

5.4.15.3 Discussion of conservation status

Little Eagle is listed as vulnerable under the TSC Act.

Little Eagle were not recorded during the EnviroKey field surveys in the study area or the locality.

According to OEH (2014c), Little Eagle is threatened by the following:

- Secondary poisoning from rabbit baiting.
- Rural-residential subdivision and as sociated land uses (e.g. horse and goat grazing).
- Urban expansion.
- Clearing and degradation of foraging and breeding habitat.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Little Eagle and are considered relevant to the proposed works:

- Clearing of native vegetation – the proposed works will involve the clearing of 1.47 hectares of potential habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Little Eagle and are considered relevant to the proposed works:

- Land clearance – see above.

To date, no recovery plan or threat abatement plan have been prepared for the Little Eagle. Through the Saving Our Species conservation program, the Little Eagle has been assigned as a landscape-managed species as the primary threats occur at a landscape scale (ie, habitat loss and degradation). OEH is currently developing a targeted approach to managing this species, however, in the interim, three management actions have been identified for the species (OEH 2014b). These are outlined as follows:

- Raise awareness non-target poisoning from baits.
- Identify and secure appropriate habitat and improve management by erecting fences, adding supplementary planting, managing or reducing grazing, increasing size of habitat patches, planting stepping-stone linking patches and encourage the retention or placement of fallen logs, coarse woody debris and standing dead trees.
- Raise awareness of loss of habitat through population pressure and implement appropriate controls in areas subject to urban expansion, including identification of appropriate habitat and implementation of improved management.

5.4.16 Regent Honeyeater

5.4.16.1 Discussion of local and regional abundance

Discussion of other known populations

Regent Honeyeater occurs in Queensland, New South Wales, Victoria and South Australia (Frankin *et al.* 1989; Menkhorst *et al.* 1999; NPWS 1999a; OEH 2014c; Oliver 1998). The Regent Honeyeater Recovery Plan suggests that the total population may be between 500 and 1,500 birds (Menkhorst *et al.* 1999). In NSW, previous records total 2,073 (OEH 2014a) and they are known from all CMA regions with the exception of Lower Murray-Darling and Western (OEH 2014c).

In the Southern Rivers CMA, a total of 60 previous records are known with 29 of these within the Bateman CMA sub-region. There are only two previous records within the locality (one of these within Potato Point village in a suburban garden – T. Ricketson, email.), but they have been previously recorded within Eurobodalla NP (6 records) and Bodalla SF (1 record) (OEH 2014a).

Three key breeding areas are known, two of these being located in NSW. The NSW breeding areas are in the Capertee Valley and Bundarra-Barraba regions (Menkhorst *et al.* 1999). Regent Honeyeater is a highly nomadic species with preliminary data confirming that movements up to several hundred kilometres is not uncommon (OEH 2014c).

No Regent Honeyeater were recorded during the EnviroKey field surveys either within the study area or within the locality. However, the timing of the field surveys was likely not commensurate with their detection period, as on most occasions, they are known between autumn and spring on the south coast. However, with consideration of the habitat present, the highly mobile nature of the species and that they are known to utilise suburban areas, the relative significance of habitat within the study area is considered to be low.

Discussion of habitat utilisation

Regent Honeyeater is considered a flagship threatened woodland bird which utilises habitats dominated by Mugga Ironbark, Yellow Box, Blakey's Red Gum, White Box and Swamp Mahogony (OEH 2014c). However, lowland coastal forests are increasingly being utilised by Regent Honeyeater and it is hypothesised that Spotted Gum forests may provide a drought refuge when woodlands on the western slopes fail to flower (Menkhorst *et al.* 1999).

Regent Honeyeater is also known to utilise urban and suburban habitats. This includes a relatively recent record in Potato Point village in a backyard and the well-known use of planted Mugga Ironbark and Yellow Box in the urban areas of Albury.

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south and west-east movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Regent Honeyeater are unlikely to be significant given the relatively mobile nature of this species. As such, the proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.16.2 Assessment of habitat

Description of habitat values

Portions of the study area may contain potential foraging habitat for Regent Honeyeater. This would be confined to areas containing Spotted Gum given that they are known to utilise these habitats on the south coast from time to time.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area is generally in moderate to good condition.

As detailed within **Table 25**, 0.44 hectares of potential habitat for Regent Honeyeater will be affected by the proposed works. This represents 19.9 percent of the potential foraging habitat available for Regent Honeyeater within the study area.

Table 25: Potential foraging habitat for Regent Honeyeater that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR642 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats - Modified	2.21	0.44
Total	2.21	0.44

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on t he NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works and Regent Honeyeater has been previously recorded in both. Both managed lands extend beyond the locality and are likely to contribute significantly to the long term security of habitat at a regional scale.

In general, habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) shows similarities with that of the study area particularly with regard to the presence of Spotted Gum forest habitat.

5.4.16.3 Discussion of conservation status

Regent Honeyeater is listed as critically endangered under the TSC Act and endang ered under the EPBC Act.

Regent Honeyeater was not recorded during the EnviroKey field surveys in the study area or the locality.

According to OEH (2014c), Regent Honeyeater is threatened by the following:

- Historical loss, fragmentation and deg radation of habitat from clearing for agricultural and residential development, particularly fertile Yellow Box-White Box-Blakely's Red Gum woodlands.
- Continuing loss of key habitat tree species and remnant woodlands from strategic agricultural developments, timber gathering and residential developments.
- Suppression of natural regeneration of overstorey tree species and s hrub species from overgrazing. Riparian gallery forests have been p articularly impacted by overgrazing.
- Inappropriate forestry management practices that remove large mature resource-abundant trees. Firewood harvesting in Box-Ironbark woodlands can also remove important habitat components.

- Competition from larger aggressive honeyeaters, particularly Noisy Miners, Noisy Friarbirds and Red Wattlebirds.
- The small population size and restricted habitat availability make the species highly vulnerable to extinction via stochastic processes.
- Egg and nest predation by native birds.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Regent Honeyeater and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Clearing of native vegetation – the proposed works will involve the clearing of 0.44 hectares of potential foraging habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the Regent Honeyeater and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

A recovery plan was prepared for the Regent Honeyeater in 1999 that identified recover objectives, criteria and action (Menkhorst *et al.* 1999). Recent changes to threatened species recovery in NSW saw the development of the Saving our Species conservation program. Through the program, the Regent Honeyeater has been assigned as a site-managed species (OEH 2014b). OEH has established four management sites where conservation activities need to take place to ensure the conservation of Regent Honeyeater and secure it from extinction over the next 100 years. None of these sites are located within the Eurobodalla local government area, or indeed on the NSW far south coast.

5.4.17 Southern Brown Bandicoot

5.4.17.1 Discussion of local and regional abundance

Discussion of other known populations

Southern Brown Bandicoot has a patchy distribution occurring in New South Wales, Victoria, South Australia and Queensland (Braithwaite 1983; Menkhorst and Knight 2010). In NSW, Southern Brown Bandicoot is known from 721 records (OEH 2014a) and they are known from the following CMA regions: Hawkesbury – Nepean, Sydney Metro and Southern Rivers (OEH 2014c).

In the Southern Rivers CMA, Southern Brown Bandicoot is known from 300 previous records with only one of these from within the Bateman CMA sub-region (OEH 2014a). A single road-killed specimen is known from the Grandfather's Gully area at Surf Beach near

Batemans Bay. Given this, Southern Brown Bandicoot is considered very rare in the Eurobodalla LGA, and known from only a single population.

No Southern Brown Bandicoot were recorded during the EnviroKey field surveys within the study area or the locality despite extensive motion-activated camera surveys. Given this, the relative significance of habitat within the study area is considered to be low.

Discussion of habitat utilisation

Southern Brown Bandicoot are known to have a home ranges as low as 2 to 3 hectares for females and between 5-20 hectares for males (DECC 2006b). The species is known to occupy habitats that are heath, or open forest with a heathy understorey on sandy or friable soil. Habitat utilisation by bandicoots in general has been suggested to increase with increasing ground cover vegetation from between 0.5 and 2 metres in height, where soil fertility is low and in habitat that is between 6-18 years post-fire (Claridge and Barry 2000). Work completed by Forests NSW specifically on Southern Brown Bandicoot reveals that the heathy understory habitats preferred by this species in southern NSW generally have an overstorey of *Eucalyptus consideniana*, *E.ovata* and *E.globoidea* (ForestsNSW 2007).

Extensive field surveys using motion-activated infrared cameras in the study area revealed only the presence of Long-nosed Bandicoot (not listed as threatened).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south and east-west movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Southern Brown Bandicoot even if they occur there, are unlikely to be significant. The proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.17.2 Assessment of habitat

Description of habitat values

Portions of the study area may contain potential habitat for Southern Brown Bandicoot, but this is dubious given that the vegetation communities present are not commensurate with the known habitat requirements of the species. At best, only areas of dry, Spotted Gum forest habitat may be considered marginally potential habitat but these lack a heathy understorey.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

As detailed within **Table 26**, 0.44 hectares of marginally potential habitat for Southern Brown Bandicoot will be affected by the proposed works. This represents 19.9 percent of the potential habitat available for Southern Brown Bandicoot within the study area.

Table 26: Potential habitat for Southern Brown Bandicoot that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR642 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats - Modified	2.21	0.44
Total	2.21	0.44

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on the NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works and despite no records of Southern Brown Bandicoot within either, both managed lands extend beyond the locality and are likely to contribute to the long term security of habitat at a regional scale, particularly where suitable heathy habitat and low fertility occurs along the low ridges of Bodalla SF.

In general, habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) bears some similarities with that of the study area and given the extent of both, a diverse range of habitats are likely to occur given difference fire histories and management regimes across both managed lands.

5.4.17.3 Discussion of conservation status

Southern Brown Bandicoot is listed as endangered under the TSC Act and EPBC Act.

Despite extensive surveys, Southern Brown Bandicoot was not recorded during the EnviroKey field surveys in the study area or the locality.

According to OEH (2014c), Southern Brown Bandicoot is threatened by the following:

- Loss and fragmentation of habitat through land-clearing for agriculture and urban development and changes in forest structure.
- Burning regimes that impact on understorey species and floristic structure.
- Predation by introduced predators such as cats, dogs and foxes.
- Death or injury by fire and motor vehicles.
- Unsure of the species' localised distribution or abundance.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Southern Brown Bandicoot and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Clearing of native vegetation – the proposed works will involve the clearing of 0.44 hectares of potential foraging habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten Southern Brown Bandicoot and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

An approved recovery plan was prepared for Southern Brown Bandicoot in 2006 which outlines recovery objectives, criteria and actions (DECC 2006b). Recent changes to threatened species recovery in NSW saw the development of the Saving our Species conservation program. Through the program, Southern Brown Bandicoot has been assigned as a site-managed species as the primary threats to this species generally occur at the landscape scale (ie, habitat loss and degradation) (OEH 2014b). OEH has established three management sites where conservation activities need to take place to ensure the conservation of Southern Brown Bandicoot and secure it from extinction over the next 100 years. None of these sites are located within the Eurobodalla local government area.

5.4.18 Long-nosed Potoroo

5.4.18.1 Discussion of local and regional abundance

Discussion of other known populations

Long-nosed Potoroo occurs on the east coast of Australia from Queensland through to eastern Victoria and Tasmania (Claridge *et al.* 2007; OEH 2014c). In NSW, Long-nosed Potoroo is known from 949 previous records (OEH 2014a) and they are known from the following CMA regions: Hawkesbury – Nepean, Hunter – Central Rivers, Northern Rivers and Southern Rivers (OEH 2014c).

In the Southern Rivers CMA, a total of 675 previous records are known with 24 of these within the Bateman CMA sub-region. While there are no records of Long-nosed Potoroo within the locality or Eurobodalla NP, there are a number of records within Bodalla SF outside of the locality (13 records) (OEH 2014a).

No Long-nosed Potoroo (or signs of their foraging through an absence of cylindrical rather than conical diggings (Triggs 2008)) were recorded during the EnviroKey field surveys either within the study area or within the locality.

Discussion of habitat utilisation

Long-nosed Potoroo are often crepuscular however, in the winter months they are known to be active during the day (OEH 2014c). Long-nosed Potoroo are known to occupy coastal heaths and dry and wet sclerophyll forests (Claridge *et al.* 2007; Holland and Bennett 2007; Menkhorst and K night 2010; OEH 2014c). Essential elements to occupied habitat are a dense understorey with occasional open elements and a sandy loam soil (OEH 2014c).

Long-nosed Potoroo are generally solitary with home ranges varying between 2-5 hectares (OEH 2014c).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south movement.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale. The impacts of this fragmentation on the Long-nosed Potoroo even if they occur there, are unlikely to be significant. The proposed works are unlikely to represent a physical barrier for the species. The effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.18.2 Assessment of habitat

Description of habitat values

Potential habitat for Long-nosed Potoroo occurs within the study area in the Wetland and Casuarina Forest habitat (**Map 15**). The distribution of these fauna habitat types corresponds with the vegetation community descriptions provided within Section 4.3.2.

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. All vegetation communities and habitat within the study area are generally in moderate to good condition.

As detailed within **Table 27**, 1.03 hectares of potential habitat for Long-nosed Potoroo will be affected by the proposed works. This represents 26.6 percent of the potential habitat available for Long-nosed Potoroo within the study area.

Table 27: Potential habitat for Long-nosed Potoroo that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR649 Swamp Oak - Prickly Tea-tree - Swamp Paperbark swamp forest on coastal floodplains	3.88	1.03

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
Total	3.88	1.03

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on t he NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works and despite no records of Long-nosed Potoroo within either, both managed lands extend beyond the locality and are likely to contribute to the long term security of habitat at a regional scale, particularly where suitable heathy habitat and low fertility occurs along the low ridges of Bodalla SF.

In general, habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) bears some similarities with that of the study area and given the extent of both, a diverse range of habitats are likely to occur given difference fire histories and management regimes across both management lands.

5.4.18.3 Discussion of conservation status

Long-nosed Potoroo is listed as vulnerable under the TSC Act and EPBC Act.

Despite extensive surveys, Long-nosed Potoroo was not recorded during the EnviroKey field surveys in the study area or the locality.

According to OEH (2014c), Long-nosed Potoroo is threatened by the following:

- Habitat loss and fragmentation from land clearing for residential and agricultural development.
- Predation from foxes, dogs and cats.
- Too frequent fires or grazing by stock that reduce the density and f loristic diversity of understorey vegetation.
- Logging regimes or other disturbances that reduce the availability and abundance food resources, particularly fungi, and ground cover.
- Removal of wild dogs and dingoes potentially exposes potoroos to other threats (competition from other species of wallaby / fox predation) due to removal of top order predator.
- Unplanned clearing in areas where the species occurs on pr ivate property is likely to degrade the species' habitat.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten Long-nosed Potoroo and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Clearing of native vegetation – the proposed works will involve the clearing of 1.03 hectares of potential foraging habitat.

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten Long-nosed Potoroo and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

To date, no recovery plan or threat abatement plan have been prepared for the Long-nosed Potoroo. Through the Saving Our Species conservation program, the Long-nosed Potoroo has been assigned as a site-managed species (OEH 2014b). OEH has established five management sites where conservation activities need to take place to ensure the conservation of Long-nosed Potoroo and secure it from extinction over the next 100 years. None of these sites are located within the Eurobodalla LGA.

5.4.19 White-footed Dunnart

5.4.19.1 Discussion of local and regional abundance

Discussion of other known populations

White-footed Dunnart is known to occur in south-east New South Wales, Victoria and Tasmania with an outlying population in Queensland (Menkhorst and Knight 2010). In NSW, White-footed Dunnart are known from 117 records with the majority of these from within Southern Rivers CMA (111 records). Within the Bateman CMA sub-region, 13 previous records are known (OEH 2014a). Two disjunct populations are known; one being in the coastal forests at Broulee (Keystone 2013), the second in forests in Eurobodalla NP/Bodalla SF (Korn 1999). A large population of White-footed Dunnart is also known from Mumbulla Mountain about 50 kilometres south of the Narooma (Lunney and Ashby 1987) and other significant populations are known from Jervis Bay, Waratah Creek and Yambulla and the Nadgee Wilderness (NPWS 1999c).

One White-footed Dunnart was trapped in a pitfall bucket within the study area on 19th February 2014. This capture triggered additional requirements within the DGR notably additional field surveys within the locality to determine the significance of the population within the study area.

Given that some data was available on White-footed Dunnart from the research of Korn (1999), a review of this work and capture rates was completed. Key sites where White-footed Dunnart was captured in this work included Brou Lake – Dune Complex (DC1), Coastal Woodland Complex – Brou Lake Road (CWC1) and Blackfellow's Point (CWC2). As

this work was completed 16 years ago and that White-footed Dunnart is thought to have affinities with disturbance regimes (Lunney *et al.* 1989a), this study surveyed those three sites as well as two additional sites (both directly adjacent to the southern boundary of the study area) for the additional White-footed Dunnart surveys.

Table 28: White-footed Dunnart capture data from the field surveys within the study area and locality.

TRAP SITE	TOTAL CAPTURES OF WHITE-FOOTED DUNNART	TOTAL RECAPTURES OF WHITE-FOOTED DUNNART
DC1 (Brou Lake Dune Complex)	18	3
CWC1 (Brou Lake campsite)	1	0
CWC2 (Blackfellow's Point)	1	0
PF1 (SOFF EEC within the study area)	0	0
PF2 (disturbed Forest within the study area)	1	0
PF3 (disturbed Forest adjacent to southern boundary of study area)	0	0
PF4 (disturbed Forest directly adjacent to southern point of PF3)	1	0
Total	22	3

White-footed Dunnart were captured at all but two of the seven survey locations (**Table 28**). This study identified a relatively large population of White-footed Dunnart at a previous site of Korn (1999) known as DC1 (15 individuals). This site is located on a dune between Brou Lake and the beach about 2.7 kilometres south of the study area. It could be hypothesised that the White-footed Dunnart at DC1 are part of the same population at those within and adjacent to the study area given the known movement and dispersal capabilities of White-footed Dunnart (Lunney and Leary 1989). Further supporting this theory, vegetation in this area has been known to provide habitat at other sites (ie, dune complex and coastal forest) (Korn 1999), and White-footed Dunnart was previously recorded by Korn (1999) between DC1 and the study area at Tarouga Road further increasing the likelihood of connectivity through dispersal. Given the large gap (c.250 metres) between heath vegetation at DC1 (Brou Lake Dune Complex) and CWC2 (Brou Lake Campsite), it is unlikely that dispersal would occur between these two sites. However, these hypotheses were not tested by this SIS.

Korn (1999) concludes that the regional distribution of White-footed Dunnart is "reasonably extensive" with the species being known from National Parks and from within Bodalla SF, including portions that have been harvested for timber.

Discussion of habitat utilisation

White-footed Dunnart is known from a range of different habitats including coastal dune vegetation, coastal forest, tussock grassland, heathland, woodland and forest (Keystone 2013; Korn 1999; Lunney *et al.* 1989a; Lunney *et al.* 1989b; OEH 2014c). OEH (2014c) acknowledge the ability of White-footed Dunnart to utilise disturbed habitats including logged forest which was also confirmed by the radio-tracking of a female White-footed Dunnart by Korn (1999). However, recent studies provide evidence that White-footed Dunnart prefers a relatively dense, mid-succession habitat (Wilson and Aberton 2006).

In this study, White-footed Dunnart were found to utilise habitats ranging from Spotted Gum forest with a Burrawang understorey, Coastal forest dominated by Bangalay, Dune heathland, and disturbed Spotted Gum forest confirming that locally and likely regionally, White-footed Dunnart utilise a range of different habitats.

Interestingly, this SIS found White-footed Dunnart were occupying habitats where the species was present 16 years prior. No significant disturbance events had occurred at some sites while others were recently disturbed habitats. Given these results, we suggest that White-footed Dunnart occurs in habitats that are recently disturbed through to dense, mid-succession habitats (as in CWC1 - Brou Lake Campsite).

Discussion of corridors

The locality comprises large areas of native vegetation to the north, south and west of the study area (**Map 4**). In a landscape context, these provide a major corridor for north-south and west-east movement. In consideration of the general movement ability of White-footed Dunnart, the landscape provides ample opportunity.

Given the relatively minor nature of the proposed works, it is acknowledged that while this will contribute to existing fragmentation of forest around Potato Point, it is unlikely to exacerbate the general effects of habitat fragmentation at the landscape scale, particularly given that the proposed works will be undertaken adjacent to Potato Point-Bodalla Road. Given this, the proposed works are unlikely to represent a physical barrier for the species. Nonetheless, Korn (1999) revealed that White-footed Dunnart has the ability to cross open spaces including roads. Given this, the effects of habitat fragmentation as a result of the proposed works are considered low.

5.4.19.2 Assessment of habitat

Description of habitat values

Known habitat for White-footed Dunnart occurs within the study area on the basis of one female White-footed Dunnart being trapped in habitat to the west of Jemison's Point Road and a male to the south of the study area (also west of Jemison's Point Road). The known habitat within the study area is provided in **Map 17**. Much of this habitat has been the subject of ongoing maintenance as it forms part of the existing APZ for Potato Point, and is

mechanically slashed on a regular basis. Nonetheless, it may be the existing maintenance regime that is providing suitable habitat for this species given that White-footed Dunnart are known to respond to disturbance in varying forms (Korn 1999; Lunney and Leary 1989; Lunney *et al.* 1989a).

Discussion of the general condition and habitat features within these habitats and vegetation communities is provided in Section 4.3.2 and Section 4.3.5. Despite the current maintenance regime, all vegetation communities and habitat within the study area are generally in moderate to good condition.

As detailed within **Table 29**, 0.44 hectares of potential habitat for White-footed Dunnart will be affected by the proposed works. No White-footed Dunnart were trapped during this study in that portion of the study area, despite pitfall traps being established and activated in that portion. The vegetation is dense in this area, likely influenced by the fertility and dampness of the adjacent Casuarina Forest and at best, it could be considered marginally potential habitat only. No known habitat for White-footed Dunnart (west of Jemison's Point Road) will be affected by the proposed works.

Table 29: Potential habitat for White-footed Dunnart that will be affected by the proposed works.

Biometric Vegetation Type	Extent within the study area (hectares)	Extent within the subject site (extent to be cleared) (hectares)
SR642 Spotted Gum - Grey Ironbark - Woollybutt grassy open forest on coastal flats - Modified	2.21	0.44
Total	2.21	0.44

Distribution and condition of regional habitats

National Parks, Nature Reserves and State Forests are important contributors to the regional conservation of habitats on the NSW south coast (DECCW 2010b). In the locality, Eurobodalla NP and Bodalla SF comprise 43.3 percent of land within a 5 kilometre radius of the proposed works and White-footed Dunnart has been previously recorded in both. Both managed lands extend beyond the locality and are likely to contribute significantly to the long term security of habitat at a regional scale. Additionally, a large population of White-footed Dunnart is known from Mt Mumbulla (up to 99 individuals have been captured in an area of around 500 hectares), about 50 kilometres south of the study area (Lunney and Leary 1989) and a population of unknown size occurs at Broulee about 24 kilometres north (Keystone 2013). Other significant populations include Jervis Bay, Waratah Creek and Yambulla and the Nadgee Wilderness (NPWS 1999c).

In general, habitat condition within Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) shows similarities with that of the study area providing a range of different habitats

and fire histories. Habitats utilised by White-footed Dunnart as discussed in Section 5.4.1.1 are found throughout both managed lands.

5.4.19.3 Discussion of conservation status

White-footed Dunnart is listed as vulnerable under the TSC Act.

White-footed Dunnart was recorded during the EnviroKey field surveys within the study area, directly to the south of the study area and at three locations in the locality.

According to OEH (2014c), White-footed Dunnart is threatened by the following:

- Loss and fragmentation of habitat resulting from land clearing for residential and agricultural developments.
- Modification and disturbance of habitat in coastal forest and foredune complex vegetation by camping and other recreational activities.
- Predation by foxes, cats and dogs.
- Collection of firewood from areas of habitat, including standing dead timber and logs on the ground.
- Fire regimes that result in continual absence of cover or thick regeneration may be deleterious.
- Studies conducted to date suggest that the species copes well in the short-term following events such as intensive logging, but populations may disappear within three years post-disturbance as the density of regrowth increases.

The following key threatening processes (KTP) listed under the TSC Act (OEH 2014c) may threaten White-footed Dunnart and are considered relevant to the proposed works:

- Predation by feral cats - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Predation by the European Red Fox - clearing and maintenance will potentially improve the movement of feral cats through the landscape and increase predation rates.
- Competition and grazing by the Feral European Rabbit – vegetation composition is degraded by increased grazing.
- Clearing of native vegetation – the proposed works will involve the clearing of 0.44 hectares of potential habitat (no known habitat would be removed).

The following KTP as listed by the EPBC Act (DotE 2014a) may threaten the White-footed Dunnart and are considered relevant to the proposed works:

- Land clearance – see above.
- Predation by European red fox – see above.
- Predation by feral cats – see above.

A draft recovery plan was prepared for White-footed Dunnart in 1999 with amendments made in 2014 (NPWS 1999c). The draft recovery plan outlines habitat, life history and

ecology, recovery objectives, criteria and actions. Recent changes to threatened species recovery in NSW saw the development of the Saving our Species conservation program. Through the program, White-footed Dunnart has been assigned as a landscape-managed species as the primary threats to this species generally occur at the landscape scale (ie, habitat loss and degradation) (OEH 2014b). OEH is currently developing a targeted approach to managing this species, however, in the interim, ten management actions have been identified for the species (OEH 2014b). These are outlined as follows:

- Conduct population surveys and identify key habitats and populations.
- Protect key habitat and populations on private and public land.
- Assess fire and logging impacts on populations and habitat.
- Monitor known populations at selected sites.
- Control and monitor abundance of feral predators (cats, foxes and dogs) and rabbits around key populations.
- Control weeds (e.g. Bitou Bush) where they are present near key habitats.
- Collect hair samples to enable identification of genetic structure of populations across the species range.
- Conduct ecological research on population ecology, habitat use and relationships with seral stages of vegetation communities.
- Promote community awareness to prevent collection of firewood (standing dead timber and logs on the ground) from areas of habitat and to prevent domestic dogs and cats roaming in habitats near urban areas.
- Develop and distribute EIA guidelines for decision makers.

6 ASSESSMENT OF LIKELY IMPACTS ON ENDANGERED ECOLOGICAL COMMUNITIES

6.1 SWAMP OAK FLOODPLAIN FOREST OF THE NSW NORTH COAST, SYDNEY BASIN AND SOUTH EAST CORNER BIOREGION

6.1.1. Discussion of conservation status

Swamp Oak Floodplain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregion endangered ecological community (SOFF EEC) is listed under the TSC Act. It is not listed under the EPBC Act.

According to OEH (2014c) and others (Miles 2006b), SOFF EEC is threatened by the following:

- Clearing for urban and rural development, and the subsequent impacts from fragmentation.
- Flood mitigation and drainage works.
- Grazing and trampling by stock.
- Grazing and trampling by feral animals (eg. pigs).
- Activation of acid sulfate soils.
- Landfilling and earthworks associated with industrial development.
- Pollution from urban and agricultural runoff.
- Rubbish dumping.
- Climate change.
- Localised areas, particularly those within urbanised regions, may also be exposed to frequent burning which reduces the diversity of woody plant species.
- Weed invasion, particularly vines and Lantana.

No recovery plan has been prepared for SOFF EEC. However, management issues for SOFF EEC have been identified (Miles 2006a) which include weeds, changes to hydrology, nitrification, tree dieback, wood collection and erosion.

6.1.1.1 Significance within a local context

Up to 3.88 hectares of SOFF EEC occur within the study area. This conclusion was made based on the flora species composition, landscape characteristics, Biometric Vegetation Types database and a review of the OEH identification guidelines (OEH 2007).

This portion of the study area is consistent with that of the description by the NSW Scientific Committee in that SOFF EEC is *'associated with grey-black clay-loams and sandy loams, where the groundwater is saline or sub-saline, on waterlogged or periodically inundated flats, drainage lines, lake margins and estuarine fringes associated with coastal floodplains. Floodplains are level landform patterns on which there may be active erosion and aggradation by channelled and overbank stream flow with an average recurrence interval of 100 years or less. Swamp Oak Floodplain Forest generally occurs below 20 m (rarely above 10 m) elevation in the NSW North Coast, Sydney Basin and South East Corner bioregions*'.

This study identified as much as 231 hectares of SOFF EEC within the locality including 136 hectares within Eurobodalla NP (**Map 22**). This conclusion was reached based on a combination of the following analysis:

- A review of existing regional vegetation mapping (SCIVI) (Tozer *et al.* 2006).
- A review of existing EEC mapping held by Eurobodalla Shire Council (NGH 2007a).
- Aerial photograph interpretation using SIX viewer and Arc GIS.
- Ground thruthing, which was limited due to access and land tenure.

Nonetheless, we acknowledge inherent impediments to accuracy in broad scale vegetation mapping (e.g. inability to ground truth all areas and the presence of often broad ecotones) we estimate an accuracy level of around 90 percent in the extent of SOFF EEC within the locality.

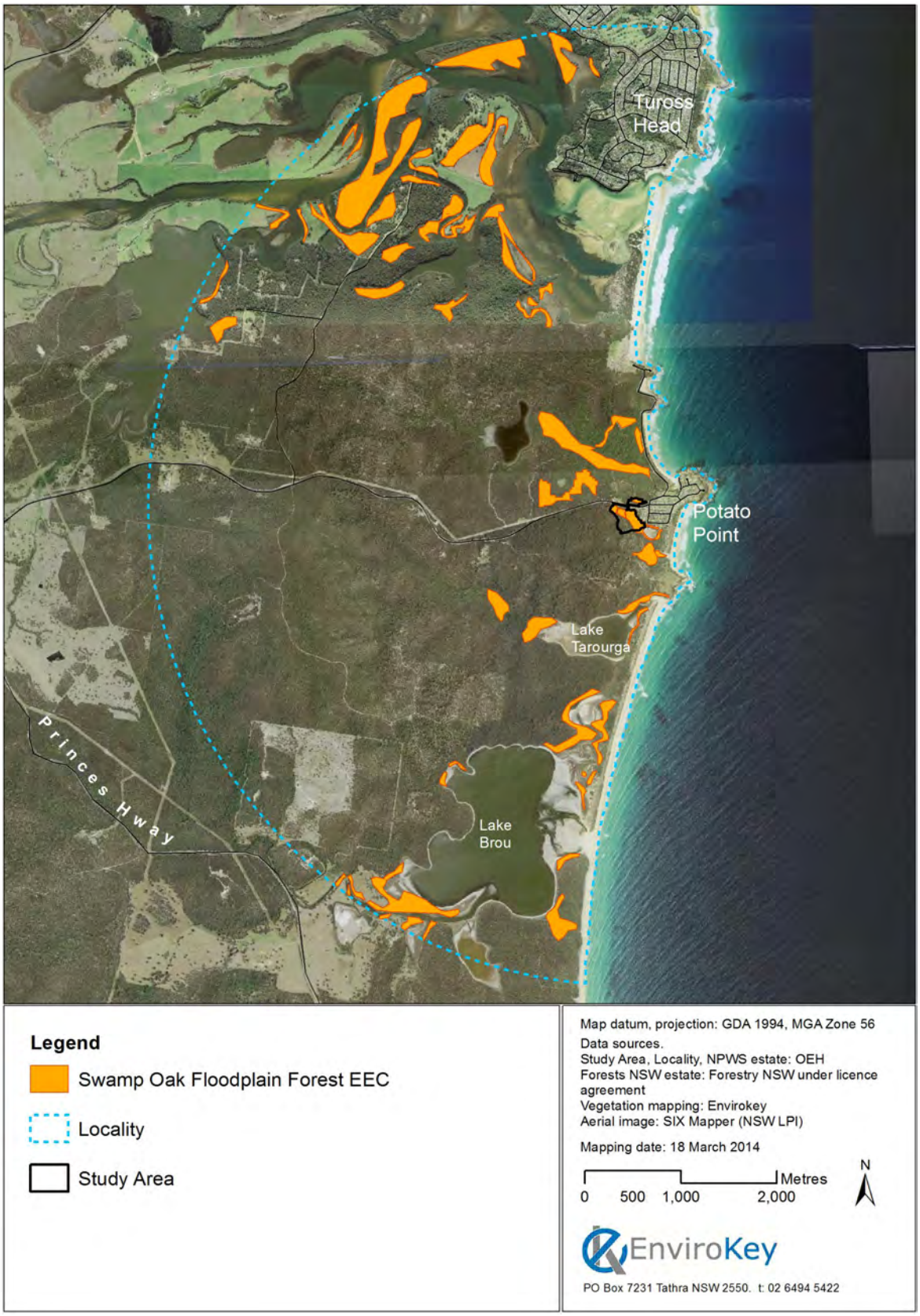
SOFF EEC in the locality comprises three SCIVI vegetation communities. These being:

- FOW p105: Floodplain Swamp Forest.
- FOW p106: Estuarine Fringe Forest.
- FOW p107: Estuarine Creekflat Scrub.

With regard to the Biobanking Assessment Methodology, SOFF EEC within the study area meets the definition of native vegetation that is in 'moderate-good condition' as the canopy cover is >25 percent of the lower benchmark for this vegetation type in the BioMetric Benchmarks database. A total of 32 native plant species were recorded within the 20 metre x 20 metre BioMetric plot (the benchmark is seven). No hollow-bearing trees were found in the plot (the benchmark is two). This absence is probably due to the lack of eucalypt species within the plot, as Swamp Oak trees do not normally form hollows.

There is an almost total lack of weeds in the SOFF EEC within the study area and a considerable number of native sensitive groundcover species are present indicating only minimal disturbance. Species composition matches closely to published descriptions for SOFF EEC.

One Blackberry (*Rubus fruticosus* sp. agg.) seedling was recorded within the plot-transect site. Other than this, weeds were only present at the fringes of this map unit where competition from dense vegetation and leaf litter diminishes and disturbance is ongoing, e.g. near roads, mown strips and where garden escapees are present.



Map 22: Extent of Swamp Oak Floodplain Forest EEC in the locality.

Historical aerial photography shows that much of the land surrounding Potato Point comprised cleared land for farming. It is noted, from a series of photographs (**Figure 1-7**), that the core of the land we have mapped as SOFF EEC was covered by woody vegetation at that time. By 1999, prior to purchase by NPWS from Eurobodalla Shire Council for inclusion into Eurobodalla National Park, this area was covered by quite dense woody vegetation (see **Figure 2** from 1981). Based on this evaluation, the core of trees within the SOFF EEC are greater than 33 years old. The site value score for SOFF EEC within the study area using BBAM was 60.

It is probable that a reasonable portion of SOFF EEC in the locality comprises regrowth vegetation due to previous and/or current farming and other disturbance factors. Therefore, the condition of the vegetation within the study area should be viewed in this context, i.e. there is probably very little of it that has not been impacted by land clearing.

Most of the SOFF EEC in the locality is also in a similar condition, with the more waterlogged and remote sections likely to have be left generally free from disturbance. The patches growing in farmland are generally in poorer condition due mostly to grazing and weed impacts, but still likely to meet moderate-good condition based on the Biometric Benchmarks database.

Hydrology on site does not appear to have been significantly altered. A dam is present upstream and a culvert crossing is installed on the Jemison's Point Road, however these are unlikely to be impacting significantly on local hydrology.

6.1.1.2 Discussion of corridor values

Based on analysis of **Map 22**, a broad level of connectivity between various patches of SOFF EEC is apparent along the coastal strip. The removal of about 1.03 hectares of SOFF EEC within the study area (**Table 8**) is unlikely to impede connectivity between the extant patches across the locality based on the following rationale:

- The close proximity of all patches extant within the locality suggests that genetic exchange is occurring. Large areas of dieback are not apparent, and areas of regeneration are apparent in patches visited during ground truthing.
- Species such as Grey-headed Flying-fox are highly mobile fauna that are known from the locality and the foraging activity of these fauna is likely to be contributing to genetic connectivity between patches.

At a finer scale, the proposed removal of SOFF EEC will occur on the northern edge of a patch that is 3.88 hectares in area. This edge is already compromised by the existing clearing and Potato Point-Bodalla Road and is unlikely to be contributing to connectivity to patches to the north at the patch scale.

6.1.1.3 Discussion of regional significance

Locally, SOFF EEC comprises three SCIVI vegetation communities. Assuming this to be the case at the regional scale, SOFF EEC is likely to comprise as much as 6,940 hectares

across the SCIVI study area (South Coast and Illawarra) and 1,820 hectares within conservation reserves (Tozer *et al.* 2006) (**Table 30**).

Whilst the SOFF EEC in the study area are contributing to the regional extant of this EEC, they are unlikely to be considered regionally significant and they comprise only a very small proportion of the regional extent.

Table 30: Likely extant of Swamp Oak Floodplain Forest EEC within the region.

SCIVI Vegetation Community	Area Extant in SCIVI region (hectares)	Area Extant in Conservation Reserves (hectares)
FOW p105: Floodplain Swamp Forest.	2,400	480
FOW p106: Estuarine Fringe Forest.	840	140
FOW p107: Estuarine Creekflat Scrub.	3,700	1,200
Total	6,940	1,820

6.1.1.4 Impacts on ecological communities in OEH estate

The largest extent of SOFF EEC within the region is likely to be Eurobodalla NP with 136 hectares present within the locality. SOFF EEC is also likely to occur within Eurobodalla NP outside of the locality at suitable landcape positions such as Congo and Bingi. Within the immediate region, SOFF EEC is also known to occur within Cullendulla Creek Nature Reserve (NPWS 2004), Illawong Nature Reserve (NPWS 2008) and Mimosa Rocks NP (NPWS 2011).

The proposed works will result in the loss of 1.03 hectares of SOFF EEC within Eurobodalla NP. This equates to less than 0.8 percent of the extant of SOFF EEC within Eurobodalla NP that occurs within the 5 kilometre locality.

6.1.2 Assessment of habitat

6.1.2.1 Description of disturbance history

Historical aerial photography shows that much of the land surrounding Potato Point comprised cleared land for farming. It is noted, from a series of photographs (**Figure 1-7**), that the core of the land we have mapped as SOFF EEC was covered by woody vegetation at that time. By 1999, prior to purchase by NPWS from Eurobodalla Shire Council for inclusion into Eurobodalla National Park, this area was covered by quite dense woody vegetation (see **Figure 2** from 1981). Based on this evaluation, the core of trees within the SOFF EEC are greater than 33 years old. The site value score for SOFF EEC within the study area using BBAM was 60.

Section 2.4.2 also provide details of the known disturbance history of the SOFF EEC.

6.1.2.2 Extent of habitat removal

Of the 1.47 hectares of native vegetation proposed for removal, 1.03 hectares is SOFF EEC. The extent of SOFF EEC proposed for removal equates to about 25.7 percent of the SOFF EEC within the study area, 0.45 percent of SOFF EEC within the locality and 0.02 percent within the region (**Table 31**).

Table 31: Extent of SOFF EEC to be removed by the proposed works compared to the extent within the study area, locality and region.

Endangered Ecological Community	Extent proposed for removal (hectares)	Extent within the study area (hectares)	Extent within the locality (hectares)	Extent within the region (hectares)
Swamp Oak Floodplain Forest EEC	1.03	3.88	231	6,940

7 IMPACT AMELIORATION MEASURES

This section of the SIS provides a description and justification of the measures proposed to mitigate any adverse effect of the proposed works on threatened biota.

7.1 MANAGEMENT STRATEGIES

Management strategies for the study area would include the development of a:

- Pre-clearance Survey.
- Weed Management Strategy.
- Feral Animal Strategy.
- Threatened Species Monitoring Plan.

Management strategies would be reviewed after 3 years.

It is acknowledged that the current fire management practices west of Jemison's Point Road (SFAZ and APZ) will continue to be maintained in accordance with the FMS which states that a Hazard Reduction Burn will occur every 5-7 years and annual slashing will be undertaken within the APZ adjacent to the road.

7.1.1. Pre-clearance Survey

A Pre-clearance Survey would be undertaken during the clearing of any native vegetation. This would be completed by suitably qualified persons working in front of any machinery checking for any fauna and relocating them to retained habitat. The pre-clearance survey would generally involve inspections of trees and shrubs for nesting avifauna and searches of leaf litter and fallen timber for frogs, reptiles and mammals. The team of ecologists would work to 'clear' a specific area immediately prior to the clearing operations commencing. This practice would continue until vegetation proposed for clearing is removed.

By undertaking a Pre-clearance survey, potential impacts as a result of directly mortality to terrestrial fauna and nesting avifauna would be greatly minimised.

7.1.2. Weed Management Strategy

A Weed Management Strategy (WMS) would be developed for the study area with particular emphasis on the SOFF EEC. The strategy would include bi-annual monitoring for exotic flora species and an active control program where required.

A WMS is justified given that the retained areas of SOFF EEC will be exposed to increased weed invasion as a result of increased light penetration and edge effects. SOFF EEC is particularly vulnerable to weed invasion under the conditions expected by the proposed works (Miles 2006a; b)

7.1.3. Feral Animal Management Strategy

A Feral Animal Management Strategy (FAMS) would be developed for the study area with particular emphasis on the SOFF EEC and sites in the locality where White-footed Dunnart occur. The strategy would include bi-annual monitoring for feral animals through scat counts and an active control program where required.

A FAMS is justified given that increased predation from Feral Cats and European Red Fox could occur as a result of clearing in the study area given their ability to colonise newly cleared areas and both are listed as threats for almost all threatened biota, the subject of this SIS. Rabbit control is also vitally important particularly for White-footed Dunnart given that they can disturb and modify vegetation composition.

7.1.4. Threatened Species Monitoring Plan

A Threatened Species Monitoring Plan (TSMP) would be developed with OEH ROG. The TSMP would include a 3-year plan to monitor threatened species within the study area and locality in conjunction with the FAMS, EBP and WMS. The TSMP should, at a minimum, target White-footed Dunnart, Striated Fieldwren and Glossy Black-cockatoo. The TSMP should include monitoring of these species within the study area and monitoring of White-footed Dunnart at known sites within the locality. More specifically, the following key items should be included (at a minimum) within a TSMP:

- Use of the study area by Glossy Black-cockatoo through Cone surveys.
- Collection of hair samples for genetic analysis of White-footed Dunnart in the study area and the locality.
- Habitat use by the Striated Fieldwren including the identification of breeding territories.

7.2 ONGOING MONITORING

OEH would monitor the ongoing effectiveness of the amelioration measures on an annual basis. All strategies and plans would be adaptive in that each can be modified to increase their effectiveness if required. OEH ROG would be consulted should any changes to amelioration measures be proposed with a full justification provided.

7.3 COMPENSATORY STRATEGIES

The nature and extent of the proposed works and the potential impacts to threatened biota as identified in Section 8, strongly suggest that a compensatory strategy such as biodiversity offsetting is not warranted in this specific instance.

Generally, the nature and extent of the proposed works has aimed to avoid important habitat for threatened fauna such as White-footed Dunnart and Glossy Black-cockatoo, and minimise impacts to SOFF EEC and known habitat of Striated Fieldwren.

Biodiversity offsetting is generally undertaken only when impacts cannot be av oided or mitigated against. The amelioration measures detailed within Section 7 are considered adequate in terms of mitigation.

8 ASSESSMENT OR SIGNIFICANCE OF LIKELY EFFECT OF PROPOSED ACTION

8.1 ENDANGERED ECOLOGICAL COMMUNITIES

8.1.1 Swamp Oak Flood Plain Forest of the NSW North Coast, Sydney Basin and South East Corner Bioregion

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Swamp Oak Floodplain Forest endangered ecological community (SOFF EEC) is not listed as a threatened species.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

SOFF EEC is not listed as an endangered population.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

i) The proposed works will result in the removal and modification of about 1.03 hectares of SOFF EEC. This will involve the removal of up to 80 percent of the canopy as well the removal of understorey and ground cover vegetation. This modification is considered vegetation clearing as detailed within Section 5.1.1. This SIS has calculated that as much as 3.88 hectares of SOFF EEC occur within the study area, 231 hectares of SOFF EEC occur within the locality and up to 6,940 hectares of SOFF EEC occur in the region (**Table 31**). As discussed in Section 6.1.1.2, it is reasonable to expect that the SOFF EEC within the study area is having genetic exchange with the SOFF EEC elsewhere in the locality and therefore, these patches are likely to form part of the 'local occurrence'. Given these factors, the proposed works are unlikely to have an adverse effect on the extent of SOFF EEC such that its local occurrence is likely to be placed at risk of extinction.

ii) The proposed works may result in increased indirect impacts to the remaining SOFF EEC in the study area. Indirect impacts such as increased light, and weed invasion are discussed in Section 5.13 of this SIS. While the removal of up to 1.03 hectares of this SOFF EEC is likely to result in additional modification to the area of retained SOFF EEC in the study area without the implementation of the amelioration measures detailed in Section 7, it is unlikely that the local occurrence of SOFF EEC would be placed at risk of extinction.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

i. The proposed works would result in the removal of about 1.03 hectares of SOFF EEC.

ii. The proposed works will not isolate or fragment other areas of SOFF EEC further than those impacts that pre-exist given the dissection by Jemison's Point Road and Potato Point-Bodalla Road.

iii. The area of SOFF EEC proposed for removal forms part (0.45 percent) of a larger local occurrence that extends across the locality. While it is acknowledged that the study area contains a range of biota that utilise the SOFF EEC, it is also likely that the larger local occurrence will continue to provide a foraging resource to biota in the locality, as will Eurobodalla NP and Bodalla SF that form about 43.3 percent of all land within the locality. Additionally, 134.97 hectares of SOFF EEC protected within Eurobodalla NP will remain unaffected by the proposed works. The retained area of SOFF EEC protects core values of this patch including the highest diversity of flora species and the catchment qualities itself for the SEPP 14 wetland no. 136 located downstream of the study area. Given this, it is unlikely that the SOFF EEC proposed for removal is important to the long-term survival of this community in the locality.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared in Eurobodalla LGA under TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

No recovery or threat abatement plan has been prepared for SOFF EEC. However, should one exist, it is likely that key actions within such a plan would include retention of high quality patches, weed and feral animal management and protection of hydrological cycles. The extent and nature of proposed works as discussed in point d), indicate that the proposed works would be consistent with the objectives of such a plan should one exist.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process (KTP).

The proposed works are consistent with a number of KTP. These include *Clearing of native vegetation* and the *Removal of dead wood and dead trees*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may lead to impacts on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change. The proposed works would result in the removal of about 1.47 hectares of native vegetation which includes 1.03 hectares of SOFF EEC. This minor loss of vegetation is considered negligible in the context of the extent of native vegetation in the locality which includes Bodalla SF and the remaining area of Eurobodalla NP which will remain unaffected by the proposed works.

The 'removal of dead wood and dead trees' includes the removal of fallen branches and litter as general tidying up and the removal of standing dead trees. Dead wood and dead trees provide essential habitat for a wide variety of native animals. It is acknowledged that some dead wood would be removed. However, in areas of retained vegetation, no dead wood will be removed by the proposed works.

Conclusion

The proposed works would have the following impacts on SOFF EEC:

- About 1.03 hectares of SOFF EEC would be partially removed.
- Increase in the impact of some KTP.

The proposed works are considered *'unlikely'* to result in a *'significant effect'* on SOFF EEC as:

- Only 0.45 percent of the total SOFF EEC in the locality would be removed.
- The core area of SOFF EEC within the drainage line would be retained.
- Amelioration measures designed to mitigate any negative impacts would be implemented.

8.2 THREATENED FAUNA

8.2.1 Microchiropteran Bats - Golden-tipped Bat, Eastern Bentwing Bat, Eastern Freetail Bat and Large-footed Myotis

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

The Golden-tipped Bat occurs along the east coast of Australia in scattered locations from Cape York to the Victorian/New South Wales border (Churchill 2008).

The Eastern Bentwing Bat occurs along the east coast of Australia from the coastal plain and into the Great Dividing Range with only a handful of records west of the Great Dividing Range (Churchill 2008; Dwyer 1968).

The Eastern Freetail Bat occurs along the coastal plain and adjoining Great Dividing Range from southern Queensland to southern New South Wales (Churchill 2008).

Large-footed Myotis, is found primarily in coastal environments from the Kimberley region in Western Australia around the coast into Northern Territory, Queensland, New South Wales and Victoria with some inland populations following major rivers including the Murray and Murrumbidgee River (Churchill 2008).

These species comprise a majority of hollow-dependant species with two species known to utilise caves and one species that roosts in abandoned bird nests (Golden-tipped Bat). The cave dwellers (Eastern Bentwing Bat and Large-footed Myotis (Large-footed Myotis will also use tree hollows) are also known to roost in culverts, old buildings, bridges and mine shafts and tree hollows (Churchill 2008).

Eastern Bentwing Bat and Large-footed Myotis were both recorded within the study area and the locality. This is not surprising given that microchiropteran bats are generally regarded as highly mobile fauna extending their foraging ranges over tens of kilometres from their roosting sites (Barclay *et al.* 2000; Pavey 1998; Pavey and Burwell 2004; Pennay and Freeman 2005). In the context of their ecology, the study area could form habitat of some importance given that foraging habitat is present, but no roosting habitat was identified.

According to OEH (2014c), the Golden-tipped Bat is threatened by the following:

- Loss of riparian rainforest for roosting.
- Loss of understorey habitat on upper slopes for foraging.

According to OEH (2014c), the Eastern Bentwing Bat is threatened by the following:

- Disturbance by recreational cave climbers and general public accessing the cave and adjacent areas particularly during winter or breeding.
- Loss of foraging habitat.

- Loss of food resources and indirect poisoning of individuals from nearby use of herbicides / insecticides.
- Predation by feral cats and foxes.
- Introduction of exotic pathogens, specifically known White-nosed fungus.
- Threat of cave entrances being blocked for human safety reasons. Also, vegetation encroaching and blocking cave entrances.
- Potential for large scale wildfire to impact on resource availability in surrounding habitat. Direct threats at caves from fire.
- Weeds (blackberry) encroaching over cave entrances restrict access; need to ensure sympthetic control techniques for blackberry.

According to OEH (2014c), Eastern Freetail Bat is threatened by the following:

- Loss of hollow-bearing trees.
- Loss of foraging habitat.
- Application of pesticides in or adjacent to foraging areas.

According to OEH (2014c), Large-footed Myotis is threatened by the following:

- Loss or disturbance of roosting sites.
- Clearing adjacent to foraging areas.
- Application of pesticides in or adjacent to foraging areas.
- Reduction in stream water quality affecting food resources.

Based on the threats, clearing of known or potential foraging habitat is of relevance when considering the impacts of the proposed works. The proposed works would result in the removal of 1.03 hectares of potential habitat for Golden-tipped Bat, 1.47 hectares of known foraging habitat for Eastern Bentwing Bat, 1.47 hectares of potential foraging habitat for Eastern Freetail Bat and 1.03 hectares of known foraging habitat Large-footed Myotis.

The removal of a relatively minor level of habitat is considered negligible given the mobile nature of these species and the context of the extent of the native vegetation in the locality (**Map 4**) and bey ond which includes Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares). Both will remain unaffected by the proposed works with the exception of 1.47 hectares.

Nonetheless, the retention of 5.75 hectares of native vegetation within the study area (79.7 percent) will continue to provide foraging habitat for all species of microchiropteran bat.

With consideration of these factors, it is *unlikely* that the proposed works could have an adverse effect on the life cycle of either the Golden-tipped Bat, Eastern Bentwing Bat, Eastern Freetail Bat and Large-footed Myotis such that a viable local population is likely to be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the

endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Golden-tipped Bat, Eastern Bentwing Bat, Eastern Freetail Bat and Large-footed Myotis are not listed as an endangered population.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Golden-tipped Bat, Eastern Bentwing Bat, Eastern Freetail Bat and Large-footed Myotis are not listed as an endangered ecological community or critically endangered ecological community.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

i. The proposed works would result in the removal of approximately 1.47 hectares of potential or known foraging habitat.

ii. The proposed works will not isolate or fragment other areas of habitat further than those impacts that pre-exist given the dissection by Jemison's Point Road and Potato Point-Bodalla Road and in consideration of the highly mobile nature of these species.

iii. The habitat to be removed is considered to be of low importance for Golden-tipped Bat, Eastern Bentwing Bat and E astern Freetail Bat while of relatively high importance for Large-footed Myotis given their association with wetlands and riparian vegetation. However, this SIS has identified that habitat condition and distribution across the locality has similarities with that of the study area in the context of Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) and the extent of SEPP 14 wetlands (244 hectares). The habitat to be removed is considered to be of little importance survival of these species in the locality given their highly mobile

nature, that roosting habitat is not present and the extent of similar habitats elsewhere in the locality.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared in Eurobodalla LGA under TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

No recovery plan or threatened abatement plan has been prepared for these species. However, under the Saving our Species conservation program, the consistent management actions include developing an understanding of the distribution and habitat use of these species across their range, protection of key habitat such as roosting or maternity sites and the management of feral animals. This SIS for the proposed works has completed extensive field surveys to determine presence/absence and the amelioration measures proposed in Section 7 provide consistency with the remaining actions.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed works are consistent with a number of KTP. These include *Clearing of native vegetation*, *Predation by Feral Cats* and *Predation by European Red Fox*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may lead to impacts on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change. The proposal would result in the removal of about 1.47 hectares of native vegetation which includes 1.03 hectares of SOFF EEC. This minor loss of vegetation is considered negligible in the context of the extent of native vegetation in the locality which includes Bodalla SF and the remaining area of Eurobodalla NP which will remain unaffected by this proposal.

Predation by feral animals is likely to be exacerbated by the removal of 1.47 hectares of native vegetation. New edges and loss of habitat extent will provide introduced predators with additional opportunity to forage in the areas of retained vegetation.

Conclusion

The proposed works would have the following impacts on microchiropteran bats:

- Up to 1.47 hectares of known or potential habitat would be partially removed.
- Increase in the impact of some KTP.

The proposed works are considered *'unlikely'* to result in a *'significant effect'* on Golden-tipped Bat, Eastern Bentwing Bat, Eastern Freetail and Large-footed Myotis as:

- Only 20 percent of the native vegetation in the study area would be removed.
- Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares) would continue to provide habitat for these species.
- The core area of SOFF EEC within the drainage line would be retained.
- Amelioration measures designed to mitigate any negative impacts would be implemented.

8.2.2 Birds of Prey - Square-tailed Kite and Little Eagle

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Square-tailed Kite is known to occur in northern Australia, QLD, NSW and Victoria (NPWS 1999b; OEH 2014c). In NSW, scattered records occur across the state and they are considered resident in northern NSW, to a summer breeding migrant in south-east NSW NSW (OEH 2014c). Square-tailed Kite preferred habitat is open eu calypt forest and woodland where it is a predator primarily of small birds and their nestlings, foraging in the tree tops of the forest. The species is sparsely distributed with resident pairs having territories of greater than 100 km², and is also believed to be nomadic (Garnett and Crowley 2000; NPWS 1999b). Habitat requirements essential for the lifecycle of these species are areas of intact forest that provide forage habitat and ne st sites. It has been s uggested however, that the Square-Tailed Kite prefers a landscape that is structurally diverse and that the mixed landscape created by partial clearing may favour it.

Square-tailed Kite was recorded during the EnviroKey field surveys within the study area. On two occasions, a single bird was observed flying slowly across the top of the tree canopy presumably hunting small birds. Extensive searches failed to reveal any evidence of a current or past nest site within the study area.

Little Eagle occurs across Australia in all mainland states and territories (Morcombe 2004). In NSW, Little Eagle is known as a single population in NSW (OEH 2014c). Little Eagle are known to utilise open eucalypt forest and woodland (OEH 2014c). The species builds a large stick nest in winter usually within a l ive tree where they will lay two or three eggs during spring (OEH 2014c). Young generally fledge in summer with generation length estimated at 10 years (OEH 2014c).

No Little Eagle were recorded during the EnviroKey field surveys either within the study area or within the locality.

According to OEH (2014c), Square-tailed Kite is threatened by the following:

- Clearing, logging, burning, and grazing of habitats resulting in a reduction in nesting and feeding resources.

- Disturbance to or removal of potential nest trees near watercourses.
- Illegal egg collection and shooting.

According to OEH (2014c), Little Eagle is threatened by the following:

- Secondary poisoning from rabbit baiting.
- Rural-residential subdivision and as sociated land uses (e.g. horse and goat grazing).
- Urban expansion.
- Clearing and degradation of foraging and breeding habitat.

Based on the threats, clearing of known or potential foraging habitat is of relevance when considering the impacts of the proposed works. The proposed works would result in the removal of 1.47 hectares of potential foraging habitat for Little Eagle and 1.03 hectares of known foraging habitat for Square-tailed Kite.

The removal of a relatively minor level of habitat is considered negligible given the mobile nature of these species and the context of the extent of the native vegetation in the locality (**Map 4**) and beyond which includes Bodalla State Forest (24,100 hectares) and Eurobodalla National Park (2,200 hectares). Both will remain unaffected by the proposed works with the exception of 1.47 hectares.

Nonetheless, the retention of 2.85 hectares of known foraging habitat for Square-tailed Kite and 5.75 hectares of potential habitat for Little Eagle within the study area will continue to provide foraging habitat for both species.

With consideration of these factors, it is *unlikely* that the proposed works could have an adverse effect on the life cycle of either the Square-tailed Kite or Little Eagle such that a viable local population is likely to be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Square-tailed Kite and Little Eagle are not listed as an endangered population.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Square-tailed Kite and Little Eagle are not listed as an endangered ecological community or critically endangered ecological community.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

i. The proposed works would result in the removal of approximately 1.47 hectares of potential or known foraging habitat.

ii. The proposed works would not isolate or fragment other areas of habitat further than those impacts that pre-exist given the dissection by Jemison's Point Road and Potato Point-Bodalla Road and in consideration of the highly mobile nature of these species.

iii. The habitat to be removed is considered to be of low importance for Little Eagle and moderate to high importance for Square-tailed Kite given that the latter species was recorded foraging on two occasions. Nonetheless, this SIS has identified that habitat condition and distribution across the locality has similarities with that of the study area in the context of Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares) and the extent of SEPP 14 wetlands (244 hectares). The habitat to be removed is considered to be of little importance to the long-term survival of these species in the locality given their highly mobile nature, that breeding sites were not present and the extent of similar habitats elsewhere in the locality.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared in Eurobodalla LGA under TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

No recovery plan or threatened abatement plan has been prepared for these species. However, under the Saving our Species conservation program, the consistent management actions include developing an understanding of the distribution and habitat use of these species across their range, protection of key habitat such as breeding sites and the management of feral animals. This SIS for the proposed works has completed extensive

field surveys to determine presence/absence and the amelioration measures proposed in Section 7 provide consistency with the remaining actions.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed works are consistent with a number of KTP. These include *Clearing of native vegetation*, *Predation by Feral Cats* and *Predation by European Red Fox*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may lead to impacts on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change. The proposal would result in the removal of about 1.47 hectares of native vegetation which includes 1.03 hectares of SOFF EEC. This minor loss of vegetation is considered negligible in the context of the extent of native vegetation in the locality which includes Bodalla SF and the remaining area of Eurobodalla NP which will remain unaffected by this proposal.

Predation by feral animals is likely to be exacerbated by the removal of 1.47 hectares of native vegetation. New edges and loss of habitat extent will provide introduced predators with additional opportunity to forage in the areas of retained vegetation.

Conclusion

The proposed works would have the following impacts on Square-tailed Kite and Little Eagle:

- Up to 1.47 hectares of known or potential foraging habitat would be partially removed.
- Increase in the impact of some KTP.

The proposed works are considered *'unlikely'* to result in a *'significant effect'* on Square-tailed Kit and Little Eagle as:

- Only 20 percent of the native vegetation in the study area would be removed.
- Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares) would continue to provide habitat for these species.
- The core area of SOFF EEC within the drainage line would be retained.
- No breeding sites are present in the study area.
- Amelioration measures designed to mitigate any negative impacts would be implemented.

8.2.3 Cockatoos - Gang-gang Cockatoo and Glossy Black Cockatoo

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Gang-gang Cockatoo occurs in NSW, Victoria, far south-east of South Australia and northern Tasmania (Morcombe 2004; NSWSC 2008a). In NSW, the species is regularly recorded from the south-east corner to the Hunter area and inland to the Central Tablelands, South-west Slopes (OEH 2014c). Gang-gang Cockatoo have a strong affinity to open forest and woodlands with an acacia understory (NSWSC 2008a). They are a highly mobile species and are considered a partial or altitudinal migrant with individuals known to breed in moist highland forests while in winter, moving to more open habitats at lower elevations (NSWSC 2008a).

Gang-gang Cockatoo occur in pairs, family groups and small flocks. Fidelity to nesting locations is considered strong (NSWSC 2008a). It is thought that most of the breeding population (and sites) now exist within either OEH estate or State Forests (NSWSC 2008a).

According to OEH (2014c), Gang-gang Cockatoo is threatened by the following:

- Clearing of vegetation and degradation of habitat may reduce the abundance of optimal foraging and roosting habitat.
- Individual pairs show high fidelity to selected nesting trees (choosing nesting hollows of particular shape, position and structure), with clearing and frequent fire posing a threat to continued successful breeding.
- Climate change may alter the extent and nature of its preferred habitat (cool temperate vegetation).
- Susceptible to Psittacine cirovirus disease (PCD) which is spread through contaminated nest chambers. PCD is known to have increased near Bowral in the southern highlands of New South Wales over the past decade and constitutes a further threat to the species.

Glossy Black-cockatoo occurs in QLD, NSW and Victoria (Morcombe 2004) with a subspecies known from South Australia (NSWSC 2008b). In NSW, it occurs in the eastern one-third of the state and includes populations on the western slopes and plains. A small, isolated population is known from the Riverina which is now listed as an endangered population under the TSC Act (OEH 2014c). Glossy Black-cockatoo was regularly recorded in the south-west and west of the study area, where Black She-oak becomes common. Foraging signs and individual birds foraging were present. Cameron (2007) states that Black She-oak is the primary food resource for Glossy Black-cockatoo, and while individuals can move up to 12 kilometres in search of food, individuals tend to forage closer to their nest site. Given the regular foraging activity within the study area, and the absence of hollow-bearing trees, it is likely that a nest site is within proximity of the study area.

According to OEH (2014c), Glossy Black-cockatoo is threatened by the following:

- Reduction of suitable habitat through clearing for development.
- Decline of hollow bearing trees over time due to land management activities.
- Excessively frequent fire which eliminates she-oaks from areas, prevents the development of mature she-oak stands, and destroys nest trees.

- Firewood collection resulting in loss of hollow bearing trees, reduced recruitment of hollow bearing trees, and disturbance of breeding attempts.
- Decline in extent and pr oductivity of she-oak foraging habitat due to feral herbivores.
- Limited information on the location of nesting aggregations and the distribution of high quality breeding habitat.
- Disturbance from coal seam gas and open cut coal mining causing loss of foraging and breeding habitat as well as disturbing reproductive attempts.
- Forestry activity resulting in loss of hollow bearing trees, reduced recruitment of hollow bearing trees, degradation of foraging habitat, and disturbance of breeding attempts.
- Decline in extent and productivity of she-oak foraging habitat caused by moisture stress due to climate change.
- Grazing can degrade foraging habitat and limit the capacity of she-oak stands to regenerate following fire or drought.
- Illegal bird smuggling and egg-collecting.

For Gang-gang Cockatoo, only the first threat is of potential relevance when considering the impacts of the proposed works. The proposed works would result in the removal of about 0.44 hectares of potential foraging habitat (**Table 16**). Despite being the subject of extensive field survey, no Gang-gang Cockatoo have been r ecorded flying through the study area suggesting that it is of little importance to any local population for foraging. No breeding habitat is present given the absence of hollow-bearing trees. Given the relatively mobility of Gang-gang Cockatoo, the loss of 0.44 hectares is considered negligible in the context of the extent of the native vegetation in the locality (**Map 4**) and beyond which includes Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares). Both will remain unaffected by the proposed works with the exception of 1.47 hectares.

For Glossy Black-cockatoo, only the first threat is of potential relevance when considering the impacts of the proposed works. The proposed works would result in the removal of about 0.44 hectares of potential foraging habitat (**Table 17**). However, no known foraging habitat will be removed by the proposed work. Foraging habitat was identified by the presence of feeding individuals as well as past signs of their foraging (ie, crushed Black She-oak cones). All known feeding locations are away from the proposed works area, with the around 20 metres from the clearing boundary. No breeding habitat is present given the absence of hollow-bearing trees. Given the relatively mobility of Glossy Black-cockatoo and the retention of known foraging habitat, the loss of 0.44 hectares is considered negligible in the context of the extent of the native vegetation in the locality (**Map 4**) and beyond which includes Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares). Both will remain unaffected by the proposed works with the exception of 1.47 hectares.

With consideration of these factors, it is *unlikely* that the proposed works could have an adverse effect on the life cycle of either the Gang-gang Cockatoo or Glossy Black-cockatoo such that a viable local population is likely to be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

While an endangered population is known for Gang-gang Cockatoo and Glossy Black-cockatoo, neither is located within the boundaries of the locality. Given this, no endangered population of either species is of relevance to the study area.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Gang-gang Cockatoo and Glossy Black-cockatoo are not listed as an endangered ecological community or critically endangered ecological community.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

i. The proposed works would result in the removal of approximately 0.44 hectares of potential foraging habitat. Known foraging for Glossy Black-cockatoo would be retained.

ii. The proposed works would not isolate or fragment other areas of habitat further than those impacts that pre-exist given the dissection by Jemison's Point Road and Potato Point-Bodalla Road and in consideration of the mobile nature of these species.

iii. The habitat to be removed is considered to be of low importance for Gang-gang Cockatoo and high importance for Glossy Black-cockatoo given that the latter species was recorded regularly foraging with juvenile birds on numerous occasions within the study area. For Gang-gang Cockatoo, this SIS has identified that habitat condition and distribution across the locality has similarities with that of the study

area in the context of Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares). The habitat to be removed is considered to be of little importance survival of Gang-gang Cockatoo in the locality given their highly mobile nature, that breeding sites were not present and the extent of similar habitats elsewhere in the locality.

For Glossy Black-cockatoo, the proponent has designed the proposed works to avoid known foraging locations identified within the study area. Key foraging habitat was identified mostly in the land to the west of Jemison's Point Road, and as identified on **Map 14**, the known foraging habitat was identified predominately in the study area, or within close proximity to it. Extensive areas of potential foraging habitat were identified across the locality, but little evidence of current foraging signs were noted. Given this, the retained areas of vegetation within the study area are considered important to the long-term survival of Glossy Black-cockatoo within the locality.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared in Eurobodalla LGA under TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

No recovery plan or threatened abatement plan has been prepared for these species. However, under the Saving our Species conservation program, the consistent management actions include developing an understanding of the distribution and habitat use of these species across their range, protection of key habitat such as breeding sites and key foraging habitat and the management of feral animals. This SIS for the proposed works has completed extensive field surveys to determine presence/absence and to identify known and potential foraging habitat within the study area and locality and the amelioration measures proposed in Section 7 provide consistency with the remaining actions.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed works are consistent with a number of KTP. These include *Clearing of native vegetation*, *Predation by Feral Cats* and *Predation by European Red Fox*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may lead to impacts on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change. The proposal would result in the removal of about 1.47 hectares of native vegetation which includes 1.03 hectares of SOFF EEC. This minor loss of vegetation is considered negligible in the context of the extent of native vegetation in the locality which includes Bodalla SF and the remaining area of Eurobodalla NP which will remain unaffected by this proposal.

Predation by feral animals is likely to be exacerbated by the removal of 1.47 hectares of native vegetation. New edges and loss of habitat extent will provide introduced predators with additional opportunity to forage in the areas of retained vegetation.

Conclusion

The proposed works would have the following impacts on Gang-gang Cockatoo and Glossy Black-cockatoo:

- Up to 0.44 hectares of potential foraging habitat would be partially removed.
- Increase in the impact of some KTP.

The proposed works are considered *'unlikely'* to result in a *'significant effect'* on Gang-gang Cockatoo and Glossy Black-cockatoo as:

- Locally important foraging habitat for Glossy Black-cockatoo in the study area would be retained.
- Only 20 percent of the native vegetation in the study area would be removed.
- Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares) would continue to provide potential and known foraging habitat for these species.
- No breeding sites are present in the study area.
- Amelioration measures designed to mitigate any negative impacts would be implemented.

8.2.4 Forest Owls - Barking Owl, Masked Owl

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Barking Owl occurs across all Australian states with the exception of Tasmania (Morcombe 2004). In NSW, Barking Owl is known from 1,326 previous records (OEH 2014a) and they are known from all CMA regions (OEH 2014c). There are no published estimates for the abundance or population densities in NSW (NPWS 2003).

Barking Owl usually occurs in forests and woodlands where it will roost in dense foliage often in riparian areas or wetlands and most often in *Acacia* or *Casuarina* species (NPWS 2003; Shelly 2006). In the study area, Barking Owl would only be likely to utilise the Casuarina Forest or Wetland as potential roosting habitat, should it occur there. Extensive searches failed to reveal the presence of this species, or a past roost site often characterised by 'white- wash'.

Barking Owl typically occupies a traditional and permanent territory where they breed in later winter or spring (NPWS 2003). Radio tracking of females has revealed mixed results in relation to home range, with one female in north-east Victoria having a home range of 225 hectares (NPWS 2003) while an individual in Goonoo State Forest was found to have a home range of around 6,000 hectares (Schedvin *et al.* 2001).

Barking Owl was not recorded during the EnviroKey field surveys both within the study area and the locality but it is known from four previous records within Eurobodalla National Park.

According to OEH (2014c), Barking Owl is threatened by the following:

- Clearing and degradation of habitat, mostly through cultivation, intense grazing and the establishment of exotic pastures.
- Inappropriate forest harvesting practices that remove old, hollow-bearing trees and change open forest structure to dense regrowth.
- Firewood harvesting resulting in the removal of fallen logs and felling of large dead trees.
- Too-frequent fire leading to degradation of understorey vegetation which provides shelter and foraging substrates for prey species.
- Disturbance of nesting and excessive disturbance of foraging by inappropriate use of call-playback surveys.

Masked Owl occurs in all Australian states and territories (Morcombe 2004). The population in NSW (in 2006) was estimated to be between 1,500 and 4,000 pairs but was suspected to be in decline given that the current distribution had declined by as much as 50 percent (DECC 2006a). Nonetheless, the eastern NSW population is continuous (DECC 2006a). Masked Owl occurs in eucalypt forests and woodlands across their range where they roost in dense foliage, tree hollows or caves and breed in tree hollows in either dead or live trees (DECC 2006a; Kavanagh and Bamkin 1995; Kavanagh and Murray 1996). In the study area, there are no hollow-bearing trees, confirming that Masked Owl would not breed within the existing habitats.

The species has a large home range, varying between 400 and 1, 000 hectares (DECC 2006a) and despite being common in landscapes that have some level of fragmentation, large, continuous forested landscapes within the home range of a breeding pair is considered critical to long-term survival (NGH 2010).

Masked Owl was not recorded during the EnviroKey field surveys both within the study area and the locality but it is known from previous records within Eurobodalla NP (2 records) and Bodalla SF (15 records) (OEH 2014a).

According to OEH (2014c), Masked Owl is threatened by the following:

- Loss of mature hollow-bearing trees and changes to forest and woodland structure, which leads to fewer such trees in the future.
- Clearing of habitat for grazing, agriculture, forestry or other development.
- A combination of grazing and regular burning is a threat, through the effects on the quality of ground cover for mammal prey, particularly in open, grassy forests.
- Secondary poisoning from rodenticides.
- Being hit by vehicles.

For both species, the impacts to potential habitat are of key relevance when considering the impacts of the proposed works. The proposed works would result in the removal of up to

1.47 hectares of potential foraging habitat. Despite being the subject of extensive field survey, no Barking Owl or Masked Owl were recorded within the study area of within the locality. Additionally, no breeding habitat is present given the absence of hollow-bearing trees confirming the presence of potential foraging habitat only.

Both owl species are known to occupy and forage over large home ranges from a few hundred hectares to more than 1,000 hectares in some instances. Given the relatively mobility of both species, and the lack of breeding habitat, the loss of up to 1.47 hectares of potential foraging habitat is considered negligible in the context of the extent of the native vegetation in the locality (**Map 4**) and beyond which includes Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares). Both will remain unaffected by the proposed works with the exception of 1.47 hectares.

With consideration of these factors, it is *unlikely* that the proposed works could have an adverse effect on the life cycle of either the Barking Owl or Masked Owl such that a viable local population is likely to be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Barking Owl and Masked Owl is not listed as an endangered population.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Barking Owl and Masked Owl are not listed as an endangered ecological community or critically endangered ecological community.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

i. The proposed works would result in the removal of up to 1.47 hectares of potential foraging habitat.

ii. The proposed works would not isolate or fragment other areas of potential habitat further than those impacts that pre-exist given the dissection by Jemison's Point Road and Potato Point-Bodalla Road.

iii. The habitat to be removed is considered to be of low importance for Barking Owl and Masked Owl. Nonetheless, this SIS has identified that habitat condition and distribution across the locality has similarities with that of the study area in the context of Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares). The habitat to be removed is considered to be of little importance to the long-term survival of these species in the locality given their highly mobile nature, that breeding sites were not present and the extent of similar habitats elsewhere in the locality.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared in Eurobodalla LGA under the TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A final recovery plan has been prepared for the Masked Owl (DECC 2006a) and a draft recovery plan for the Barking Owl (NPWS 2003). The proposed works are consistent with the objectives and actions of both plans in that they avoid key habitat areas, avoid impacts to breeding sites and hollow-breeding trees, and provide for management actions such as the control of feral animals.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed works are consistent with a number of KTP. These include *Clearing of native vegetation*, *Predation by Feral Cats* and *Predation by European Red Fox*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may lead to impacts on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change. The proposal would result in the removal of about 1.47 hectares of native vegetation which includes 1.03 hectares of SOFF EEC. This minor loss of vegetation is considered negligible in the context of the extent of native vegetation in the locality which

includes Bodalla SF and the remaining area of Eurobodalla NP which will remain unaffected by this proposal.

Predation by feral animals is likely to be exacerbated by the removal of 1.47 hectares of native vegetation. New edges and loss of habitat extent will provide introduced predators with additional opportunity to forage in the areas of retained vegetation.

Conclusion

The proposed works would have the following impacts on Barking Owl and Masked Owl:

- Up to 1.47 hectares of potential foraging habitat would be removed.
- Increase in the impact of some KTP.

The proposed works are considered *'unlikely'* to result in a *'significant effect'* on Barking Owl and Masked Owl as:

- Only 20 percent of the native vegetation in the study area would be removed.
- The core area of SOFF EEC within the drainage line would be retained.
- Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares) would continue to provide habitat for these species.
- No breeding habitat is present within the study area.
- Amelioration measures designed to mitigate any negative impacts would be implemented.

8.2.5 Forest birds - Olive Whistler, Pink Robin and Scarlet Robin

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Olive Whistler is known from the wet forests of the Great Dividing Range in NSW, Victoria, south-east South Australia and Tasmania (Morcombe 2004). In NSW, it is known from 723 previous records (OEH 2014a) and occurs within the following CMA regions: Central West, Hawkesbury – Nepean, Hunter – Central Rivers, Murray, Murrumbidgee, Namoi, Northern Rivers and Southern Rivers (OEH 2014c). Olive Whistler are mostly known from wet forest habitats above 500 metres elevation (OEH 2014c). However, during the winter months, individuals are known to move to lower altitudes, and in some instances, can be found within one kilometre of the coastline where it can occupy dense vegetation (EnviroKey 2011). At best, the Wetland and Casuarina forest of the study area may provide potential winter habitat for Olive Whistler.

No Olive Whistler were recorded during the EnviroKey field surveys either within the study area or within the locality.

According to OEH (2014c), Olive Whistler is threatened by the following:

- Clearing and fragmentation of habitat.

- Fire that is too intense, widespread or frequent resulting in changed vegetation structure and composition.
- Predation by foxes and cats.

Pink Robin is known from NSW, Victoria, South Australia and Tasmania (Morcombe 2004). In NSW, Pink Robin is known from 83 previous records (OEH 2014a) and it occurs within the following CMA regions: Murray, Murrumbidgee and Southern Rivers (OEH 2014c). Pink Robin inhabits rainforest and tall, open eucalypt forest with an apparent preference for densely vegetated gullies (OEH 2014c). Pink Robin breed between October and January and can produce two nests in a single season. There is some level of movement of the population associated with winter seasons. Pink Robin are known to disperse north and west into more open habitats in winter (OEH 2014c).

Pink Robin was not recorded during the EnviroKey field surveys within the study area or the locality.

According to OEH (2014c), Pink Robin is threatened by the following:

- Clearing of rainforest and tall, wet forest habitat, particularly near gullies.
- The impact of fire on this species is unknown, but regular fires are assumed to not be beneficial.

Scarlet Robin is known from all Australian mainland states and Tasmania (Morcombe 2004). It is also known from the ACT. Scarlet Robin is known from dry eucalypt forests and woodlands. The understory is generally open with a sparse understory and it can be found in mature or regrowth vegetation (OEH 2014c; Watson *et al.* 2001). Where they occur, they are usually resident, with dispersal occurring with juvenile birds and some adults to more open habitats in autumn and winter (OEH 2014c). Scarlet Robin can be found in pairs or occasionally small groups, likely to be juvenile birds from the last breeding season.

Scarlet Robin generally breed between the months of July and January and a pair will maintain a breeding territory. They are known to produce up to three clutches of eggs in a single season (OEH 2014c).

Scarlet Robin was not recorded during the EnviroKey field surveys in the study area or the locality.

According to OEH (2014c), Scarlet Robin is threatened by the following:

- Historical habitat clearing and degradation.
- Habitat modification due to overgrazing.
- Reduction of size of remnant patches.
- Reduction in the structural complexity of habitat, including reductions in canopy cover, shrub cover, ground cover, logs, fallen branches and leaf litter.
- Reduction of the native ground cover in favour of exotic grasses.

- Loss of nest sites, food sources and foraging sites, such as standing dead timber, logs and coarse woody debris from depletion by grazing, firewood collection and 'tidying up' of rough pasture.
- Predation by over-abundant populations of Pied Currawong which are supported by planted exotic berry-producing shrubs; this pressure, is addition to that from other native and exotic predators, may be a potentially severe threat to the breeding success of Scarlet Robin populations.
- Predation by Feral cats.
- Robbing of nests and predation of fledglings by rats.
- Isolation of patches of habitat, particularly where these patches are smaller than 30 hectares, and in landscapes where clearing has been heavy or where remnants are surrounded by cropping or stock grazing.

For all three species, the removal of potential habitat is the main threat of potential relevance when considering the impacts of the proposed works. The proposed works would result in the removal off:

- 1.03 hectares of potential winter habitat for Olive Whistler.
- 1.03 hectares of potential habitat for the Pink Robin.
- 0.44 hectares of potential habitat for the Scarlet Robin

Despite being the subject of extensive field survey, none of these species were recorded during the field surveys. Nonetheless, loss of up to 1.03 hectares of potential habitat is considered negligible in the context of the relatively mobile of all three species, the extent of the native vegetation in the locality (**Map 4**) and beyond which includes Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares). Both of these management lands are likely to contain the largest areas of potential habitat that provide long term security within the locality. Both will remain unaffected by the proposed works with the exception of 1.47 hectares.

The retention of potential habitat as described in Section 5 for each species will continue to provide resources within the study area into the future.

With consideration of these factors, it is *unlikely* that the proposed works could have an adverse effect on the life cycle of Olive Whistler, Pink Robin or Scarlet Robin such that a viable local population is likely to be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Olive Whistler, Pink Robin and Scarlet Robin are not listed as an endangered population.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Olive Whistler, Pink Robin and Scarlet Robin are not listed as an endangered ecological community or critically endangered ecological community.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

i. The proposed works would result in the removal of approximately 1.03 hectares of potential habitat.

ii. The proposed works would not isolate or fragment other areas of habitat further than those impacts that pre-exist given the dissection by Jemison's Point Road and Potato Point-Bodalla Road and in consideration of the highly mobile nature of these species.

iii. The habitat to be removed is considered to be of low importance for all three species. Nonetheless, this SIS has identified that habitat condition and distribution across the locality has similarities with that of the study area in the context of Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares). In this context, the habitat to be removed is considered of little importance to the long-term survival of these species in the locality.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared in Eurobodalla LGA under TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

No recovery plan or threatened abatement plan has been prepared for these species. However, under the Saving our Species conservation program, the consistent management actions include developing an understanding of the distribution and habitat use of these

species across their range, protection of key habitat and the management of feral animals. This SIS for the proposed works has completed extensive field surveys to determine presence/absence and the amelioration measures proposed in Section 7 provide consistency with the remaining actions.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed works are consistent with a number of KTP. These include *Clearing of native vegetation*, *Predation by Feral Cats* and *Predation by European Red Fox*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may lead to impacts on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change. The proposal would result in the removal of up to 1.03 hectares of potential habitat. This minor loss of vegetation is considered negligible in the context of the extent of native vegetation in the locality which includes Bodalla SF and the remaining area of Eurobodalla NP which will remain unaffected by this proposal.

Predation by feral animals is likely to be exacerbated by the removal of native vegetation. New edges and loss of habitat extent will provide introduced predators with additional opportunity to forage in the areas of retained vegetation.

Conclusion

The proposed works would have the following impacts on Olive Whistler, Pink Robin and Scarlet Robin:

- Up to 1.03 hectares of potential habitat would be removed.
- Increase in the impact of some KTP.

The proposed works are considered *'unlikely'* to result in a *'significant effect'* on Olive Whistler, Pink Robin and Scarlet Robin as:

- Only 20 percent of the native vegetation in the study area would be removed.
- The core area of SOFF EEC within the drainage line would be retained.
- Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares) would continue to provide habitat for these species.
- Amelioration measures designed to mitigate any negative impacts would be implemented.

8.2.6 Striated Fieldwren

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Striated Fieldwren occurs in south-eastern NSW, southern Victoria, south-east South Australia and Tasmania (Morcombe 2004). In NSW, Striated Fieldwren occurs south of Wollongong with most records occurring in the Nadgee Nature Reserve/Ben Boyd NP area and in Morton NP (OEH 2014c). Previous records of Striated Fieldwren in NSW total 161 (OEH 2014a) and they are known primarily from the Southern Rivers CMA region (OEH 2014c).

Striated Fieldwren utilise coastal heathlands, tussock grasslands, the margins of swamps and wetland vegetation and areas of low shrubby vegetation in the vicinity of these habitats (OEH 2014c). In these habitats, Striated Fieldwren will forage through the undergrowth for insects and small seeds.

The species is known for its extended breeding season, with eggs recorded between July and January (OEH 2014c). Little is known of the social organisation of this species as birds have been observed solitarily, in pairs, or in family groups of adults and dependent young post-fledging (NSWSC 2008c). Striated Fieldwren are thought to maintain exclusive breeding territories ranging between 0.2 hectares and 0.8 hectares with neighboring males as little as 50 metres apart (NSWSC 2008c).

Striated Fieldwren was recorded during the EnviroKey field surveys within the study area and adjacent areas. On three separate occasions, a single bird was heard and observed. It is uncertain if these three records were the same individuals, two or three individuals. With exclusive breeding territories ranging between 0.2 hectares and 0.8 hectares, it is likely that at least two, possibly three breeding territories are present based on the location of each individual sighted during this study. Given this and the low mobility of this species, the relative significance of habitat within the study area is considered to be high.

According to OEH (2014c), Striated Fieldwren is threatened by the following:

- Loss of swampy heath and tussock habitats due to clearing for urban and agricultural development.
- Heavy grazing and trampling by stock causing habitat degradation through root damage, prevention of seedling establishment and erosion.
- Habitat degradation as a result of weed invasion.

The first and third threats are likely to be of potential relevance when considering the impacts of the proposed works. The proposed works would result in the removal of 1.03 hectares of known habitat (**Table 15**). Three individual sightings were made of Striated Fieldwren. Two sightings were made within the study area, and the third to the east of the adjacent SEPP 14 wetland, confirming the presence of habitat beyond the boundaries of the study area. While the exact size and boundaries of the habitat of each individual were not identified during this study, it is likely that some territory will be removed. This is likely to be restricted to only one territory given the spatial locations identified on **Map 18** and the nature and extent of the proposed works identified on **Map 2**.

With consideration that at least one territory is present outside of the study area (to the east of the SEPP 14 wetland no. 136, it is reasonable to assume that other territories may also

exist within Eurobodalla NP where SEPP 14 wetland occur. As much as 244 hectares of SEPP 14 wetland occur within the locality, with the majority of these adjoining large areas of native vegetation. The primary author previously recorded Striated Fieldwren in Coastal Forest within Eurobodalla NP near Congo (2006) suggesting that the species may be widely distributed within similar habitats with this OEH estate. In the context of the extent of native vegetation in the locality (**Map 4**) and beyond which includes Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares), both will remain unaffected by the proposed works with the exception of 1.47 hectares of native vegetation.

Nonetheless, the loss of at least one territory is likely to have a detrimental impact to the known local population of Striated Fieldwren given the lack of records, and the low mobility of the species.

With consideration of these factors, and with application of the precautionary principle, it may be *likely* that the proposed works could have an adverse effect on the life cycle of Striated Fieldwren such that a viable local population is likely to be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Striated Fieldwren are not listed as an endangered population.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Striated Fieldwren are not listed as an endangered ecological community or critically endangered ecological community.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

i. The proposed works would result in the removal of 1.03 hectares of known habitat.

ii. The proposed works would not isolate or fragment other areas of habitat further than those impacts that pre-exist given the dissection by Jemison's Point Road and Potato Point-Bodalla Road.

iii. The habitat to be removed is considered to be of high importance for Striated Fieldwren. Other populations of Striated Fieldwren are known from within Eurobodalla NP (ie, Jemisons Point and Tarouga Lake) however, the current status of these is unknown.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared in Eurobodalla LGA under the TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

No recovery plan or threatened abatement plan has been prepared for Striated Fieldwren. However, under the Saving our Species conservation program, the consistent management actions include developing an understanding of the distribution and habitat use of these species across their range, protection of key habitat such as roosting or maternity sites and the management of feral animals. This SIS for the proposed works has completed extensive field surveys to determine presence/absence and the amelioration measures proposed in Section 7 provide consistency with the remaining actions.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed works are consistent with a number of KTP. These include *Clearing of native vegetation*, *Predation by Feral Cats* and *Predation by European Red Fox*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may lead to impacts on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change. The proposed works would result in the removal of up to 1.03 hectares of potential habitat. This minor loss of vegetation is considered negligible in the context of the extent of native vegetation in the locality which includes Bodalla SF and the remaining area of Eurobodalla NP which will remain unaffected by the proposed works.

Predation by feral animals is likely to be exacerbated by the removal of native vegetation. New edges and loss of habitat extent will provide introduced predators with additional opportunity to forage in the areas of retained vegetation.

Conclusion

The proposed works would have the following impacts on Striated Fieldwren:

- Up to 1.03 hectares of known habitat would be removed.
- Loss of at least one breeding territory of a possible three (perhaps only two) within the study area and habitat directly adjoining.
- Increase in the impact of some KTP.

The proposed works may be *'likely'* to result in a *'significant effect'* on Striated Fieldwren as:

- The species is relatively restricted having low mobility.
- Up to 1.03 hectares of known habitat would be removed.
- Loss of at least one breeding territory of a possible three (perhaps only two) within the study area and habitat directly adjoining.

Nonetheless, the following factors are contributing to the retention of habitat for Striated Fieldwren based on the current design of the proposed works:

- The core area of SOFF EEC within the drainage line would be retained.
- Amelioration measures that have been designed to mitigate some negative impacts would be implemented.

8.2.7 Nectar Feeders - Little Lorikeet and Regent Honeyeater

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Little Lorikeet is known from Queensland, NSW, Victoria and South Australia (Courtney and Debus 2006; Morcombe 2004). However, NSW provides the core of the habitat for this species with individuals recorded as far west as Dubbo and Albury when food availability is high (OEH 2014c). In NSW, previous records of Little Lorikeet total 2,822 (OEH 2014a) and they are known from all CMA regions with the exception of Lower Murray-Darling and Western (OEH 2014c). Little Lorikeet are primarily associated with open eucalypt forest and woodland (Courtney and Debus 2006). However, they are also known to utilise habitats where Angophora, Melaleuca and other tree species occur. Their apparent preference for riparian habitats is likely to due to greater soil fertility which influences productivity of flowering species (OEH 2014c). Little Lorikeet are a relatively mobile species utilising isolated flowering trees in paddocks, roadside vegetation and urban areas. Little Lorikeet nest in tree hollows typically in smooth-barked eucalypts in close proximity to feeding areas (OEH 2014c). On the south coast, Blackbutt is a commonly utilised nesting tree (pers.obs).

No Little Lorikeet were recorded during the EnviroKey field surveys either within the study area or within the locality.

According to OEH (2014c), Little Lorikeet is threatened by the following:

- Habitat loss and degradation.
- Loss of hollow-bearing trees.
- Increased competition with native and exotic species for hollows.
- Competition with the introduced honeybee for both nectar and hollows.

Regent Honeyeater occurs in Queensland, New South Wales, Victoria and South Australia (Frankin *et al.* 1989; Menkhorst *et al.* 1999; NPWS 1999a; OEH 2014c; Oliver 1998). The Regent Honeyeater Recovery Plan suggests that the total population may be between 500 and 1,500 birds (Menkhorst *et al.* 1999). In NSW, previous records total 2,073 (OEH 2014a) and they are known from all CMA regions with the exception of Lower Murray-Darling and Western (OEH 2014c). Regent Honeyeater is considered a flagship threatened woodland bird which utilises habitats dominated by Mugga Ironbark, Yellow Box, Blakey's Red Gum, White Box and Swamp Mahogony (OEH 2014c). However, lowland coastal forests are increasingly being utilised by Regent Honeyeater and it is hypothesised that Spotted Gum forests may provide a drought refuge when woodlands on the western slopes fail to flower (Menkhorst *et al.* 1999).

No Regent Honeyeater were recorded during the EnviroKey field surveys either within the study area or within the locality. However, the timing of the field surveys was likely not commensurate with their detection period, as on most occasions, they are known between autumn and spring on the south coast.

According to OEH (2014c), Regent Honeyeater is threatened by the following:

- Historical loss, fragmentation and degradation of habitat from clearing for agricultural and residential development, particularly fertile Yellow Box-White Box-Blakely's Red Gum woodlands.
- Continuing loss of key habitat tree species and remnant woodlands from strategic agricultural developments, timber gathering and residential developments.
- Suppression of natural regeneration of overstorey tree species and shrub species from overgrazing. Riparian gallery forests have been particularly impacted by overgrazing.
- Inappropriate forestry management practices that remove large mature resource-abundant trees. Firewood harvesting in Box-Ironbark woodlands can also remove important habitat components.
- Competition from larger aggressive honeyeaters, particularly Noisy Miners, Noisy Friarbirds and Red Wattlebirds.
- The small population size and restricted habitat availability make the species highly vulnerable to extinction via stochastic processes.
- Egg and nest predation by native birds.

For Little Lorikeet and Regent Honeyeater, the main threat of relevance to the proposed works is the removal of potential habitat. The proposed works would result in the removal of 1.47 hectares of potential foraging habitat for Little Lorikeet and 0.44 hectares of potential foraging habitat for Regent Honeyeater.

The removal of a relatively minor level of habitat is considered negligible given the highly mobile nature of these species and the context of the extent of the native vegetation in the locality (**Map 4**) and beyond which includes Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares). Both will remain unaffected by the proposed works with the exception of 1.47 hectares. Nonetheless, the retention of up to 5.75 hectares of potential foraging habitat within the study area will continue to provide potential resources for both species.

With consideration of these factors, it is *unlikely* that the proposed works could have an adverse effect on the life cycle of either the Little Lorikeet or Regent Honeyeater such that a viable local population is likely to be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Little Lorikeet and Regent Honeyeater are not listed as an endangered population.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Little Lorikeet and Regent Honeyeater are not listed as an endangered ecological community or critically endangered ecological community.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

i. The proposed works would result in the removal of 1.47 hectares of potential foraging habitat for Little Lorikeet and 0.44 hectares of potential foraging habitat for Regent Honeyeater.

ii. The proposed works would not isolate or fragment other areas of habitat further than those impacts that pre-exist given the dissection by Jemison's Point Road and Potato Point-Bodalla Road.

iii. The habitat to be removed is considered to be of low importance for both species. Nonetheless, this SIS has identified that habitat condition and distribution across the locality has similarities with that of the study area in the context of Eurobodalla NP (2,200 hectares) and Bodalla SF (24,100 hectares). The habitat to be removed is considered to be of little importance to the long-term survival of these species in the locality given their highly mobile nature and the extent of similar habitats in Bodalla SF and Eurobodalla NP.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared in Eurobodalla LGA under TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A recovery plan was prepared for the Regent Honeyeater in 1999 that identified recover objectives, criteria and action (Menkhorst *et al.* 1999). The extent and nature of proposal and the habitats that would be affected, as discussed in point d), indicate that the proposed works would be consistent with the objectives of this plan.

No recovery plan or threatened abatement plan has been prepared for Little Lorikeet. However, under the Saving our Species conservation program, the consistent management actions include developing an understanding of the distribution and habitat use of Little Lorikeet across their range, protection of key habitat such as breeding sites and the management of feral animals. This SIS for the proposed works has completed extensive field surveys to determine presence/absence and the amelioration measures proposed in Section 7 provide consistency with the remaining actions.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed works are consistent with a number of KTP. These include *Clearing of native vegetation*, *Predation by Feral Cats* and *Predation by European Red Fox*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may lead to impacts on biological diversity such as habitat fragmentation limiting gene flow between small isolated

populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change. The proposed works would result in the removal of up to 1.47 hectares of potential habitat. This minor loss of vegetation is considered negligible in the context of the extent of native vegetation in the locality which includes Bodalla SF and the remaining area of Eurobodalla NP which will remain unaffected by the proposed works.

Predation by feral animals is likely to be exacerbated by the removal of native vegetation. New edges and loss of habitat extent will provide introduced predators with additional opportunity to forage in the areas of retained vegetation.

Conclusion

The proposed works would have the following impacts:

- 1.47 hectares of potential foraging habitat for Little Lorikeet would be removed.
- 0.44 hectares of potential foraging habitat for Regent Honeyeater would be removed.
- Increase in the impact of some KTP.

The proposed works are considered *'unlikely'* to result in a *'significant effect'* on Little Lorikeet and Regent Honeyeater as:

- A large proportion of the study area would be retained.
- The core area of SOFF EEC within the drainage line would be retained.
- Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares) would continue to provide habitat for these species.
- Amelioration measures designed to mitigate any negative impacts would be implemented.

8.2.8 Southern Brown Bandicoot and Long-nosed Potoroo

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

Southern Brown Bandicoot has a patchy distribution occurring in New South Wales, Victoria, South Australia and Queensland (Braithwaite 1983; Menkhorst and Knight 2010). Southern Brown Bandicoot are known to have a home ranges as low as 2 to 3 hectares for females and between 5-20 hectares for males (DECC 2006b). The species is known to occupy habitats that are heath, or open forest with a heathy understorey on sandy or friable soil. Habitat utilisation by bandicoots in general has been suggested to increase with increasing ground cover vegetation from between 0.5 and 2 metres in height, where soil fertility is low and in habitat that is between 6-18 years post-fire (Claridge and Barry 2000). Work completed by Forests NSW specifically on Southern Brown Bandicoot reveals that the heathy understory habitats preferred by this species in southern NSW generally have an overstorey of *Eucalyptus consideniana*, *E.ovata* and *E.globoidea* (ForestsNSW 2007).

A single road-killed specimen is known from the Eurobodalla LGA near the Grandfather's Gully area at Surf Beach near Batemans Bay. Given this, Southern Brown Bandicoot is considered very rare in the Eurobodalla LGA, and known from a single population.

Long-nosed Potoroo occurs on the east coast of Australia from Queensland through to eastern Victoria and Tasmania (Claridge *et al.* 2007; OEH 2014c). Long-nosed Potoroo are often crepuscular however, in the winter months they are known to be active during the day (OEH 2014c). Long-nosed Potoroo are known to occupy coastal heaths and dry and wet sclerophyll forests (Claridge *et al.* 2007; Holland and Bennett 2007; Menkhorst and Knight 2010; OEH 2014c). Essential elements to occupied habitat are a dense understorey with occasional open elements and a sandy loam soil (OEH 2014c). Long-nosed Potoroo are generally solitary with home ranges varying between 2-5 hectares (OEH 2014c).

Despite more than 7,500 images being collected from motion-activated infrared cameras baited with truffle oil, no Southern Brown Bandicoot or Long-footed Potoroo were recorded during the EnviroKey field surveys.

According to OEH (2014c), Southern Brown Bandicoot is threatened by the following:

- Loss and fragmentation of habitat through land-clearing for agriculture and urban development and changes in forest structure.
- Burning regimes that impact on understorey species and floristic structure.
- Predation by introduced predators such as cats, dogs and foxes.
- Death or injury by fire and motor vehicles.
- Unsure of the species' localised distribution or abundance.

According to OEH (2014c), Long-nosed Potoroo is threatened by the following:

- Habitat loss and fragmentation from land clearing for residential and agricultural development.
- Predation from foxes, dogs and cats.
- Too frequent fires or grazing by stock that reduce the density and floristic diversity of understorey vegetation.
- Logging regimes or other disturbances that reduce the availability and abundance food resources, particularly fungi, and ground cover.
- Removal of wild dogs and dingoes potentially exposes potoroos to other threats (competition from other species of wallaby / fox predation) due to removal of top order predator.
- Unplanned clearing in areas where the species occurs on private property is likely to degrade the species' habitat.

For Southern Brown Bandicoot and Long-nosed Potoroo, the main threat of relevance to the proposed works is the removal of potential habitat. The proposed works would result in the removal of 1.03 hectares of potential foraging habitat for Long-nosed Potoroo and 0.44 hectares of potential habitat for Southern Brown Bandicoot. Nonetheless, while potential habitat is present, extensive application of survey methods designed to detect both species,

failed to reveal their presence within the study area suggesting that it is of little, if any importance to both species.

Long-nosed Potoroo is known from nearby Bodalla SF (13 records) and given the extent of the native vegetation in the locality (**Map 4**) and beyond which includes Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares), these are likely to contribute to the long term security of habitat at a regional scale. Both will remain unaffected by the proposed works with the exception of 1.47 hectares. Nonetheless, the retention of up to 5.75 hectares of potential habitat within the study area will continue to provide potential resources for both species should they occur there in the future.

With consideration of these factors, it is *unlikely* that the proposed works could have an adverse effect on the life cycle of either the Southern Brown Bandicoot or Long-nosed Potoroo such that a viable local population is likely to be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

Southern Brown Bandicoot is not listed as an endangered population. An endangered population of Long-nosed Potoroo known on the NSW north coast is of no relevance to the study area.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Southern Brown Bandicoot and Long-nosed Potoroo are not listed as an endangered ecological community or critically endangered ecological community.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

i. The proposed works would result in the removal of 1.03 hectares of potential habitat for Long-nosed Potoroo and 0.44 hectares of potential habitat for Southern Brown Bandicoot.

ii. The proposed works would not isolate or fragment other areas of habitat further than those impacts that pre-exist given the dissection by Jemison's Point Road and Potato Point-Bodalla Road.

iii. The habitat to be removed is considered to be of low importance for both species. Nonetheless, this SIS has identified that habitat condition and distribution across the locality has similarities with that of the study area in the context of Eurobodalla NP (2,200 hectares) and B odalla SF (24,100 hectares) and Long-nosed Potoroo is known from Bodalla SF. In this context, the habitat to be removed is considered of little importance to the long-term survival of these species in the locality.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared in Eurobodalla LGA under TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

An approved recovery plan was prepared for Southern Brown Bandicoot in 2006 which outlines recovery objectives, criteria and actions (DECC 2006b). The extent and nature of proposed works and the extent of habitat in the locality that would be affected, as discussed in point d), indicate that the proposed works would be generally consistent with the objectives of this plan.

To date, no recovery plan or threat abatement plan have been prepared for the Long-nosed Potoroo. However, under the Saving our Species conservation program, the consistent management actions include developing an understanding of the distribution and habitat use of these species across their range, protection of key habitat and the management of feral animals. This SIS for the proposed works has completed extensive field surveys to determine presence/absence and the amelioration measures proposed in Section 7 provide consistency with the remaining actions.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed works are consistent with a number of KTP. These include *Clearing of native vegetation*, *Predation by Feral Cats* and *Predation by European Red Fox*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may lead to impacts on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change. The proposed works would result in the removal of up to 1.03 hectares of potential habitat. This minor loss of vegetation is considered negligible in the context of the extent of native vegetation in the locality which includes Bodalla SF and the remaining area of Eurobodalla NP which will remain unaffected by the proposed works.

Predation by feral animals is likely to be exacerbated by the removal of native vegetation. New edges and loss of habitat extent will provide introduced predators with additional opportunity to forage in the areas of retained vegetation.

Conclusion

The proposed works would have the following impacts on Southern Brown Bandicoot and Long-nosed Potoroo:

- 1.03 hectares of potential habitat for Long-nosed Potoroo would be removed.
- 0.44 hectares of potential habitat for Southern Brown Bandicoot would be removed.
- Increase in the impact of some KTP.

The proposed works are considered *'unlikely'* to result in a *'significant effect'* on Southern Brown Bandicoot and Long-nosed Potoroo as:

- Only 20 percent of the native vegetation in the study area would be removed.
- The core area of SOFF EEC within the drainage line would be retained.
- Bodalla SF (24,100 hectares) and Eurobodalla NP (2,200 hectares) would continue to provide habitat for these species.
- Amelioration measures designed to mitigate any negative impacts would be implemented.

8.2.9 White-footed Dunnart

(a) in the case of a threatened species, whether the action proposed is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,

White-footed Dunnart is known to occur in south-east New South Wales, Victoria and Tasmania with an outlying population in Queensland (Menkhorst and Knight 2010). White-footed Dunnart is known from a range of different habitats including coastal dune vegetation, coastal forest, tussock grassland, heathland, woodland and forest (Keystone 2013; Korn 1999; Lunney *et al.* 1989a; Lunney *et al.* 1989b; OEH 2014c). OEH (2014c) acknowledge the ability of White-footed Dunnart to utilise disturbed habitats including logged forest which was also confirmed by the radio-tracking of a female White-footed Dunnart by Korn (1999).

However, recent studies provide evidence that White-footed Dunnart prefers a relatively dense, mid-succession habitat (Wilson and Aberton 2006).

White-footed Dunnart were captured at all but two of the seven survey locations (**Table 28**, **Map 14**). This study identified a relatively large population of White-footed Dunnart at a previous site of Korn (1999) known as DC1 (15 individuals). This site is located on a dune between Brou Lake and the beach about 2.7 kilometres south of the study area. It could be hypothesised that the White-footed Dunnart at DC1 are part of the same population at those within and adjacent to the study area given the known movement and dispersal capabilities of White-footed Dunnart (Lunney and Leary 1989). In support of this theory, the vegetation in this area has been known to provide habitat at other sites (ie, dune complex and coastal forest) (Korn 1999), and that White-footed Dunnart was previously recorded by Korn (1999) between DC1 and the study area at Tarouga Road further increasing the likelihood of connectivity through dispersal. Given the large gap (c.250 metres) between heath vegetation at DC1 (Brou Lake Dune Complex) and CWC2 (Brou Lake Campsite), it is unlikely that dispersal would occur between these two sites. However, these hypotheses were not tested by this SIS.

Korn (1999) concludes that the regional distribution of White-footed Dunnart is "reasonably extensive" with the species being known from National Parks and from within Bodalla SF, including portions that have been previously logged.

According to OEH (2014c), White-footed Dunnart is threatened by the following:

- Loss and fragmentation of habitat resulting from land clearing for residential and agricultural developments.
- Modification and disturbance of habitat in coastal forest and foredune complex vegetation by camping and other recreational activities.
- Predation by foxes, cats and dogs.
- Collection of firewood from areas of habitat, including standing dead timber and logs on the ground.
- Fire regimes that result in continual absence of cover or thick regeneration may be deleterious.
- Studies conducted to date suggest that the species copes well in the short-term following events such as intensive logging, but populations may disappear within three years post-disturbance as the density of regrowth increases.

Known habitat for White-footed Dunnart occurs within the study area on the basis of one female White-footed Dunnart being trapped in habitat to the west of Jemison's Point Road and a male to the south of the study area (also west of Jemison's Point Road). The known habitat within the study area is provided in **Map 17**. Much of this habitat has been the subject of ongoing maintenance as it forms part of the existing APZ for Potato Point, and is mechanically slashed on a regular basis. Nonetheless, it may be the existing maintenance regime that is providing suitable habitat for this species given that White-footed Dunnart are known to respond to disturbance in varying forms (Korn 1999; Lunney and Leary 1989; Lunney *et al.* 1989a).

The preferred option developed by OEH for the proposed works would result in the removal of 0.44 hectares of potential habitat only. No White-footed Dunnart were trapped during this study in that portion of the study area, despite pitfall traps being established and activated in that portion. The vegetation is dense in this area, likely influenced by the fertility and dampness of the adjacent Casuarina Forest and at best, it could be considered potential habitat only. No known habitat for White-footed Dunnart (west of Jemison's Point Road) would be affected by the proposed works.

Additionally, the known populations confirmed by the SIS throughout the locality would not be affected by the proposed works. Amelioration measures proposed in Section 7 provide a framework for ensuring the continued survival of White-footed Dunnart in the study area.

With consideration of these factors, it is *unlikely* that the proposed works could have an adverse effect on the life cycle of White-footed Dunnart such that a viable local population is likely to be placed at risk of extinction.

(b) in the case of an endangered population, whether the action proposed is likely to have an adverse effect on the life cycle of the species that constitutes the endangered population such that a viable local population of the species is likely to be placed at risk of extinction,

White-footed Dunnart is not listed as an endangered population.

(c) in the case of an endangered ecological community or critically endangered ecological community, whether the action proposed:

(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or

(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

White-footed Dunnart are not listed as an endangered ecological community or critically endangered ecological community.

(d) in relation to the habitat of a threatened species, population or ecological community:

(i) the extent to which habitat is likely to be removed or modified as a result of the action proposed, and

(ii) whether an area of habitat is likely to become fragmented or isolated from other areas of habitat as a result of the proposed action, and

(iii) the importance of the habitat to be removed, modified, fragmented or isolated to the long-term survival of the species, population or ecological community in the locality,

i. The proposed works would result in the removal of 0.44 hectares of potential habitat for White-footed Dunnart. Known habitat to the west of Jemison's Point Road would be retained.

ii. The proposed works would not isolate or fragment other areas of habitat further than those impacts that pre-exist given the dissection by Jemison's Point Road.

iii. The habitat to be removed is considered to be of low importance for White-footed Dunnart given that it was only recorded on the western side of Jemison's Point Road. Nonetheless, this SIS has identified five locations in the locality where White-footed Dunnart is present (including the study area). In this context, the habitat to be removed is considered of only minor importance to the long-term survival of White-footed Dunnart in the locality.

(e) whether the action proposed is likely to have an adverse effect on critical habitat (either directly or indirectly),

No critical habitat has been declared in Eurobodalla LGA under the TSC Act.

(f) whether the action proposed is consistent with the objectives or actions of a recovery plan or threat abatement plan,

A draft recovery plan was prepared for White-footed Dunnart in 1999 with amendments made in 2014 (NPWS 1999c). The draft recovery plan outlines habitat, life history and ecology, recovery objectives, criteria and actions. The extent and nature of proposed works and that only potential habitat would be affected, and that known habitat would be retained, as discussed in point d), indicate that the proposed works would be generally consistent with the objectives of this plan.

(g) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the impact of, a key threatening process.

The proposed works are consistent with a number of KTP. These include *Clearing of native vegetation*, *Predation by Feral Cats* and *Predation by European Red Fox*.

The 'clearing of native vegetation' is recognised as a major factor contributing to the loss of biodiversity. Clearing of any area of native vegetation, may lead to impacts on biological diversity such as habitat fragmentation limiting gene flow between small isolated populations, which may result in a reduction in the potential for biodiversity to adapt to environmental change. The proposed works would result in the removal of up to 0.44 hectares of potential habitat. This minor loss of vegetation is considered negligible in the context of the extent of native vegetation in the locality which includes Bodalla SF and the remaining area of Eurobodalla NP which will remain unaffected by the proposed works.

Predation by feral animals is likely to be exacerbated by the removal of native vegetation. New edges and loss of habitat extent will provide introduced predators with additional opportunity to forage in the areas of retained vegetation.

Conclusion

The proposed works would have the following impacts on White-footed Dunnart:

- 0.44 hectares of potential habitat would be removed.
- Increase in the impact of some KTP.

The proposed works are considered *'unlikely'* to result in a *'significant effect'* on White-footed Dunnart as:

- Areas of known habitat are to be retained (disturbed forest west of Jemison's Point Road).
- Extant populations in the locality will continue unaffected by the proposed works.
- Amelioration measures designed to mitigate any negative impacts would be implemented.

9 ADDITIONAL INFORMATION

9.1 QUALIFICATIONS AND EXPERIENCE

Personnel, their qualifications and experience and their role in the preparation of this SIS are detailed in **Appendix E**.

9.2 OTHER APPROVALS REQUIRED FOR THE DEVELOPMENT ACTIVITY

A number of approvals may be required under NSW legislation. This includes Part 5 approval under the NSW *Environmental Planning and Assessment Act 1979*. The SIS will require concurrence from OEH before the project can proceed.

The REF for the proposed works provides a detailed description of other approvals that may be required.

9.3 LICENSING MATTERS RELATING TO THE SURVEY

The relevant licenses and authorities for the field surveys associated with this SIS are as follows:

- Scientific Licence: SL100110 issued by OEH – NSW NPWS.
- Animal Research Authority: 09/2596 issued by Department of Primary Industries.
- Certificate of Approval - Animal Care and Ethics Committee: 09/2596 issued by Department of Primary Industries.
- Special Purpose Permit: HS53511 issued by Forestry Corporation of NSW to conduct surveys within Bodalla SF.

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