

13. Ecology

13.1 Introduction

The CoastConnect — Caloundra to Maroochydore project is proposed within a corridor that is highly urbanised and developed. Much of the area's original vegetation has been cleared and replaced by residential, business/commercial, industrial and community facility land uses.

Some small pockets of green and/or open space are still present; however, these areas are fragmented. They have also been highly altered and generally do not represent vegetation with high ecological integrity. Despite this, these green and/or open spaces are valued at a social and community level because they provide places for recreation and outdoor activities.

Although the CoastConnect — Caloundra to Maroochydore corridor is highly urbanised, it is still necessary to identify ecological values that remain in the project area and to consider possible ecological impacts (i.e. impacts on native flora and fauna) that may result from the project.

13.2 Methodology

13.2.1 Desktop assessment

To inform this study, both desktop and field-based assessments of ecological values within the proposed project area were undertaken. The objectives of the desktop assessment were:

- to review existing and available data sources, including ecology-related mapping and databases and information supplied by local government authorities
- based on the above, to identify ecological values that have previously been recorded in the project area and which would require field assessment.

Ecology-related mapping and databases consulted for the purpose of this study are detailed in Table 13-1:

The data sources allowed assessment of the actual or potential presence of a particular species within the nominated search area. The reliability of information records varies between databases. The results of the desk-top assessment were used to inform and focus the field assessments. A collated list of flora and fauna species obtained from these data sources is presented in Appendix H.

Table 13-1: Database and mapping information sources

Department/information source	Database, mapping name
Department of Environment, Water, Heritage and Arts	<ul style="list-style-type: none"> ▪ <i>Environment Protection and Biodiversity Conservation Act 1999</i> Protected Matters Search Tool (grid search area: 26.6459, 153.08582 – 26.68580, 153.13645 – 26.80901, 153.14668 – 26.80477, 153.11226 – 26.69627, 153.10652 – 26.66959, 153.07186) ▪ Directory of Important Wetlands in Australia
Department of Environment and Resource Management	Wildlife Online database (grid search area: 26.6459 to 26.8090 and longitude 153.0719 to 153.1467)
Department of Environment and Resource Management	<ul style="list-style-type: none"> ▪ Regional ecosystem mapping (Version 5.2, 2006) ▪ Essential habitat mapping (2006)
Department of Infrastructure and Planning	South East Queensland Koala Habitat regulatory maps
Department of Employment, Economic Development and Innovation	Coastal Habitat Resources Information System
Environmental Protection Agency, Queensland Parks and Wildlife Service	South-east Queensland Regional Coastal Management Plan (August 2006)
Sunshine Coast Regional Council	Environment-related information pertaining to the project area

13.2.2 Field assessments

Field assessments for the purposes of ecological assessment were undertaken on two occasions: in December 2007 and in April 2009. They were undertaken in order to:

- identify the presence of species, communities and habitat that exist in the project area and may be affected by construction and operation of the project
- identify areas of habitat that may be affected by the project
- assess the strategic importance of all waterway crossings as green spaces and ecological corridors
- identify the presence of terrestrial fauna and flora species listed under the *Environment Protection and Biodiversity Conservation Act 1999*, *Nature Conservation Act 1992*, *Vegetation Management Act 1999*, and planning schemes and schedules used by the Sunshine Coast Regional Council that may potentially be impacted by the proposed project
- identify vegetation communities with potential for habitat, landscape or community value within the study area.

The concept design for the CoastConnect — Caloundra to Maroochydore project has been prepared, and locations of proposed construction works (associated with property acquisitions, bridge widening, lane widening, bus stops etc.) have been identified. Field assessments focused on surveying areas where bridge widening is proposed and on construction of recessed bus stops.

13.3 Preliminary analysis

13.3.1 Existing situation

Corridor-wide considerations

The proposed location of the CoastConnect — Caloundra to Maroochydore project is a highly developed and urbanised area. Both desktop review and field assessments reflect the fact that most of the vegetation within the proposed corridor has been cleared, and the land subsequently developed. Despite this, some green/open spaces and waterways occur within the project area and any potential impacts to these areas must be considered. Corridor-wide considerations are summarised below.

Matters of national environmental significance

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) protects matters of National Environmental Significance (NES). The EPBC Act identifies seven matters of NES:

- World Heritage properties
- wetlands of international importance (RAMSAR wetlands)
- national heritage places
- Commonwealth marine areas
- nuclear actions (including uranium mining)
- threatened species and ecological communities listed under the EPBC Act
- migratory species listed under the EPBC Act.

Where a project or action is believed to potentially cause a significant impact on a matter of NES, it must be referred to the Department of the Environment, Water, Heritage and the Arts (DEWHA) for assessment as to whether Commonwealth approval is required for the proposed action. Searches conducted using DEWHA's Protected Matters Search Tool indicates that there are matters of NES occurring either within or close to the project area. These are summarised in Table 13-2:

Table 13-2: Protected Matters Search Tool results for the search area

Search area	Search results
World Heritage areas/places	Nil recorded within the search area.
National heritage places	Nil recorded within the search area.
Wetlands of international significance	Moreton Bay is located to the south-west of the project area and includes the Pumicestone Passage. The project does not directly impact on Moreton Bay, and any indirect impacts associated with construction are unlikely to significantly impact on this RAMSAR wetland.
Commonwealth marine areas	Nil recorded within the search area.
Threatened ecological communities	Nil recorded within the search area.
Threatened species	<p>Habitat for 10 threatened bird species may or is likely to occur in the search area.</p> <p>Habitat for 1 threatened frog species is known to occur in the search area.</p> <p>Habitat for 7 threatened mammal species (including marine species) may or is likely to occur in the search area. Further, breeding of humpback whales (<i>Megaptera novaeangliae</i>) is known to occur in the search area.</p> <p>Habitat for 5 threatened reptile species (including marine species) may occur in the search area. Further, breeding of loggerhead turtles (<i>Caretta caretta</i>) is known to occur in the search area.</p> <p>Habitat for 14 threatened plant species may or is likely to occur in the search area. Further, the migration route of <i>Cryptocarya foetida</i> (stinking cryptocarya) is likely to occur within the search area.</p> <p>Given that the majority of the project is to be developed within an existing urbanised area and predominantly within existing road infrastructure, it is unlikely that the project will have any significant impact on recorded threatened species.</p>
Migratory species	<p>Habitat for 9 migratory terrestrial species may or is likely to occur within the search area. Further breeding of <i>Monarcha melanopsis</i> (black-faced monarch), <i>Monarcha trivirgatus</i> (spectacled monarch), <i>Myiagra cyanoleuca</i> (satin flycatcher) and <i>Rhipidura rufifrons</i> (rufous fantail) may or is likely to occur in the search area.</p> <p>Habitat for 14 migratory wetland bird species may or is likely to occur within the search area.</p> <p>Habitat for 7 migratory marine bird species may occur within the search area.</p> <p>Migratory marine species including mammals, reptiles and sharks are also likely to occur in the search area. However, given that the majority of the project is to be developed within an existing urbanised area and within existing road infrastructure, it is unlikely that the project will have any significant impact on migratory species.</p>
Nuclear actions	The project does not involve nuclear actions, neither do any occur within the search area.

The CoastConnect — Caloundra to Maroochydore project is proposed to be developed within a highly urbanised area and predominantly within the footprint of existing road infrastructure. Therefore, potential impacts to NES as a result of the project are expected to be negligible and a referral to DEWHA, for determination of whether or not the project is a 'controlled action' pursuant to the EPBC Act is not considered to be required.

Important wetlands of Australia

While the Directory of Important Wetlands in Australia has no statutory or legislative framework or authority, it identifies and provides information on the values of nationally important wetlands across Australia and is tool which should be used to identify:

- sites and wetland values present in the local area, particularly in relation to regional natural resource management
- sites of importance for particular species taxa, including threatened and migratory species
- potential RAMSAR sites and potential sites for the East Asian–Australasian Shorebird Site Network.

A search of the Directory of Important Wetlands in Australia indicates that two wetlands of national importance are located in proximity to the project area. The Coolum Creek and Lower Maroochy River wetland is located to the north and north-west of the project area and will not be impacted by the project. The Lower Mooloolah River wetland is generally located to the south and west of the project area and traverses the project area at Currimundi Creek. Further detail regarding the Lower Mooloolah River wetland is provided below in *Sections 3 and 4 — Nicklin Way and Kawana Town Centre*.

Remnant vegetation and regional ecosystems

Remnant vegetation is a term used in Queensland to describe vegetation that has the following characteristics:

- 50 % of the predominant canopy cover that would exist if the vegetation community were undisturbed
- 70 % of the height of the predominant canopy that would exist if the vegetation community were undisturbed
- composed of the same floristic species that would exist if the vegetation community were undisturbed (Department of Environment and Resource Management 2009a).

Queensland's vegetation management legislation protects remnant and some regrowth vegetation on freehold land and state land, as well as certain non-remnant vegetation on state land.

The Queensland Herbarium (part of the DERM) has mapped the remnant extent of regional ecosystems for much of Queensland. Regional ecosystems (REs) are communities of vegetation that are consistently associated with a particular combination of geology, land form and soil in a bioregion (Department of Environment and Resource Management 2009a).

Reference to RE mapping, extracted 1 May 2009, indicates that a number of REs are located adjacent or close to the project area. Mapped RE localities are described on a route section-by-section basis later in this chapter. It should be noted that only areas subject to RE mapping are discussed and any areas of the proposed route that are not discussed should be assumed to not be subject to RE mapping.

Threatened flora and fauna species

A total of 40 fauna species and 19 flora species of conservation significance listed under the Nature Conservation Regulation 2006 have previously been recorded within the search area (see Appendix H). Of the recorded fauna species, three species are amphibians, 19 species are birds, seven species are mammals, nine species are reptiles and one each is a species of fish and of insect. Of the recorded flora species, 11 are higher dicots, two are lower dicots and six are monocots.

When considering the results of the database searches relating to species of conservation significance, it should be noted that all database searches and mapping were undertaken for a predetermined grid search area (see grid search coordinates in Table 13-1) in order to capture relevant species information about the study area. This grid search generally includes (but is not limited to) the suburbs of Maroochydore, Cotton Tree, Alexandra Headland, Mooloolaba, Mountain Creek, Minyama, Buddina, Parrearra, Warana, Bokarina, Birtinya, Kawana Waters, Wurtulla, Currimundi, Aroona, Moffat Beach, Dicky Beach, Shelly Beach and Caloundra. However, due to the inflexibility of the search tools and their inability to define specific corridor areas, the results may include flora and fauna species, such as marine and migratory species, that may not necessarily actually occur within a particular area.

Therefore, results of these database searches can be used as an indication of flora and fauna that may have previously been recorded within the study area, but cannot be used definitively for this purpose.

Essential habitat

Essential habitat is vegetation in which a flora or fauna species that is endangered, vulnerable, rare or near-threatened under Queensland legislation has been known to occur. Essential habitat mapping is prepared by DERM. Essential habitat mapping has been consulted for the purposes of this study and indicates that a number of the mapped REs close to the project area may function as essential habitat for a number of flora and fauna species of conservation significance. These are discussed on a route section-by-section basis later in this chapter.

Koala habitat

The draft South East Queensland Koala State Planning Regulatory Provisions and regulatory maps came into effect on 12 December 2008. For development within the south-east Queensland urban footprint (in which this project is located), the draft South East Queensland koala state planning regulatory provisions and regulatory maps provide protective mechanisms for koala habitat areas that have already been identified within the urban footprint.

A review of the draft South East Queensland Koala State Planning Regulatory Provisions maps indicates that no identified koala habitat or protection areas exist within the proposed project area.

Local wetlands

The Sunshine Coast Regional Council (SCRC) has indicated that a number of locally significant wetlands in the Maroochydore area are located adjacent or close to the preferred route option (see Table 13-3). Project development works along Maroochy Boulevard and the Sunshine Motorway will remain within the existing road reserve and footprint, and therefore, no impacts to identified locally significant wetlands are expected to occur.

Table 13-3: Locally significant wetlands (Maroochydore area)

SCRC wetland number	Location of wetland relative to the project area
2	Maroochy Boulevard, Maroochydore
5	Maroochy Boulevard, Maroochydore
6	Maroochy Boulevard, Maroochydore
8	Sunshine Motorway (Maroochy Blvd on-ramp)
11	Sunshine Motorway (western side)
12	Sunshine Motorway (eastern side)
13	Sunshine Motorway (western side)
14	Sunshine Motorway (western side)
15	Sunshine Motorway (western side)
16	Sunshine Motorway (western side)
17	Sunshine Motorway (western side)
18	Sunshine Motorway (western side)
19	Sunshine Motorway (western side)
20	Sunshine Motorway (western side)
21	Sunshine Motorway (western side)

Source: Sunshine Coast Regional Council (formerly Maroochy Shire Council) 2007

Protected areas

A number of protected areas (e.g. national parks, conservation parks, reserves) are located close to the project area (see Table 13-4).

Table 13-4: Protected areas relevant to project area

Protected area	General location
Mooloolah River National Park	Mooloolah River and associated floodplains (west of study area)
Currimundi Environmental Park	Bokarina Beach foreshore and dunal system (north and east of the project area)
Currimundi Lake Conservation Park	North bank of Currimundi Lake foreshore and dunal area (east of project area)

Of the protected areas listed in Table 13-3, only the Mooloolah River National Park is located adjacent to the project area.

Locally significant trees and vegetation

While the project area is predominantly cleared of remnant vegetation, stands of regrowth or non-remnant vegetation, and even individual trees, may provide habitat, foraging and nesting resources to a wide variety of fauna species.

Additionally, individual and specific trees may have particular cultural, heritage or aesthetic value. The Sunshine Coast Regional Council has provided information (for the Maroochydore area) which indicates that there are a number of locally significant trees close to the proposed route (see Table 13-5).

Table 13-5: Locally significant trees (Maroochydore area)¹⁴

Location of significant tree	Species of tree	Significance of tree
Corner Aerodrome Road, Cornmeal Parade and Horton Parade, Maroochydore	<i>Eucalyptus citriodora</i>	Aesthetic value
Corner Aerodrome Road, Cornmeal Parade and Horton Parade, Maroochydore	<i>Eucalyptus citriodora</i>	Aesthetic value
Corner Aerodrome Road, Cornmeal Parade and Horton Parade, Maroochydore	<i>Eucalyptus citriodora</i>	Aesthetic value
Corner Aerodrome Road, Cornmeal Parade and Horton Parade, Maroochydore	<i>Eucalyptus citriodora</i>	Aesthetic value
Corner Aerodrome Road, Cornmeal Parade and Horton Parade, Maroochydore	<i>Eucalyptus citriodora</i>	Aesthetic value
Horton Parade (Sunshine Plaza car park)	<i>Ficus obliqua</i>	Age

¹⁴ Potential impacts to these trees resulting from the project are further discussed in Section 7 — Maroochydore.

Sections 1 and 2 — Caloundra to Currimundi

Section 1

Section 1 of the CoastConnect — Caloundra to Maroochydore project is located within a highly developed and urbanised area, and passes through the suburbs of Caloundra, Shelly Beach, Moffat Beach, Dicky Beach and Currimundi. No remnant vegetation or essential habitat is mapped within this section of the proposed route. Vegetation in this section predominantly consists of streetscaping and gardens planted with a palette of common horticultural specimens, associated with detached dwellings and unit developments.

Section 2

Riparian vegetation on Tooway Creek is mapped as remnant vegetation constituting RE 12.9-10.22, which has a conservation status of 'of concern' under the *Vegetation Management Act 1999*.

Tooway Creek riparian vegetation is also mapped as 'essential habitat' for the following species:

- *Pezoporus wallicus wallicus* (ground parrot), with a conservation status of 'vulnerable' under the Nature Conservation Regulation 2006
- *Litoria olongburensis* (wallum sedgefrog), with a conservation status of 'vulnerable' under the Nature Conservation Regulation 2006
- *Crinia tinnula* (wallum froglet), with a conservation status of 'vulnerable' under the Nature Conservation Regulation 2006
- *Litoria freycineti* (wallum rocketfrog), with a conservation status of 'vulnerable' under the Nature Conservation Regulation 2006.

Table 13-6 provides an assessment of the likelihood of occurrence of these species within the mapped remnant vegetation adjacent to Tooway Creek.

Table 13-6: Essential habitat fauna species likelihood assessment (Tooway Creek)

Scientific name	Common name	NC Act status	Source	Preferred habitat	Potential to occur in the corridor
<i>Pezoporus wallicus</i>	Ground parrot	V*	Wildnet	Coastal table heathlands, sedge lands and button-grass plains. Is also found on drier ridges and burned areas of grasslands (Pizzey & Knight 1997; Simpson 1999).	Low: suitable habitat exists, but it is highly degraded, fragmented and located within highly developed area. Historical records show one sighting within the search area.
<i>Litoria olongburensis</i>	Wallum sedgefrog	V	Wildnet, DEWHA	Restricted to wallum sand plain with low pH waters of between 3 and 6.8. Inhabits paperback forests and sedge swamps; individuals occasionally found in other wet heath associations (Lewis & Goldingay 2005; Meyer et al. 2005).	Low: suitable habitat exists for the species; however, it is highly degraded, fragmented and located within highly developed area. Restricted to riparian zones and is not particularly abundant. Historical records show one sighting within the search area.
<i>Crinia tinnula</i>	Wallum froglet	V	Wildnet	Adapted to acidic waters of coastal lowlands. Restricted to Bribie, Moreton and Stradbroke islands and some areas adjacent on the mainland (Queensland Museum 2000).	Low: suitable habitat exists for the species; however, it is highly degraded, fragmented and located within highly developed area. Restricted to riparian zones and not particularly abundant. Historical records show two sightings within the search area.
<i>Litoria freycineti</i>	Wallum rocketfrog	V	Regional Ecosystem Mapping	Occurs in coastal lowlands and is adapted to acidic waters. Also occurs in forests, heaths and temporary swamps (Frogs Australia Network 2005).	Low: suitable habitat exists for the species based on predictive modelling. No sightings have been recorded for the species within the search area.

* V = vulnerable

Field assessments undertaken along Tooway Creek indicate that marine plants (including *Sporobolus virginicus* (saltwater couch) and *Avicennia marina* (grey mangrove) are present along the banks.

Sections 3 and 4 — Nicklin Way and Kawana Town Centre

Section 3

Project works proposed in Section 3 include a number of small land acquisitions, construction of recessed bus stops and bridge widening works over Currimundi Creek and Tokara Canal.

Remnant vegetation is not mapped along either Currimundi Creek or Tokara Canal in the vicinity of the proposed widening works. Riparian vegetation associated with the Mooloolah River at the northern end of Section 3 is mapped as including remnant vegetation RE 12.1.3 and 12.2.7.

Marine plants — including *Tetragonia tetragonoides* (warrigal greens), *Cupaniopsis anacardioides* (tuckeroo), *Casuarina glauca* (swamp oak) and *Juncus kraussii* (jointed rush) — have been recorded immediately adjacent to the existing bridge structure across Currimundi Creek (see Photo 13-1).



Photo 13-1: South-eastern bank of Currimundi Creek¹⁵

Typical on-street landscaping in Section 3 includes tree species *Syzygium australe* (scrub cherry), *Cupaniopsis anacardioides* (tuckeroo), *Xanthostemon chrysanthus* (golden penda), *Archontophoenix alexandrae* (Alexandra palm), *Melaleuca quinquenervia* (paper bark tea tree) and *M. leucadendra* (weeping paperbark). Landscaping exists to the north-west of the existing bridge crossing at Currimundi Creek, with species including *Callistemon* ‘Little John’ (dwarf callistemon), *Lomandra longifolia*, *Melaleuca quinquenervia* and *Corymbia trachyphloia* (brown bloodwood).

Tokara Canal is a constructed canal, and rock and revetment walls have been employed adjacent to the existing bridge (see Photo 13-2). The canal banks along Tokara Canal are landscaped with species typical to the area, including *Lomandra longifolia* (spiny-headed mat rush), *Melaleuca linarifolia* ‘Claret Tops’, *Myoporum ellipticum* (coastal myoporum), *Cupaniopsis anacardioides* and *Ficus* sp. The canal banks adjacent to the existing bridge appear to be regularly maintained, as evidenced by pruned vegetation and lack of weed growth. Only one marine plant (a single specimen of *Casuarina glauca*) was recorded at Tokara Canal: on the south-eastern bank adjacent to the existing bridge.

¹⁵ *Juncus kraussii* can be seen below high water mark.



Photo 13-2: North-eastern bank of Tokara Canal¹⁶

As mentioned above, Currimundi Creek forms part of the Lower Mooloolah River wetland, which is a wetland identified on the Directory of Important Wetlands in Australia. The Lower Mooloolah River wetlands are formed from a loose aggregation of three main wetland clusters, the third aggregate being Currimundi Creek. The Lower Mooloolah River wetlands are tributaries, floodplains, coastal swamps, inlets, estuaries and flows from these wetlands that combine in very large flood events to form an expanse of eastward-flowing water (DEWHA 2009a).

To protect the ecological integrity and functioning of this wetland system, a number of conservation measures have been undertaken in the region. These measures include declaration of a number of national parks, conservation parks and environmental reserves such as the Mooloolah River National Park, the Palmview and Currimundi Lake conservation parks (DEWHA 2009a). Further, the State Coastal Management Plan — Queensland Coastal Policy (August 2001) provides policy that prevents, minimises or mitigates further loss or degradation and impacts on coastal wetlands (DEWHA 2009a).

¹⁶ Note the use of rock and revetment walls and landscaped banks.

Section 4

Section 4 of the project area is located in the emerging precinct of Lake Kawana and Kawana Town Centre. This section of the project crosses Lake Kawana, and bridge widening is proposed. This precinct area has recently (i.e. within the last five years) been subject to significant land development, including dredging for construction of Lake Kawana and subsequent deposition of dredged spoil. As a result, negligible remnant native vegetation has been retained in this section of the project and no remnant vegetation is mapped by the Department of Environment and Resource Management in this area. On-street landscaping has been provided as part of recent development and is present along both Lake Kawana Boulevard and Kawana Way.

Section 5 — Mooloolaba

Planning and delivery of this section is being lead by the Sunshine Coast Regional Council.

Section 6 — Alexandra Parade

Section 6 of the proposed CoastConnect — Caloundra to Maroochydore route is located between the northern end of Venning Street and the northern end of Alexandra Parade. Reference to mapping indicates that a small area of foredune vegetation mapped as RE 12.2.14 (which has a conservation status of ‘not of concern’) is located to the east of Alexandra Parade from Aerodrome Road to Katoa Street (see Photo 13-3). This RE is described as:

“Strand and foredune complex comprising Spinifex sericeus grassland, Casuarina equisetifolia woodland/open-forest and with Acacia leiocalyx, A. aulacocarpa, Banksia integrifolia subsp. integrifolia, Pandanus tectorius, Corymbia tessellaris, Cupaniopsis anacardioides and Acronychia imperforata.”



Photo 13-3: Remnant vegetation east of Alexandra Parade/Okinja Road intersection

This vegetation was inspected as part of the field inspections and verified as being consistent with the RE mapping. This remnant vegetation is not mapped as providing essential habitat for any flora or fauna species of conservation significance.

The majority of development works for this section will be conducted within existing road infrastructure. However, some widening at major intersections will be needed to accommodate queue bypass lanes, as will reconfiguring of existing car-parking facilities at the Alex Surf Club and construction of recessed bus stops on Alexandra Parade at the Mandin Street, Mayfield Street, Boolarong Crescent, Mari Street and Okinja Road intersections. The latter recessed bus stop is located south of an area mapped as remnant vegetation RE 12.2.14. Therefore, development of this bus stop and reinstatement of existing footpaths are not expected to impact on or require clearing of remnant vegetation.

An off-street parking and landscaped area is proposed to be developed in a cleared area immediately south of the Seabreeze Caravan Park (see Photo 13-4). This area is maintained as open space and therefore includes mown grass with a small number (i.e. less than 10) of purpose-planted landscape trees. Landscape trees recorded in this area include *Cupaniopsis anacardioides*, *Pandanus pedunculatus* (screw palm), *Hibiscus tiliaceus* and *Araucaria heterophylla* (Norfolk pine).



Photo 13-4: Proposed location of off-street car-parking facility, Alexandra Parade

A recessed bus stop is also proposed on the eastern side of Alexandra Parade, immediately north of the Mandin Street intersection (see Photo 13-5). Adjacent to the proposed location of this bus stop is a significant stand of coastal vegetation including (but not limited to) *Casuarina glauca*, *Cupaniopsis anacardioides* and *Macaranga tanarius* (macaranga). While this stand of vegetation is not mapped as being remnant vegetation, it is considered locally significant as it provides a sizeable area of habitat for local fauna species and protection against erosive processes that typically act on the coastal and foredune zone.



Photo 13-5: Location of recessed bus stop north of Mandin Street, Alexandra Headland

A recessed bus stop is also proposed to the north-east of the Mari Street/Alexandra Parade intersection, which will encroach on the existing Alexandra Beach esplanade. Field assessments have noted a number of mature *Banksia integrifolia* and *Casuarina equisetifolia* in this locality that are likely to require removal to accommodate the bus stop (see Photo 13-6). The precise number and location of street trees and landscaping that may require removal will be established when the design is finalised.



Photo 13-6: Proposed location of recessed bus stop (eastern side of Alexandra Parade)

Section 7 — Maroochydore

This section of the CoastConnect — Caloundra to Maroochydore project is located between the southern end of Aerodrome Road and Horton Parade, Maroochydore, in a highly urbanised environment where few existing ecological values have been identified.

No remnant vegetation or essential habitat is mapped along this section of the proposed corridor. The corridor crosses Cornmeal Creek at the intersection of Horton Parade and Cornmeal Parade; widening of Cornmeal Creek bridge is proposed to accommodate priority bus lanes. At present, the area contains a landscape strip that provides a buffer to car-parking areas to the west of Horton Parade and supports a number of *Delonix regia* (poinciana) street trees. As mentioned in Table 13-4, five locally significant trees are located in the road reserve at the corner of Aerodrome Road, Cornmeal Parade and Horton Parade, Maroochydore; and a significant tree has been identified within the existing Sunshine Plaza car park.

A potential car-parking and landscaped area has been identified for a traffic island that currently exists between Aerodrome Road, Kingsford Smith Parade and Third Avenue.

13.3.2 Potential benefits, impacts and typical mitigation measures

Corridor-wide considerations

The CoastConnect — Caloundra to Maroochydore project is proposed within a corridor that is highly urbanised and developed. Much of the area's original vegetation has been cleared and replaced by residential, business/commercial, industrial and community facility land uses. Consequently, in general terms, terrestrial ecological values within the project area are nominal and fragmented. While they also have been subject to development, aquatic and marine ecological values are present within the project area and are predominantly associated with tidal waterway crossings.

Potential impacts

Across the CoastConnect — Caloundra to Maroochydore project, the most common impacts expected to occur include:

- removal of riparian vegetation associated with bridge widening and realignment at waterway crossings
- removal of marine plants at waterway crossings
- disturbance of waterway beds and substrates associated with bridge widening
- loss of on-street landscaping associated with construction of recessed bus stops and bus stations.

These impacts — where they are expected to occur and to what extent — are detailed in the following sections.

Typical mitigation measures

As a result of database searches, field assessment, input of ecological information to the design process and community consultation, a number of changes have been made to preliminary designs to reduce or mitigate associated environmental impacts.

Other activities, such as undertaking detailed marine plant surveys near proposed bridge works and undertaking fauna investigations and monitoring, can also help mitigate potential impacts.

Sections 1 and 2 — Caloundra to Currimundi

Potential impacts

These sections of the CoastConnect — Caloundra to Maroochydore project are proposed to operate within the existing road infrastructure, thus minimising potential impacts to on-street landscaping and existing ecological values.

The project will not impact on Tooway Creek as the corridor will be located within the existing road reserve and footprint of disturbance. Therefore, impacts to recorded ecological values at this location will be negligible.

Typical mitigation measures

Since potential impacts to ecological values are expected to be negligible, mitigation measures are not deemed to be required. Permits and/or approvals from DERM and DEEDI relating to the *Water Act 2000* and the *Fisheries Act 1994* (respectively) are unlikely to be necessary.

Sections 3 and 4 — Nicklin Way and Kawana Town Centre

Potential impacts

Project works, including construction of recessed bus stops and bridge-widening works over Currimundi Creek, Tokara Canal and Lake Kawana, are expected to result in removal of on-street landscaping and of riparian vegetation and marine plants.

A small land resumption is proposed to the north-west of the existing bridge crossing at Currimundi Creek. This land requirement will impact on Crummunda Park, and is likely to require removal of existing landscaping.

Typical mitigation measures

Bridge-widening works are likely to disturb or clear marine plants, especially adjacent to Currimundi Creek. Therefore, a permit will be required from DEEDI pursuant to the *Fisheries Act 1994* and off-sets may be required. Given that development works will occur close to waterways, drafting and implementation of a construction management plan (CMP) is recommended. This CMP must include water quality protection and monitoring measures. Further detail regarding water quality can be found in Chapter 12 — Hydrology, hydraulics and surface water quality.

Approval from DERM to clear remnant vegetation (associated with the Mooloolah River at the northern end of Section 3) will not be required, as no development works will be undertaken outside the existing road infrastructure footprint.

Where construction of recessed bus stops and works associated with land resumptions results in removal of on-street landscaping, it is recommended that replacement on-street landscaping be provided; however, removal of on-street landscaping should be avoided wherever possible. All replacement on-street landscaping works should be undertaken in accordance with relevant council or Department of Transport and Main Roads provisions. The precise number and location of street trees that may require removal will be established when the design is finalised.

Section 5 — Mooloolaba

Planning and delivery of this section is being lead by the Sunshine Coast Regional Council.

Section 6 — Alexandra Headland

Potential impacts

Section 6 of the CoastConnect — Caloundra to Maroochydore project is located between the northern end of Venning Street and the northern end of Alexandra Parade. The majority of development works for this section will be conducted within existing road infrastructure. However, some widening at major intersections will be needed to accommodate queue bypass lanes, as will the reconfiguring of existing car-parking facilities at the Alex Surf Club and the construction of recessed bus stops on Alexandra Parade at the Mandin Street, Mayfield Street, Boolarong Crescent, Mari Street and Okinja Road intersections.

A recessed bus stop is proposed on the eastern side of Alexandra Parade, immediately north of the Mandin Street intersection. Adjacent to the proposed location of this bus stop is a significant stand of coastal vegetation. While this stand of vegetation is not mapped as remnant vegetation, it is considered locally significant as it provides a sizeable area of habitat for local fauna species and protection against the erosive processes that typically act on the coastal and foredune zone.

Another recessed bus stop is proposed to be located to the south of the Aerodrome Road/Okinja Road intersection and an area mapped as remnant vegetation RE 12.2.14. Development of this bus stop and reinstatement of existing footpaths are not expected to impact on, or require clearing of, remnant vegetation.

Construction of queue bypass lanes at the Alexandra Parade/Okinja Road intersection will impact on a number of mature *Araucaria heterophylla* and *Banksia integrifolia* that are located in the traffic island south of Okinja Road.

On the western side of Alexandra Parade, a recessed bus stop is proposed immediately north of the Okinja Road intersection. Development of this recessed bus stop may require partial removal of a landscaped area that presently screens the Seaforth development and associated commercial premises.

An off-street parking and landscaped area is proposed for a cleared area immediately south of the Seabreeze Caravan Park. This area is maintained as open space; it includes mown grass with a small number (i.e. less than 10) of purpose-planted landscape trees. Landscape trees recorded in this area include *Cupaniopsis anacardioides*, *Pandanus pedunculatus* (screw palm), *Hibiscus tiliaceus* and *Araucaria heterophylla* (Norfolk pine). Development of this area as an off-street car-parking facility may require removal of some of the existing landscape trees (pending detailed design) but would not impact on adjacent remnant vegetation. The precise number and location of street trees and landscaping that may require removal will be established when the design is finalised.

Typical mitigation measures

The following general mitigation measures are recommended for implementation in this section:

- introduction of additional coastal planting to supplement and strengthen existing dunal vegetation and coastal landscaping
- implementation of more landscaping for the retail area in the Okinja Road realignment option.
- Additionally, where construction of recessed bus stops results in removal of on-street landscaping, it is recommended that replacement on-street landscaping be provided. All replacement on-street landscaping works should be undertaken in accordance with relevant council or Department of Transport and Main Roads provisions.

Section 7 — Maroochydore

Potential impacts

Section 7 of the CoastConnect — Caloundra to Maroochydore project is located between the southern end of Aerodrome Road and Horton Parade, Maroochydore. Project development works will not impact on the six locally significant trees that were identified along Aerodrome Road and in the existing Sunshine Plaza car park. However, bridge-widening works are proposed to the existing Cornmeal Creek bridge, and therefore it is likely that marine plants will be disturbed or cleared.

Removal of on-street landscape trees may be required for recessed bus stops and the relocated bus station proposed for Horton Parade. The precise number and location of street trees and landscaping that may require removal will be established when the design is finalised.

To compensate for loss of on-street car parking, development of off-street car parking facilities is being considered at a traffic island between Aerodrome Road, Third Avenue and Kingsford Smith Parade. This site has previously been developed and exhibits negligible ecological values. Therefore, development of the site for possible car-parking facilities is not expected to result in any significant ecological impact.

Typical mitigation measures

Marine plants in Cornmeal Creek may be disturbed as a result of proposed widening of the existing Cornmeal Creek bridge. Therefore, a permit will be required from DEEDI pursuant to the *Fisheries Act 1994* and off-sets may be required. Given that development works will occur close to a waterway, drafting and implementation of a CMP is recommended. This CMP must include water quality protection and monitoring measures. Further detail regarding water quality can be found in Chapter 12 — Hydrology, hydraulics and surface water quality.

Where construction of recessed bus stops results in removal of on-street landscaping, it is recommended that replacement on-street landscaping be provided. All replacement on-street landscaping works should be undertaken in accordance with relevant council or Department of Transport and Main Roads provisions.

13.4 Future investigations

With appropriate mitigation, no long-term ecological impacts as a result of the proposed CoastConnect — Caloundra to Maroochyore project are expected.

To ensure ecological values within the project area are properly identified and protected, habitat values within the project corridor should be investigated in more detail closer to delivery of the project. Of particular importance for this project are potential impacts associated with waterway crossings (bridge widening and realignment).

Therefore, prior to detailed design of realignment and bridge widening works at Currimundi Creek, Tokara Canal, Lake Kawana and Cornmeal Creek, it is recommended that the following investigations be undertaken:

- detailed marine plant surveys in the expected area of disturbance for all bridge realignment and widening works
- benthic fauna investigations and monitoring (only where required by relevant state government departments in association with permitting e.g. prescribed tidal works).

Where development works will occur close to waterways, implementation of a CMP is recommended. The CMP must include water quality protection and monitoring features.

13.5 References

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