Restoration Management Plan

87-89 Tweed Coast Road, Hastings Point

TriCare Hastings Point

7 May 2025

Final

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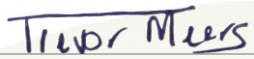
Signed:	
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Glossary

Term / Abbreviation	Definition
AHD	Australian Height Datum
APZ	Asset Protection Zone
asl	Above sea level
BAM	Biodiversity Assessment Method
BAM-C	Biodiversity Assessment Method Calculator
BC Act	NSW *Biodiversity Conservation Act 2016*
BDAR	Biodiversity Development Assessment Report
BOS	Biodiversity Offsets Scheme
Biosecurity Act	NSW *Biosecurity Act 2015*
BRC	Bush Regeneration Contractor
Council	Tweed Shire Council
DA	Development Application
DCCEEW	Commonwealth Department of Climate Change, Energy, the Environment and Water
DBH	Diameter at breast height
EEC	Endangered Ecological Community
E&H	Environment and Heritage Group
EIS	Environmental Impact Statement
EP&A Act	NSW *Environmental Planning and Assessment Act 1979*
EPBC Act	Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*
GIS	Geographic Information System
ha	Hectares
HTE	High Threat Exotic
ILU	Independent Living Unit
IPA	Inner Protection Area
KHA	Koala Habitat Assessment
MNES	Matters of National Environmental Significance
NSW	New South Wales
PCT	Plant Community Type
RAC	Residential Aged Care
Resilience and Hazards SEPP	*State Environmental Planning Policy (Resilience and Hazards) 2021*
Restoration area	Area covered by this Restoration Management Plan
RMP	Restoration Management Plan
the Project	The proposed Senior's Living development

Term / Abbreviation	Definition
SAT	Spot Assessment Technique
SSD	State Significant Development
Study area	The subject site extending west to the edge of Cudgera Creek (see **Figure 1**)
Subject site	47-49 Tweed Coast Road, Hastings Point, New South Wales (NSW) (the 'Project'), also known as Lot 1 DP786570 (see **Figure 1**).
Subject land	The area of land impacted by the Project (see **Figure 1**).
TEC	Threatened Ecological Community
TBDC	Threatened Biodiversity Data Collection
TPZ	Tree Protection Plan
Tweed Coast CKPoM	Tweed Coast Comprehensive Koala Plan of Management 2020
Tweed Shire DCP	Tweed Shire Development Control Plan 2008
VI Score	Vegetation Integrity Score
VRZ	Vegetated Riparian Zone
WM Act	*Water Management Act 2000*
WoNS	Weed of National Significance

1. Introduction

Cumberland Ecology was commissioned by PlanIT Consulting on behalf of TriCare Hastings Point (the 'client', hereafter referred to as 'TriCare'), to prepare a Restoration Management Plan (RMP) to support a Development Application (DA) for a Seniors' Living development to be located at Lot 1 DP 786570, otherwise known at 87-89 Tweed Coast Road, Hastings Point, NSW (the 'subject site') (**Figure 1**). The 37, 390m^2 (3.8 ha) subject site is located at the southern end of the Hastings Point. Hastings Point is predominantly a low-scale coastal settlement providing a range of recreational, holiday and residential opportunities.

The subject site is surrounded by public open space and environmental land including Cudgera Creek to the west, Cudgera Beach and dunal foreshore to the east, and the Pottsville Environmental Park to the north and south. An existing Service Station adjoins the site's south-east.

The subject site is currently zoned R1 General Residential.

1.1. Project History

A Senior Housing development was approved on the subject site in May 2007. Stage 1 of the development was developed in 2009 by another provider. Stage 1 incorporates 91 independent living units across three buildings with basement car parks.

TriCare subsequently purchased the site in 2011 and currently operates the existing development.

The remaining stages, which comprised 94 supported living units and 67 residential aged care beds across 4 buildings, has never been built. Nevertheless, the development consent remains valid.

TriCare has reviewed the balance of the approved development and concluded that the design no longer responds to the contemporary vision of senior living needs and requirements - including the quality of accommodation, allowance for lifestyle amenity, provision of greater passive and active communal spaces and the support and encouragement of age in place principles.

Accordingly, TriCare has elected to review the balance of the master plan and embark on a new delivery outcome for the balance stages of the seniors housing community (the 'Project').

Development consent for the Project is being sought under the *Environmental Planning and Assessment Act 1979* (EP&A Act) by way of State Significant Development planning pathway.

1.2. Project Description

1.2.1. Location

The Project is located at Lot 1 DP 786570, otherwise known at 87-89 Tweed Coast Road, Hastings Point, NSW (the 'subject site'). The subject site is approximately 3.8 hectares (ha) in area and is currently zoned R1 General Residential. The subject site is located approximately 22 km south of Tweed Heads and the Queensland border. The location of the subject site is shown in **Figure 1**.

Parts of the subject site supporting the existing Senior's Living Development are included in the study area, with the study area also extending west of the subject site to include a narrow strip of land between the subject

site and Cudgera Creek that is located on the Biodiversity Values Map. This also includes a rehabilitation area established to offset impacts of the existing Senior's Development.

The study area is bound to the east by the existing Senior's Living Development and to the west by Cudgera Creek. Residential dwellings are located to the north along Tweed Coast Road, while bushland (Cudgen Nature Reserve) is located to the south separating Hastings Point from Pottsville and on the opposite bank of Cudgera Creek.

Parts of the study area extend into Crown land adjacent to Cudgera Creek. As these areas are outside the subject site, they are located outside the restoration area. The restoration area covers the areas of the subject site outside the development footprint, but including areas to be managed as bushfire Asset Protection Zones (APZs). Mitigation measures to be applied during construction within the development footprint are also detailed in this RMP, as detailed in **Section 6**.

1.2.2. Project Overview

The TriCare Hastings Point development comprises both independent living units (ILUs) and a residential aged care home (RAC) home, that will be supported by a range of other services.

Specifically, the proposal includes:

- A 47 place RAC (Building D) comprising:
    - individual private rooms with ensuites facilities;
    - shared dining, lounge and sitting rooms;
    - café;
    - kitchen;
    - serveries;
    - nurses stations;
    - offices;
    - staff room and facilities;
    - waste room; and
    - loading bay.
- 51 ILUs split across 3 buildings, including:
    - 24 ILUs in Building E
    - 18 ILUs in Building F
    - 9 ILUs in Building G

Complimenting the ILUs and RAC, the development offers a range of communal facilities for entertainment, health, active and passive recreation. These facilities include:

- Bowling Green and pavilion with bowls store, amenities, kitchen and covered seating area;
- Indoor swimming pool and spa, with amenities and viewing area;
- Perimeter walking trail; and
- Landscaped gardens.

The proposed development will provide an important contribution to supporting the need for seniors accommodation and care within the Kingscliff locality.

No changes to the existing Stage 1 development are proposed.

The four buildings are referred to as building D, E, F and G, and are built around a central community precinct that will include a bowls green, bowls pavilion and pool pavilion. A proposed walking trail will be located around the exterior of the development and will form an emergency access track. The Project will be accessed by road from the existing Stage 1 development and there will be above ground parking spots in addition to the basement level cark parks. Areas between the access roads, car parks, buildings and facilities will be landscaped with garden beds, walking tracks and informal lawn areas.

Areas to be cleared/modified to establish APZs also form part of the development footprint.

The Project layout including landscaping is shown in **Figure 2** while a ground floor plan, including APZs is provided as **Figure 3** as per the plans prepared by Aquis Design (2024).

General Description of the Subject Site and Study Area

1.2.2.1. Historical and Present Land Use

Prior to the current Senior's Living Development, approved in 2007, the subject site was occupied by the Hastings Point Holiday Village including 60 long term sites, 40 short term sites and 20 tent sites, as well as amenities. A marine flora and fauna museum and associated buildings including holiday style cabins dominated the northern part of the subject site. The subject site included ornamental tree plantings together with scattered remnant trees. Ornamental and garden plantings were also undertaken in 13 allotments located along Cudgera Creek. The cabins located on these allotments have been progressively removed with removal completed around 2019. The area occupied by these cabins has in part been maintained through mowing since this time, with some areas containing remaining garden plantings intermixed with native bushland.

The current Senior's Living Development now occupies the eastern portion of the subject site. This includes two to three storey residential buildings, car parking, landscaping and recreation and health facilities.

1.2.2.2. Topography and Soils

The study area is elevated at approximately 6m as per the Australian Height Datum (AHD) and slopes gently towards Cudgera Creek. The soils are generally aeolian sand deposits. In areas that have been subject to

previous development the sands are extensively intermixed with gravel and building rubble. In areas subject to rehabilitation plantings a shallow topsoil rich in organic matter have developed. Closer to Cudgera Creek the soils have developed into moist dark grey to black sandy loams that are rich in organic matter. Estuarine muds are present in the Cudgera Creek estuary below mangroves.

The following soil landscapes are mapped on Soil Landscapes of the Murwillumbah-Tweed Heads 1:100,000 Sheets (Morand 1996) in the study area:

- Cobaki variant A (covering the western side of the study area) ; and
- Bogangar (covering the eastern side of the study area).

The Cobaki soil landscape is described as narrow inter barrier creek floodplains consisting of mixed estuarine and aeolian materials (Morand 1996), while the Bogangar soil landscape is described as very disturbed outer barrier (Holocene) dunes (Morand 1996).

1.2.2.3. Geology

The Tweed Heads 1: 100 000 Coastal Quaternary Geology Map indicates that the following geological units are present within the study area:

- Qhbd: Holocene dune, marine sand (minor occurrence in the north);
- Qpbr: Pleistocene beach ridge and associated strand plain, marine sand, indurated sand (associated generally with the subject land);
- Qhei; Holocene interbarrier creek deposits: marine sand, silt, clay, silt, shell (associated with the banks of Cudgera Creek); and
- Qhec: Holocene estuarine channel: marine sand, silt, clay, gravel, shell (associated with the channel of Cudgera Creek).

1.2.2.4. Hydrology

The study area extends to the edge of Cudgera Creek which is estuarine and fringed by mangroves. The Cudgera Creek estuary flows directly out to the South Pacific Ocean, at Hastings Point, approximately 1 km north of the study area.

A minor stormwater drain runs through part of the subject site towards Cudgera Creek and would only flow after heavy rainfall. This is not defined as a watercourse due to a lack of a defined channel and/or top of bank. Drainage within the subject site is generally limited to surface flow, and as the subject site grades to the rear no ponding of water occurs. The subject site is not subject to the influence of any external catchments (Cozans Regan 2024a).

1.2.2.5. Vegetation

The vegetation of Hastings Point and the surrounding landscapes have been modified since European settlement in NSW and some areas of coastal sand dunes have been subject to historical sand mining. Small areas of the pre-existing vegetation within proximity of the study area have been historically cleared for

agriculture and residential development purposes. These areas are surrounded by significant areas of intact native vegetation on the opposite bank of Cudgera Creek and on coastal sand dunes.

Most of the vegetation within the subject site has been significantly altered through clearing for previous development including the previous Hastings Point Holiday Village which included removal of trees and ornamental garden plantings. While some of these ornamental plantings have been removed, some garden plants remain throughout the retained bushland on the subject site. Some restoration plantings of littoral rainforest have been undertaken following the previous DA approval. The remaining vegetation is mostly comprised of native regrowth over exotic grasslands and remnant vegetation that has been highly infested by weeds.

1.2.3. Study Area, Subject Site, Subject Land and Restoration Area

The subject site is land located at 87-89 Tweed Coast Road, Hastings Point, also known as Lot 1 DP786570.

The study area includes the subject site, areas extending beyond the subject site to the east, and areas extending to the banks of Cudgera Creek to the west, including fringing mangroves.

The restoration area includes portions of the study area and subject site to be managed for conservation, including setback areas. The study area extends to the edge of mangroves growing within Cudgera Creek outside the subject site. The mangroves within the creek itself are relatively weed free and as such this area is excluded from the restoration area. Some other fringing riparian vegetation is located outside the subject site along the Cudgera Creek but is included in the restoration area as it makes sense to manage weeds in these narrow areas while managing weeds in adjacent areas to be revegetated.

The area impacted by the Project, including APZs, is referred to as the subject land.

The study area, subject site, subject land and restoration area are shown in **Figure 1**.

1.3. Previous Restoration Strategy

Seekchange (2008) prepared a Restoration Strategy for the subject site in 2008. This Restoration Strategy proposed several management zones being:

- An existing riparian area covering riparian vegetation along Cudgera Creek to be managed through assisted natural regeneration;
- A core rehabilitation zone with a width of 20 m to be planted with dense littoral rainforest plantings; and
- A residual/outer rehabilitation zone extending up to 30 m from the core rehabilitation zone containing existing residences that was to be managed through weed control.

The restoration planting included a mixture of littoral rainforest species that were established in part of the core and residual/outer rehabilitation zone in the north east of the subject site, that extended 20 m from Cudgera Creek. This 'core rehabilitation zone' was proposed to be planted with Tweed Shire Vegetation Strategy (Kingston et al. 2004) vegetation community 101 Littoral Rainforest, with plantings at a high density.

Restoration plantings have not been undertaken to the south in areas previously occupied by cabins along Cudgera Creek.

The residual/outer rehabilitation zone extending between the core rehabilitation zone and the approved development footprint was to be maintained as an open forest/woodland rehabilitation zone, which was to include:

- Spaced canopy trees to ensure maintenance of the required APZ;
- A boardwalk with associated picnic shelters and birdwatching/viewing deck;
- Swales/stormwater infiltration devices planted with native species; and
- Turfed areas for picnicking.

This zone was also to be planted with Littoral Rainforest species, with trees planted at a spacing of three trees per 10 x 10 m area. This zone has not been established, with the area remaining grassland.

The area proposed for restoration under this RMP includes a portion of the 20 m core rehabilitation zone that was planted and will be retained, plus additional areas not planted. An additional area in the south has been added to this to infill a canopy gap in the riparian vegetation to improve connectivity. Existing riparian vegetation is to be retained, including much of the original restoration planting within this area to be managed through weed control. An area of the original restoration plantings now included in the APZs as an inner protection area (IPA), is to be retained in a modified form as per IPA requirements, together with plantings within the IPA. This area is referred to as the 'residual outer rehabilitation zone'. Areas to be subject to landscape plantings outside the APZ area and surrounding the proposed buildings are excluded from the restoration area and are covered by a landscape plan (Arcadia 2024). An emergency access road is located within the proposed APZs. The breakdown of areas included in the original Restoration Strategy and what is proposed under this RMP are provided in **Table 1** below. The total area appears to be reduced as parts of the APZ extending across the emergency access track are not included in the proposed Core Rehabilitation Area. However, with the inclusion of the access track and additional landscaping plantings the areas are much the same.

Table 1 Areas approved in the original Restoration Strategy, and areas proposed in this RMP.

Boundary	Area Approved (ha)	Area Proposed (ha)
Residual Outer Rehabilitation Zone (IPA)	0.399	0.277
Core Rehabilitation Zone	0.412	0.467

This RMP supersedes the previous Restoration Strategy. The previous restoration area (as approved) is shown in **Figure 4**, with the proposed restoration area shown in **Figure 5**.

1.4. Relevant Legislation

It is noted that as the Project is to be assessed under the SSD pathway, a range of Tweed Shire Council development controls do not directly apply to the Project. Other legislation that is relevant is detailed further below.

1.4.1. Biodiversity Conservation Act 2016

The BC Act is the key piece of legislation in NSW relating to the protection and management of biodiversity and threatened species. The purpose of the BC Act is to maintain a healthy, productive, and resilient environment for the greatest well-being of the community, now and into the future, consistent with the principles of ecologically sustainable development. The BC Act is supported by a number of regulations, including the *Biodiversity Conservation Regulation 2017* (BC Regulation).

The BC Act requires consideration of whether a development or an activity is likely to significantly affect threatened species. For Part 4 local developments, projects that significantly affect threatened species trigger the Biodiversity Offsets Scheme (BOS). The BOS is intended to simplify biodiversity assessment and improve biodiversity outcomes by creating consistent assessment requirements to measure the likely biodiversity loss of development proposals and gains in biodiversity value achieved at offset sites through active management. The BOS requires an assessment following the Biodiversity Assessment Methodology (BAM) by an accredited assessor and the preparation of a Biodiversity Development Assessment Report (BDAR).

A BDAR has been prepared for the Project by Cumberland Ecology (Report No. 21273 RP2). This RMP supports this BDAR.

1.4.2. Environment Protection and Biodiversity Conservation Act 1999

The *Environment Protection and Biodiversity Conservation Act 1999 (*EPBC Act) prescribes the Commonwealth's role in environmental assessment, biodiversity conservation and the management of protected areas of national significance. It also provides a mechanism for national environment protection and biodiversity conservation.

The EPBC Act is administered by the Department of Climate Change, Energy, the Environment and Water (DCCEEW) and provides protection for listed Matters of National Environmental Significance (MNES) including:

- Listed species and communities (e.g. listed threatened species and ecological communities and migratory species);
- Protected areas (e.g. World Heritage properties, Ramsar wetlands of international significance, conservation zones); and
- National, Commonwealth and Indigenous Heritage.

Under the EPBC Act, any action (which includes a development, project or activity) that is considered likely to have a significant impact on MNES must be referred to the Commonwealth Minister for the Environment.

There are several MNES potentially occurring within the study area that may be impacted by the Project that include Listed Marine/Migratory bird species and their habitat.

1.4.3. The State Environmental Planning Policy (Koala Habitat Protection) 2021

The State Environmental Planning Policy (Koala Habitat Protection) 2021 commenced on 17 March 2021. It is now included in the State Environmental Planning Policy (Biodiversity and Conservation) 2021. Outside the Sydney metropolitan area and Central Coast, the State Environmental Planning Policy (Koala Habitat Protection) 2021 applies to all land except land zoned as RU1 Primary Production, RU2 Rural Landscape or RU3 Forestry. The subject site is currently zoned R1 General Residential under the Tweed Local Environment Plan 2014, and as such, the State Environmental Planning Policy (Koala Habitat Protection) 2021 would apply. Where there is an approved Koala Plan of Management, Council's determination of a DA must be consistent with the Koala Plan of Management. The Tweed Coast Comprehensive Koala Plan of Management 2020 (Tweed Coast CKPoM) is an approved Koala Plan of Management and applies to subject site.

1.4.3.1. The Tweed Coast Comprehensive Koala Plan of Management 2020

Development Assessment is detailed in Section 5 of the Tweed Coast CKPoM. Of particular relevance is Section 5.8, which details requirements for the assessment of Koala habitat. Additionally, Section 5.9 details requirements for the protection and restoration of Koala habitat, while Section 5.10 details measures to ensure development is designed to minimise impacts to Koala habitat. Note that Section 5.9 and 5.10 only need to be addressed if Koala habitat is identified in the Koala Habitat Assessment. Cumberland Ecology has prepared a separate Koala Habitat Assessment (Report No. 21273 RP5) addressing Koala Habitat and its implications for the Project. This RMP is the restoration plan required by Section 5.9 and includes specific requirements for the offsetting, restoration and protection of Koala habitat. Offsetting for the removal of Koala habitat is required at a ratio of 1:12 onsite. This offset requirement is met through a combination of restoration plantings and enhancement of existing habitat through weed control.

1.4.4. State Environmental Planning Policy (Resilience and Hazards) 2021

State Environmental Planning Policy (Resilience and Hazards) 2021 (Resilience and Hazards SEPP) commenced on 1 March 2022 and includes coastal planning provisions. The Resilience and Hazards SEPP replaced the *State Environmental Planning Policy (Coastal Management) 2016*.

The following zones of the Resilience and Hazards SEPP occur within the study area:

- Coastal Wetlands;
- Proximity Area for Coastal Wetlands;

The consistency of the proposed development with the objectives of each zone is outlined below.

1.4.4.1. Coastal Wetland Zone

Under the Resilience and Hazards SEPP, development can be carried out in areas mapped as Coastal Wetlands (as Designated Development) if *the consent authority is satisfied that sufficient measures have been, or will be, taken to protect, and where possible enhance, the biophysical, hydrological and ecological integrity of the coastal wetland*.

The areas within the study area mapped as Coastal Wetland occur outside of the subject site.

1.4.4.2. Proximity to Coastal Wetland Zone and Littoral Rainforest Zone

Under the Resilience and Hazards SEPP *Development consent must not be granted to development on land identified as "proximity area for coastal wetlands" or "proximity area for littoral rainforest" on the Coastal Wetlands and Littoral Rainforests Area Map unless the consent authority is satisfied that the proposed development will not significantly impact on:*

(a) the biophysical, hydrological or ecological integrity of the adjacent coastal wetland or littoral rainforest, or

(b) the quantity and quality of surface and ground water flows to and from the adjacent coastal wetland or littoral rainforest.

(2) This clause does not apply to land that is identified as "coastal wetlands" or "littoral rainforest" on the Coastal Wetlands and Littoral Rainforests Area Map .

The proximity area for Coastal Wetlands extends into the subject land and as such the Project must not have a significant impact on adjacent Coastal Wetlands. A small area in the northwest of the subject site, but not the subject land is also mapped as occurring in the proximity area for Littoral Rainforest.

1.4.5. NSW Biosecurity Act 2016

Under the *Biosecurity Act 2015* (Biosecurity Act) all weeds are required to be controlled by all persons under a "General Biosecurity Duty". The General Biosecurity Duty means that all public and private land owners or managers and all other people who deal with weed species (biosecurity matters) must use the most appropriate approach to prevent, eliminate, or minimise the negative impact (biosecurity risk) of those weeds. The power for enforcement of penalties relating to compliance with the legislation is given to Local Control Authorities (i.e. Local Governments).

State-wide management of weeds under the Biosecurity Act is directed by the NSW Invasive Species Plan (North Coast LLS 2021). This assigns weed responses to four categories:

- Prevention of new weeds establishing;
- Eradication of small and localised infestations where feasible;
- Containment of larger infestation to stop wider spread; and
- Protection of key assets, such as threatened plants and agricultural land, to prevent their damage or degradation by weed invasion.

Under the Biosecurity Act some weed species have been prioritised for management by specific regulations and controls under the Act. These are known as State Level Priority Weeds. Specific legal requirements exist for how these weeds are managed.

A number of introduced species within the study area are listed as Priority weeds under the Biosecurity Act.

1.4.6. Pesticides Act 1999

The *Pesticides Act 1999* controls the use of herbicides within NSW. Under the Act is illegal to use herbicides for species not listed on a particular herbicides' label, or in a concentration or manner not outlined on the label. Off-label use of a particular herbicide is permitted only upon obtaining a specific permit.

1.4.7. Water Management Act 2000

Impacts to waterfront land are considered under the *Water Management Act 2000* (WM Act). The NSW Office of Water administers the WM Act and is required to assess the impact of any proposed controlled activity to ensure that no more than minimal harm will be done to waterfront land because of carrying out the controlled activity. Of particular relevance is the requirement that vegetated riparian zones (VRZs) are established either side of watercourses. The width of the VRZs are dependent on stream order. Cudgera Creek is classified as a 5th order stream that is estuarine and subject to tidal influence; therefore a 40m VRZ applies to Cudgera Creek. It is noted that this VRZ is not able to be applied, and as such, the VRZs proposed are instead consistent with the original approved DA, as detailed in ***Section 1.3.***

1.4.8. Asset Protection Zones

This RMP addresses the prescriptive requirements for the bushfire APZs as described in Appendix 4 of the Rural Fire Service guideline *Planning for Bushfire Protection 2019* and the NSW Rural Fire Service publication 'Standard for Asset Protection Zones'. The APZs will require compliance with an Inner Protection Area.

1.5. Duration and Funding

This RMP is to apply for a 5-year period commencing on DA approval. During this period all construction, habitat protection and restoration planting works are expected to be completed. At the end of this period, a revised RMP is to be prepared that will outline ongoing weed control and maintenance works, that will continue in perpetuity.

The RMP including ongoing works in perpetuity is to be funded by TriCare, for the extent of time that Tricare operates the Senior's Living facility. In the event that a different operator takes over management of the facility, the funding responsibility would be transferred.

1.6. Purpose

The purpose of this RMP is to guide the management of vegetation within the Restoration Area (**Figure 1**), which includes:

- vegetation to be retained along Cudgera Creek, including the existing restoration plantings;
- proposed additional restoration plantings to improve habitat connectivity along Cudgera Creek and offset the clearing of Koala habitat; and
- the management of setback areas, that are also proposed to be managed as APZs.

2. Methodology

2.1. Review of Existing Information

2.1.1. Databases

A number of databases were utilised during the preparation of this RMP, including:

- The E&H BioNet Vegetation Classification database (E&H 2024a)
- The E&H NSW BioNet Atlas (E&H 2024b); and
- The Threatened Biodiversity Data Collection (E&H 2024c).

2.1.2. Mapping

Existing vegetation mapping for the study area and surrounds was reviewed, including Tweed Shire Council Vegetation Mapping (Kingston et al 2004), other Tweed Shire environmental mapping, the NSW Statewide Vegetation Type Map available in SEED, as well as mapping prepared for the original DA approval.

2.1.3. Literature Review

Relevant reports associated with the original DA approval were reviewed including:

- Flora and Fauna Assessment of Lot 1 DP 786570 Coast Road Hastings Point December 2005 (Bushfire Safe Environmental Services (2005); and
- Updated Rehabilitation Strategy Report for 87-89 Tweed Coast Road, Hastings Point, January 2008. (Seekchange 2008).

2.2. Field Surveys

The following field surveys were undertaken:

- An initial field survey was undertaken on 11 and 12 October 2022 by Cumberland Ecology Director Dr David Robertson and Botanist Lucas Wilson including initial vegetation mapping and Koala activity surveys;
- Further surveys undertaken by Cumberland Ecology Senior Ecologist Dr Trevor Meers, Botanist Lucas Wilson and Ecologist Anand Datar between 27 February 2023 and 3 March 2023 which included refinement of vegetation mapping, plot-based surveys, parallel traverses, Harp trapping, ultrasonic call detection and spotlighting surveys;
- A raptor nest survey undertaken on 14 July 2023 by Ecologist Anand Datar;
- Aural visual surveys by Herpetologist Ross Wellington over four nights from 7 to 10 November 2023;
- A targeted survey for Bush Stone Curlew nests by Senior Ecologist Dr Trevor Meers, Botanist Lucas Wilson on 7 November 2023; and
- Placement of two infra-red cameras between 7 November and 14 December 2023.

2.3. Native Vegetation Survey

2.3.1. Vegetation Mapping

An initial site inspection was undertaken on 11 and 12 October 2022 by Cumberland Ecology Director Dr David Robertson and Botanist Lucas Wilson, during which preliminary vegetation mapping was undertaken. Mapping was refined during surveys between 27 February and 3 March 2023 by Senior Ecologist Dr Trevor Meers and Botanist Lucas Wilson.

The vegetation community boundaries within and immediately surrounding the subject land were verified by walking through the entire area of each vegetation polygon and noting the structure and component species of the vegetation. Mapping was refined based on interpretation of the latest and clearest available aerial imagery.

2.3.2. Vegetation Integrity Assessment

Vegetation integrity assessments were undertaken by Cumberland Ecology in the subject land in accordance with the BAM. The BAM requires the establishment of a 20 x 50 m plot with an internal 20 m x 20 m plot. The following data was collected within each of the plots:

- Composition for each growth form group by counting the number of native plant species recorded for each growth form group within a 20 m x 20 m plot;
- Structure of each growth form group as the sum of all the individual projected foliage cover estimates of all native plant species recorded within each growth form group within a 20 m x 20m plot;
- Cover of 'High Threat Exotic' weed species within a 20 m x 20 m floristic plot;
- Assessment of function attributes within a 20 m x 50 m plot, including:
    - Count of number of large trees;
    - Tree stem size classes measured as 'diameter at breast height over bark' (DBH);
    - Regeneration based on the presence of living trees with stems <5 cm DBH;
    - The total length in metres of fallen logs over 10 cm in diameter;
- Assessment of litter cover within five 1 m x 1 m plots evenly spread within the 20 m x 50 m plot; and
- Number of trees with hollows that are visible from the ground within the 20 m x 50 m plot.

A total of six BAM plots were surveyed within the study area on 27 and 28 February 2023, and their locations are shown in **Figure 6**. The location of plots sought to capture the environmental variation of the Plant Community Types (PCTs) identified within the study area. One plot was located in exotic dominated grassland to verify that this was exotic vegetation.

2.3.3. Threatened Flora Surveys

Targeted threatened flora species surveys were undertaken on 11 and 12 October 2023, and on 27 and 28 February 2023. This was supplemented by BAM plot surveys undertaken on 27 and on 28 February 2023. Targeted threatened flora surveys were conducted using parallel field traverses in accordance with the *Surveying threatened plants and their habitats NSW survey guide for the Biodiversity Assessment Method* (DPIE 2020a) with traverses undertaken 10-20 m apart. The locations of the parallel traverses are shown in **Figure 6.**

2.3.4. Habitat Constraints

Desktop assessments and field surveys within the study area included assessment of habitat constraints and microhabitats for predicted species credit fauna species. This included desktop assessment of proximity of the subject land to features such as caves and waterways, and field inspection of microhabitats including leaf litter, stick nests and hollowing-bearing trees. This was confirmed during the initial site inspection undertaken on 11 and 12 October 2022, and targeted surveys between 27 February and 3 March 2023.

2.3.5. Targeted Fauna Surveys

A range of targeted threatened fauna species surveys were conducted for fauna species identified as requiring survey in the BAM Calculator (BAM-C) based on the PCTs and habitat constraints present. These surveys are detailed further below.

The location of all targeted fauna surveys is shown on **Figure 6**.

2.3.5.1. Ultrasonic Call Detection and Harp Trapping

Target Species: Southern Myotis

Harp Trapping surveys are based on *'Species credit' threatened bats and their habitats NSW survey guide for the Biodiversity Assessment Method'* (DPE 2021). Two harp traps were set in the areas of most suitable habitat that are likely to be utilised by microchiropteran bat (microbats) species as 'fly ways' with consideration to the surrounding vegetation, presence of hollows, and location waterways and waterbodies. Harp traps were set each evening and left to stand overnight, then checked the following morning within an hour of sunrise and left dismantled during the day. Harp trapping occurred over four consecutive nights between 27 February and 3 March 2023. Four ultrasonic call detection units were placed in proximity to areas of the most suitable habitat and left onsite for a minimum of four consecutive nights to record microbat activity. The recorded bat calls were analysed, and species identified by Greg Ford of Balance Environmental.

2.3.5.2. SAT Survey

Appendix E of the Tweed Coast CKPoM requires Koala activity assessments to be undertaken at points along a 75 x 75 m grid. However, as the area containing woody vegetation within the study area is relatively narrow, Koala activity assessments were only undertaken in supporting woody vegetation (excluding mangrove

(excluding derived grasslands). At each location a Koala activity assessment was undertaken following the Spot Assessment Technique (SAT) (Phillips and Callaghan 2011). SAT surveys were undertaken on 11 October 2022.

For each SAT survey, the most central tree of each vegetation community was selected as the centre point for the assessment. In accordance with Phillips and Callaghan (2011), a 40 m x 40 m (1,600 m^2) plot was established and up to 29 additional trees (not restricted to known Koala Food Trees) were selected for further assessment. Given the narrowness of the woody vegetation present, the actual plot size was smaller than the 40 x 40 m plot specified. Searches for faecal pellets were undertaken within a radial distance of up to 1 m from the base of each tree. For each tree, the survey effort dedicated to the faecal pellet search was two (2) person minutes, or until a Koala faecal pellet was found – whichever occurred first. In addition to the SAT survey the canopy of trees was searched for Koalas, and any smooth barked trees were searched for characteristic scratch marks.

2.3.5.3. Spotlighting Surveys

Target species: Koala, Stephens' Banded-Snake, Eastern Pygmy Possum, Greater Glider, Squirrel Glider, Brush-tailed Phascogale, False Water-rat, Bush Stone-Curlew.

The Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide (DPE 2022a) requires that in addition to SAT surveys another survey method must be adopted, and spotlighting was selected as a second method. Spotlighting was undertaken following *The Koala (Phascolarctos cinereus) Biodiversity Assessment Method Survey Guide* (DPE 2022). Spotlighting was undertaken just after dark from 27 February to 3 March 2023 for four consecutive nights over a period of 1 hour by three people (3 hours total survey effort per night). This involved a traverse over the entire length of woody vegetation along the western edge of the study area. Spotlighting also targeted other nocturnal arboreal mammals consistent with the relevant guidelines.

The 'Threatened Biodiversity Survey and Assessment: Guidelines for Activities and Developments' (DEC 2004) requires the following survey method for the Bush Stone-Curlew:

'Call playback for the Bush Stone-curlew should consist of playing calls for 30 seconds, followed by 4.5 minutes of listening. This 5-minute cycle should be repeated up to three times so there is a maximum of 15 minutes survey at each point. The same 30 seconds of calls should be used throughout the survey. If a bird responds to the taped call, approximately 10 minutes should be spent listening for other birds' responses. Survey points should be approximately 2 to 4 km apart depending on the weather conditions and topography of the area. Call playback should be conducted during the breeding season (June-December) as there is more chance of birds responding to calls at this time. Calm, clear, moonlit nights provide the best conditions for undertaking surveys'.

Call playback was undertaken initially to verify calls, but was not taken throughout the full extent of the spotlighting survey, as the species was heard calling, and due to the potential for disturbance to other species during spotlighting.

2.3.5.4. Infrared Cameras

Target species: Eastern Pygmy Possum, Greater Glider, Squirrel Glider, Brush-tailed Phascogale.

Two infrared cameras were set up within trees within the subject land on 7 November 2023. Each camera was set up to point at a tree mounted bait station containing a bait of oats, honey and peanut butter. Cameras were retrieved on 14 December 2023.

2.3.5.5. Diurnal Bird Surveys

Target Species: Threatened and migratory bird species

Diurnal bird surveys were undertaken with consideration of the '*Threatened Biodiversity Survey and Assessment: Guidelines for Activities and Developments*' (DEC 2004), '*Survey Guidelines for Australia's Threatened Birds*' (DCCEEW 2010) and the *EPBC Act Policy Statement 3.21—Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species* (Commonwealth of Australia 2017). Surveys were undertaken using the area search method that involves walking within a 2-ha area and recording all avian species observed. Each site was surveyed for a minimum of 20 minutes per day, for a minimum of three days between 28 February and 3 March 2023. Further to the above all bird species seen or heard calling incidentally were recorded during all surveys.

The *Threatened Biodiversity Survey and Assessment: Guidelines for Activities and Developments'* (DEC 2004) requires for natural wetlands that a one-hour bird observation be conducted at dawn or dusk. Birds are to be recorded as present within the wetland, flying overhead or outside the habitat. A 20- minute census at dawn or an hour before dusk should also be conducted at each identified source of water in the survey area. Opportunistic species sightings should be recorded continuously. Diurnal bird surveys were undertaken at dawn and an hour before dusk at four different locations including areas adjacent to and overlooking the estuarine zone of Cudgera Creek.

2.3.5.6. Aural-Visual Surveys

Target species Stephens' Banded Snake, Wallum Froglet, Olongburra Frog, Giant Barred Frog.

Aural-visual surveys were conducted by Herpetologist Ross Wellington over four nights from 7-10 November 2023. Surveys commenced after heavy rainfall (greater than >50 mm) on 6 November 2023.

Survey methods included active searches during diurnal hours each day. This included search methodology incorporating visual scans for active individuals, searching beneath ground cover included rocks, ground timber and discarded materials, searching tree trunks and decorticating bark, raking leaf litter and soil surface areas beneath turned ground covers.

Nocturnally, search effort included scanning by torch and headlamp ground surface areas for active specimens as well as scanning tree trunks, upper branches and beneath ground cover. Call playback response searches were also undertaken using pre-recorded frog calls that were played back using a smart phone and blue tooth recording relayed to a Logitech UE Megaboom 3 speaker. Call playback was conducted at three locations across the woody vegetation adjacent to Cudgera Creek.

Table 2 below details compliance with the *NSW Survey Guide for Threatened Frogs* (DPIE 2020b) for the candidate threatened frog species.

Spotlighting surveys for threatened reptiles were undertaken concurrently to amphibian surveys.

Table 2 Compliance with the NSW Survey Guide for Threatened Frogs (DPIE 2020) for candidate threatened frog species

Species	Survey Requirement	Rainfall requirements	Survey Effort and Conditions
Wallum Froglet (*Crinia tinnula)*	480 m of aural visual surveys over 4 nights. Transects to run through available breeding habitat	All year after flooding rains	Aural visual surveys over 4 nights covering the length of Cudgera Creek. Surveys undertaken after 55 mm of rain
Olongburra Frog (*Litoria olongburensis*)	One off aural visual surveys for 120 minutes, followed by transects in suitable habitat over 3 nights for 180 minutes each.	Warmer months of the year (minimum 15°C air temperature), when ephemeral or semi-permanent wetlands are widely inundated with water, when wind strength is minimal and relative humidity is maxima	Aural visual surveys and tadpole searches over 4 nights for 3 hours each, with transects covering the length of Cudgera Creek.
Mixophytes iteratus (Giant Barred Frog)	Total survey effort of 480 minutes over 4 nights. Aural-visual surveys are completed within areas of potential breeding habitat. The species does not call regularly, therefore aural surveys alone are not recommended but can be used as part of an aural-visual survey if undertaken during the breeding season; however, they are readily detected by eyeshine when active.	No specific requirements detailed	Aural visual surveys of potential habitat over 4 consecutive nights of up to 3 hours per night covering suitable breeding habitat

2.3.5.7. Active Searches

Target Species: Mitchells Rainforest Snail, White-crowned Snake

Surveys were based on the *Threatened reptiles Biodiversity Assessment Method survey guide* (DPE 2022) which for the White-crowned Snake involved undertaking habitat surveys during daylight hours for 120 minutes over four days when the species is likely to be sheltering under or near cover and more easily targeted. Surveys commenced with a visual search of the shelter habitat edges to detect active snakes, followed with searches under/within the shelter for inactive individuals. Surveys involved turning over rocks, logs and leaf litter and rubbish items in all areas of suitable habitat and recording all species detected. This was undertaken in all areas

with suitable habitat (i.e. woody vegetation with leaf litter within and adjacent to the subject land) between 28 February and 3 March 2023.

2.3.5.8. Nest Surveys

Target Species: Eastern Osprey, White-bellied Sea-Eagle, Red Goshawk, Bush Stone-curlew, False-water Rat

A search of possible current or abandoned nest sites of the Bush Stone-curlew was undertaken on 7 November 2023 within the existing Senior's Living complex where the species is known to nest on occasion. This search was guided by communications with the centre receptionist as to where the species had been seen nesting previously. Signs of possible nesting activity included disturbance to litter/patches of bare ground, and or placed rocks or shell grit.

The subject site was assessed for important components of habitat for raptors with particular reference to large stick nests. During this assessment, any evidence for presence of raptors from observation or calls was noted. This was undertaken on 14 July 2023.

According to the *National Recovery Plan for the water mouse (false water-rat) Xeromy myoides (*DERM 2010), nest site surveys enable a convenient and relatively rapid assessment of the presence/absence of the species in southern Queensland. A survey of potential nest sites in the limited areas of suitable habitat in the study area (being sedgeland composed mainly of freshwater vegetation, chenopod shrubland including succulents and dwarf shrubs, Sporobolus grassland and salt meadows, and mangrove communities (DERM 2010)) was undertaken as part of habitat assessment surveys between 27 February and 3 March 2023.

2.3.5.9. Invertebrate Surveys

Target Species: Coastal Petaltail

Surveys for dragonflies were undertaken between 27 and 28 February 2023 while also undertaking threatened flora surveys through parallel traverses. Where dragonflies were seen, a sweep was undertaken to capture dragonflies in an insect net. Any individuals of dragonflies if detected were photographed for identification prior to release.

3. Existing Biodiversity Values

3.1. Vegetation Communities

3.1.1. Existing Vegetation Mapping

Tweed Shire vegetation mapping indicates that the study area contains the following vegetation communities;

- Areas substantially cleared of native vegetation;
- Mangrove Open Forest to Woodland; and
- Broad-leaved Paperbark Closed Forest to Woodland.

These correspond broadly to the vegetation communities in the study area, but do not include areas subject to restoration plantings.

Statewide vegetation mapping in the SEED Portal (NSW Government 2024) indicates that the following Plant Community Types (PCTs) are present in the study area:

- PCT 4091 Grey Mangrove-River Mangrove Forest;
- PCT 3801 Far North Sandplain Wallum Heath; and
- PCT 4004 Northern *Melaleuca quinquenervia* Swamp Forest.

3.1.2. Ground-truthed Vegetation Mapping

Plant Community Types (PCTs) are the standard vegetation classification currently used in NSW. It is noted that the PCT numbers and names used in Eastern NSW were superseded in April 2023 and replaced by the new Eastern NSW PCT Classification. The current Eastern NSW PCT numbers and names are used throughout this RMP. Tweed Shire Council also has its own vegetation mapping (Kingston et al. 2004). As such the Tweed Shire vegetation mapping units are also cross referenced. The vegetation communities identified are listed in **Table 3** below and shown in **Figure 7**. Detailed descriptions of each PCT are provided below.

Table 3 Plant Community Types identified in the study area and corresponding vegetation units

Eastern NSW PCT No. and Name	Condition State (if relevant)	Tweed Shire vegetation unit	Area ha (study area)	Area ha (restoration area)
3989 Northern Paperbark Fern Swamp Forest	Intact	401 Broad-leaved Paperbark Closed Forest to Woodland	0.41	0.22
3989 Northern Paperbark Fern Swamp Forest Swamp Forest	Grassland	1099 Substantially Cleared of Native Vegetation	0.08	0.07
3132 Northern Sands Tuckeroo - Banksia Forest	Restoration	1008 Post-mine rehabilitation	0.17	0.15

Eastern NSW PCT No. and Name	Condition State (if relevant)	Tweed Shire vegetation unit	Area ha (study area)	Area ha (restoration area)
3132 Northern Sands Tuckeroo - Banksia Forest	Figs	1008 Post-mine rehabilitation	0.05	0.03
4019 Grey Mangrove-River Mangrove Forest	Mangrove	602 Mangrove Low Closed Forest to Woodland	0.54	-
N/A	Exotic Dominated Grassland	1099 Substantially Cleared of Native Vegetation	1.75	0.27
N/A	Mixed Native/ Exotic Landscape Plantings	1007 Urban Bushland	0.47	-
N/A	Cleared land	1099 Substantially Cleared of Native Vegetation	0.13	0.02
NA	Water	903 Open Water	0.08	-
Total*			**4.67**	0.76

**Totals may not add up due to rounding*

3.1.2.1. PCT 3989 Northern Paperbark Fern Swamp Forest

PCT 3989 is described in the Bionet Vegetation Information System (E&H 2024a) as a tall to very tall, mid-dense to dense sclerophyll forest of *Melaleuca quinquenervia,* which occurs on coastal lowland swamps north from Woodburn, North Coast. The tree canopy very frequently includes *Melaleuca quinquenervia* with by far the highest foliage cover, however eucalypts, mainly *Eucalyptus robusta,* occur rarely. The vine *Parsonsia straminea* is almost always present and is often locally abundant with the tree *Melicope elleryana* being very frequent. Commonly, *Glochidion sumatranum* and occasionally *Cupaniopsis anacardioides* are also present in the canopy or mid-stratum. The usually dense ground layer is comprised of ferns, very frequently including *Telmatoblechnum indicum* and *Lygodium microphyllum*, commonly with *Hypolepis muelleri*. In areas subject to longer inundation, *Phragmites australis* is common, *Carex appressa* is occasional, with *Cyperus lucidus* and *Leersia hexandra* rarely occurring. This PCT occurs in very warm, very wet locations receiving 1630-1810 mm mean annual rainfall, at low elevations of up to 10 metres asl. It occurs in a range of periodically inundated coastal depressions, including those on alluvium, estuarine deposits, dune swales and back-barrier flats. This PCT grades into a range of other coastal lowland PCTs with minor topographic changes, variation in drainage, duration and frequency of inundation and extent of saline influence.

This PCT occurs in two condition states as detailed further below.

i. Condition State 1 Intact

The Intact condition state occurs in a narrow band along the northern boundary of the subject land. It occurs on dark grey moist sandy loams of aeolian origin and borders the Cudgera Creek estuary. It contains large old

Melaleuca quinquenervia trees with little regeneration, with some *Casuarina glauca* (Swamp Oak) and *Ficus macrophylla* (Morton Bay Fig), over a sparse subcanopy of littoral rainforest species such as *Cupaniopsis anacardioides* (Tuckeroo), *Cryptocarya triplinervis* (Three-veined Laurel), *Macaranga tanarius* (Blush Macaranga) and *Acronychia imperforata*. The shrub and ground layers are dominated by weeds, garden escapes and garden plants that would have been introduced when cabins were located in the area, that have since been removed. These include *Asparagus aethiopicus*, S*chefflera actinophylla*, *Syagrus romanzoffiana*, *Syngonium podophyllum*, *Senna glabrata* var. *pendula*, *Lantana camara, Chrysanthemoides monilifera* ssp. *rotundata*, *Ipomoea cairica*, *Dracaena marginata, Sphagneticola trilobata, Gloriosa superba, Nephrolepsis exaltata* (Sword Fern) and the weedy native fern *Nephrolepsis cordifolia* (Fishbone Fern).

A photograph of this condition state is provided in **Photograph 1**.

Photograph 1 PCT 3989 Intact Condition State dominated by weeds within the study area

ii. Condition State 2 Grassland

The Grassland condition states include grasslands that transition into Exotic Grasslands located adjacent, but that contain a greater abundance of native species such as *Imperata cylindrica* (Blady Grass) and isolated saplings of *Casuarina glauca*. It also includes an area where *Phragmites australis* (Common Reed) occurs over *Nephrolepsis exaltata* (Sword Fern). Exotic grasses largely dominate and include *Digitaria eriantha, Sorghum halepense* (Johnson River Grass), *Megathyrsus maximus* var. *pubiglumis* (Green Panic) and *Paspalum* species. In shady areas *Sphagneticola trilobata* (Singapore Daisy) dominates. There is also a scattered shrub layer of the introduced weed *Senna pendula* var. *glabrata* in places. Where adjacent to the Intact condition state some overhanging trees of *Melaleuca quinquenervia* are present.

A photograph of this condition state is provided in **Photograph 2**.

Photograph 2 PCT 3989 Grassland Condition State in foreground

iii. Alignment with Threatened Ecological Communities

PCT 3989 is aligned with the BC Act listed Endangered Ecological Community Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (Swamp Sclerophyll Forest). The Final Determination for this Threatened Ecological Community (TEC) (NSW TSSC 2011a) states that this TEC is *associated with humic clay loams and sandy loams, on waterlogged or periodically inundated alluvial flats and drainage lines 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 Sclerophyll Forest on Coastal Floodplains generally occurs below 20 m (though sometimes up to 50 m) elevation, often on small floodplains or where the larger floodplains adjoin lithic substrates or coastal sand plains.* Within the study area the area of PCT 3989 occurs in coastal sands on the edge of Cudgera Creek that is mapped under the Tweed Shire flood mapping as having a 0-1 m design flood event. Examination of soils showed that this community occurs on dark grey/black moist sandy loam that is rich in organic matter. As such, it is considered to be located on a flood plain on sandy loam soils. The Final Determination (NSW TSSC 2011a) states that other trees may be scattered throughout at low abundance or may be locally common at few sites, including *Casuarina glauca* (Swamp Oak) which is the case in the study area. As such the Intact form is considered to align with Swamp Sclerophyll Forest TEC.

The Grassland condition state largely occurs above the 0-1 m design flood event and as such is not located on a coastal flood plain. It is largely an exotic grassland containing some native species. The Final Determination

for this TEC (NSW TSSC 2011a) states that the composition and structure of the understorey is influenced by grazing and fire history, changes to hydrology and soil salinity and other disturbance, and may have a substantial component of exotic grasses, vines and forbs. However, for this condition state other vegetation layers have been almost entirely removed and the ground layer has a substantial component of introduced species, such that there is limited potential for other vegetation layers to regenerate. The combination of occurrence above the 0-1 m design flood event and limited potential for regeneration would indicate that this condition state does not align with Swamp Sclerophyll Forest TEC.

Swamp Sclerophyll Forest is listed as endangered under the EPBC Act as Coastal Swamp Sclerophyll Forest of New South Wales and South East Queensland. Within the study area the Intact form of PCT 3989 is present as a medium sized patch connected to contiguous vegetation along Cudgera Creek as a very narrow strip but has a predominantly exotic ground layer. The intact condition state therefore does not meet key diagnostics for the EPBC Act listed TEC as detailed in the Conservation Advice (DAWE 2021). The grassland condition state does also not align with this TEC as it does not meet structural requirements in the Conservation Advice (DAWE 2021) of being a tall closed to open forest to woodland, to dense (closed) shrubland or scrub forest.

3.1.2.2. PCT 3132 Northern Sands Tuckeroo Banksia Forest

This PCT is described in the Bionet Vegetation Information System (E&H 2024a) as a low to tall, mid-dense to dense, rainforest which occurs on littoral sand deposits, or sometimes sandy colluvium on headlands, north from Forster, North Coast. The vegetation structure of this PCT is very variable, depending on exposure to sea spray and disturbance. The canopy almost always is comprised of *Banksia integrifolia* and *Cupaniopsis anacardioides*, both often with high cover. Rarely, *Lophostemon confertus* or eucalypts are present in the canopy and may have locally high cover, the most frequent eucalypt being *Corymbia intermedia*, much less frequently *Eucalyptus grandis* or *Eucalyptus tereticornis*. The small trees *Acronychia imperforata* and *Alectryon coriaceu*s are common, either in the canopy, or if the canopy is sparse, in the mid-stratum. Other trees which occur occasionally in the canopy or mid-stratum include *Myrsine variabilis, Acmena smithii* and *Cryptocarya triplinervis*. The vine S*milax australis* almost always occurs, usually in the mid-stratum or sometimes in the canopy, and is occasionally locally abundant, with a high cover. The shrub *Breynia oblongifolia* is very frequently present in the mid-stratum and other mid-stratum species which occur commonly include vines *Geitonoplesium cymosum* and S*tephania japonica*. The ground cover very frequently includes *Imperata cylindrica* and commonly *Lomandra longifolia*, *Pteridium esculentum* and *Oplismenus imbecillis*, any of which sometimes forms dense ground cover, especially in disturbed sites or where the canopy is sparse. This PCT occurs mainly at warm, wet locations receiving 1350-1810 mean annual rainfall, at low elevations of less than 20 metres asl.

This PCT occurs in two condition states as detailed further below.

i. Condition State 1 Restoration

The Restoration condition state is present in the form of a rehabilitation area established after the original DA. It is dominated by *Banksia integrifolia, Melaleuca quinquenervia*, *Casuarina glauca* and *Flindersia schottiana*, together with lower abundances of other littoral rainforest species such as *Cryptocarya triplinervis, Endiandra globosa, Glochidion* species, *Commersonia bartramia, Syzygium australe, Syzygium oleosum* and *Macaranga tanarius*. These plantings include a mix of species from PCT 4004 intermixed with littoral rainforest species. The ground layer includes *Lomandra longifolia* and *Dianella caerulea* which are likely to be planted and is

dominated by the native grass *Ottochloa gracillima*. The outer edges are weedy with the ground layer dominated by introduced grasses such as *Digitaria eriantha* and *Megathyrsus maximus* var. *pubiglumis* (Green Panic Grass).

An example of this condition state is provided in **Photograph 3** below.

Photograph 3 PCT 3132 Restoration condition state in the form of a rehabilitation planting

ii. Condition State 2 Figs

This condition state consists of two large individuals of the non-native fig *Ficus benjamina* (Weeping Fig). These appear to have been planted associated with earlier development on the study area and have been retained with rehabilitation plantings occurring around these figs. Although the canopy is exotic, littoral rainforest species have colonised the understorey. These have most likely been dispersed into the area though bats and birds feeding on fig fruit. These species include the vines *Stephania japonica, Smilax australe* and seedlings of *Cupaniopsis anacardioides, Cryptocarya triplinervis* and *Cryptocarya obovata*.

An example of this condition state is provided in **Photograph 4** below.

Photograph 4 PCT 3132 Figs condition state dominated by *Ficus benjamina*

3.1.2.3. Alignment with Threatened Ecological Communities

PCT 3132 is included in the BC Act listed TEC Littoral Rainforest in the NSW North Coast, Sydney Basin and South-East Corner. The Final Determination for this TEC (NSW TSSC 2011b) states that:

Littoral Rainforest in the NSW North Coast, Sydney Basin and South East Corner Bioregions is generally a closed forest, the structure and composition of which is strongly influenced by proximity to the ocean. The plant species in this ecological community are predominantly rainforest species with evergreen mesic or coriaceous leaves. Several species have compound leaves, and vines may be a major component of the canopy. These features differentiate littoral rainforest from sclerophyll forest or scrub, but while the canopy is dominated by rainforest species, scattered emergent individuals of sclerophyll species, such as Angophora costata, Banksia integrifolia, Eucalyptus botryoides and E. tereticornis occur in many stands.

In its current state the restoration condition state is co-dominated by sclerophyllous species forming an open sclerophyll forest with intermixed rainforest species. However, in the long term this rehabilitation area is expected to develop into Littoral Rainforest TEC as the planted sclerophyllous species begin to die out and are replaced by rainforest species and as such is considered to align with this TEC.

While the Figs condition state is a closed forest dominated by an evergreen mesic species, this species (*Ficus benjamina)* is not native to NSW. However this vegetation contains seedlings of littoral rainforest species, and the fig trees are effectively facilitating restoration of this TEC. If the fig trees can be slowly killed, while remaining in place as perches, then these areas could be restored into Littoral Rainforest TEC. However, in its current state

the canopy is not dominated by native evergreen mesic or coriaceous species and it is not considered to align with this TEC.

PCT 3132 within the study area was also assessed against the EPBC Act listed Littoral Rainforest and Coastal Vine Thickets of Eastern Australia ecological community, however it does not meet the listing criteria (Threatened Species Scientific Committee 2008a). as it does not meet the requirements for species richness, i.e. 25% of the species listed in Attachment A for South East Queensland and the NSW North Coast (Threatened Species Scientific Committee 2008b).

3.1.2.4. PCT 4091 Grey Mangrove – River Mangrove Forest

This PCT is described in the Bionet Vegetation Information System (E&H 2024a) as a low, mid-high or tall mangrove open forest or woodland, sometimes including a saltmarsh ground layer, occurring on tidal flats of the NSW coast. The tree canopy is sparse, mid-dense or sometimes dense and is almost always dominated by Grey Mangrove *Avicennia marina* subsp. *australasica*. River Mangrove *Aegiceras corniculatum* is common, occurring at around half of the known locations, however usually with a sparser projected foliage cover than *Avicennia marina* subsp. *australasica*. Other trees are rare, however may include a sparse cover of Red Mangrove *Rhizophora stylosa,* or on mangrove fringes *Casuarina glauca, Melaleuca linariifolia* or *Ficus rubigino*sa. Salt-tolerant ground cover species make a significant contribution to the species richness of this PCT overall, however are not always present. Where present, the ground layer is sparse to mid-dense. S*arcocornia quinqueflora* subsp. *quinqueflora* occasionally occurs with sparse cover, while *Sporobolus virginicus* or *Samolus* repens rarely occur however generally with higher projected foliage cover. Other rare species with variable cover include *Juncus kraussii* subsp. *australiensis, Tecticornia arbuscula, Sesuvium portulacastrum* and Spergularia marina amongst other salt-tolerant grasses, forbs and sedges.

This PCT occurs in a single condition state detailed below.

i. Condition State 1 Mangrove

This condition state is located on tidally inundated areas within the Cudgera Creek estuary. The vegetation structure is simple, consisting of a closed canopy of *Avicenna marina* var. *australasica* (Grey Mangrove) with occasional shrubs of *Aegiceras corniculatum* (River Mangrove). The ground layer contains seedlings of these species and is otherwise dominated by pneumatophores and estuarine mud or water. The outermost fringe of Cudgera Creek also contains *Rhizophora stylosa*. There are isolated pockets of saltmarsh species present, including the rushes and sedges *Juncus kraussii* and *Baumea juncea*.

An example of this PCT at high tide is shown in **Photograph 5** with the PCT at low tide shown in **Photograph 6**.

Photograph 5 PCT 4091 inundated within the Cudgera Creek Estuary at high tide

Photograph 6 PCT 4091 Mangroves exposed at low tide

ii. Alignment with Threatened Ecological Communities

PCT 4091 is not aligned with any PCTs listed under the BC Act or EPBC Act. However, as this PCT comprises a Mangrove community it comprises Type 2 – Moderately sensitive key fish habitat under the *Fisheries Management Act 1994*.

3.1.2.5. Exotic Dominated Grassland

Exotic Dominated Grassland covers the majority of the subject land. It does not align with any PCTs or TECs listed under the BC Act or EPBC Act. The grassland is dominated by the introduced grasses *Digitaria eriantha, Paspalum notatum*, *Stenotaphrum secundatum* (Buffalo Grass), *Melinis repens* (Red Natal Grass), *Megathyrsus maximus* var. *pubiglumis* (Green Panic), and the widely cultivated native lawn grass *Digitaria didactyla* (Queensland Blue Couch) and the introduced legumes *Lotononis bainesii* and *Desmodium incanum* and the introduced forbs *Ambrosia artemisioides* (Annual Ragweed), *Hypochaeris radicata* (Cat's Ear), *Richardia brasiliensis* (White Eye) and *Conyza canadensis*. Other than *Digitaria didactyla*, native species are limited to very minor occurrences of the widely cultivated lawn grass *Cynodon dactylon* (Couch Grass) and the grasses *Eragrostis interrupta* and *Imperata cylindrica*. Exotic grassland also includes two planted individual *Dypsis lutescens* (Golden Cane Palm). These grasslands are maintained by regular mowing.

Exotic Dominated Grassland aligns with Tweed Shire vegetation community (Kingston et al 2004) Substantially Cleared of Native Vegetation.

A photograph of this community is provided in **Photograph 7** below.

Photograph 7 Exotic Dominated Grassland within the subject site looking towards the restoration area

3.1.2.6. Mixed Native/Exotic Landscape Plantings

Mixed Native/Exotic Landscape Plantings includes landscaping plantings within the existing Senior's Living complex. Other than very minor over-hanging trees that are too small to be mappable, this community is not present in the subject land. It includes a mix of planted exotic and native species and as such does not align with any PCTs or TECs listed under the BC Act or EPBC Act.

A wide range of species are planted including palms such as *Bismarkia nobilis, Dypsis lutescens, Livistona chinensis, Livistona australis* and *Pandanus tectorius* and the cycads *Cycas revoluta* and *Zamia furfuracea*. A range of native and exotic species are clipped as hedges including *Acmena hemilampra. Syzygium australe, Callistemon viminalis* including cultivars such as 'Little John', *Magnolia figo,* and *Metrosideros excelsa.* The use of tropical foliage and flowering plants create a tropical feel to landscaping including cultivars of *Plumeria alba, Heliconia rostrata* and *Hibiscus rosa-sinensis.* These plantings are regularly maintained through pruning, trimming and weeding and are located in mulched beds, surrounded by paths and mown lawns. Some hardy indigenous coastal species are also used in screening plantings along the Creek Street frontage including *Cupaniopsis anacardioides, Hibiscus tiliaceus, Pandanus tectorius,* and *Banksia integrifolia.*

A photograph of landscape plantings is provided as **Photograph 8** below.

Photograph 8 Mixed Native/Exotic Landscape Planting within the existing Senior's Living complex

3.1.2.7. Cleared Land

Cleared land includes existing roads within the study area that lack vegetation cover. It does not align with any PCTs or TECs listed under the BC Act or EPBC Act. An example of cleared land within the study area is shown in **Photograph 9** below.

Photograph 9 Cleared land consisting of an existing road on the left, with Mixed Native/Exotic Landscape Plantings to the right of the fence

3.1.2.8. Water

Water includes areas of open water on Cudgera Creek within the study area. During low tide some of this area may be exposed as mud flats. Water does not align with any PCTs or TECs listed under the BC Act or EPBC Act or as Koala habitat under the Tweed Coast Koala Habitat Study (Phillips et al. 2011). An example of an area of open water within and adjacent to the study area is shown in **Photograph 10** below.

Photograph 10 Area of Open Water viewed through a gap in fringing Mangroves

3.2. Threatened Ecological Communities

3.2.1. BC Act

Two TECs listed under the BC Act are present within the study area. These TECs is listed in **Table 4** below and the distribution shown in **Figure 8**.

Two TECs listed under both BC Act are present within the study area. A total of 0.036 ha of vegetation with the potential to develop into Littoral Rainforest EEC in the form of restoration plantings is located in the subject land. These TECs is listed in **Table 4** below and the distribution shown in **Figure 8**.

Table 4 BC Act listed TECs within the subject site and study area

PCT No. and Name	Condition State	BC Act TEC	Area restoration area	Area ha (Study Area)
3989 Far North Paperbark Fern Swamp Forest	Intact	Swamp Sclerophyll Forest on Coastal Floodplains of the NSW North Coast, Sydney Basin and South East Corner bioregions (Endangered)	-	0.41

PCT No. and Name	Condition State	BC Act TEC	Area restoration area	Area ha (Study Area)
3132 Northern sands Tuckeroo-Banksia forest	Restoration	Littoral Rainforest in the NSW North Coast, Sydney Basis and South East Corner Bioregions	0	1.72

3.2.2. EPBC Act

No vegetation within the study meets the minimum condition thresholds to be afforded protection under the EPBC Act due to the poor condition, small patch size, high weed cover and low species diversity.

3.3. Flora

3.3.1. General Flora

A total of 178 flora species were detected in the field survey, including 97 native species and 80 introduced species. The full list of flora species detected are listed in **Appendix A.**

3.3.2. Threatened Flora Species

No threatened flora species were detected within the study area during flora surveys. One species of Orchid, *Pterostylis nigricans* (Dark Greenhood), which flowers in autumn and must be surveyed in autumn was not targeted in surveys. However, given the study area is highly degraded, including through weed infestation, regular mowing and previous use a caravan park, it is considered highly unlikely that this species would be present. Further to this there are no coastal records in NSW within the NSW BioNet Atlas (E&H 2024b) north of Brunswick Heads.

3.3.3. Introduced Flora

The vegetation in the study area is very weedy due to general neglect and introduced species are widespread in all vegetation communities except mangroves (which contain some weeds on the fringes).

Of the introduced species detected, 21 species are High Threat Exotic (HTE) species designated under the BAM, of which 15 species are not considered manageable. Several weed species have been recognised as having a management requirement as per **Table 5** below. Several species are listed as a Priority Weed under the NSW *Biosecurity Act 2015*, as a Weed of National Significance (WoNS) under the National Weeds Strategy or as a Species of Concern under the North Coast Regional Weed Management Plan (LLS 2022). State-listed Priority Weeds have specific legal requirements for management and have higher management priorities.

Table 5 Weed species with a management concern

Species Name	HTE Weed	Priority Weed	Weed of National Significance	Species of Concern in North Coast LLS Region
Asparagus aethiopicus	Yes	Asset Protection	Yes	Yes

Species Name	HTE Weed	Priority Weed	Weed of National Significance	Species of Concern in North Coast LLS Region
Baccharis halimifolia	Yes	Containment		
Bidens pilosa	Yes			
Bryophyllum delagoense	Yes			
Chloris gayana	Yes			
Chrysanthemoides monilifera var. *rotundata*	Yes	Containment	Yes	
Cinnamomum camphora	Yes			Yes
Desmodium uncinatum	No	Asset Protection		Yes
Gloriosa superba	Yes	Containment		
Ipomoea cairica	Yes			
Lantana camara	Yes	Asset Protection	Yes	Yes
Megathyrsus maximus	Yes			
Melinis minutiflora	Yes			
Merremia dissecta	No	Weed watch		
Murraya paniculata	No	Asset Protection		
Ochna serrulata	Yes			Yes
Paspalum spp.	Yes			
Passiflora edulis	No			Yes
Passiflora suberosa	Yes			
Pennisetum clandestinum	Yes			
Psidium cattleianum	Yes			
Schefflera actinophylla	Yes			Yes
Senecio madagascariensis	Yes	Asset Protection		Yes
Senna pendula var. *glabrata*	Yes			
Solanum chrysotrichum	No	Containment		
Seteria sphacelata	Yes			
Stenotaphrum secundatum	Yes			
Strelitzia nicholii	No	Weed watch		Yes
Syagrus romanzoffiana	No	Containment		Yes

3.4. Fauna

3.4.1. General Fauna

A total of 95 fauna species were either seen, heard calling, or seen flying overhead, or seen within areas of water in Cudgen Creek during surveys. This included three introduced species and 91 native species. It included four amphibians, 59 birds, seven reptiles, ten mammals and 11 invertebrates. The identification of three bats could not be verified from the calls detected. This included the Southern Myotis (*Myotis macropus*) for which possible social calls were detected, and as such this species was assumed to be present.

The full list of fauna species detected in provided in **Appendix B.**

3.4.2. Threatened Fauna

A total of five bird species, four bat species, and one frog species detected in surveys are listed under the BC Act and/or EPBC Act. These species and their conservation status are detailed in **Table 6** below. This includes the Southern Myotis (*Myotis macropus*) for which possible social calls were detected. A number of species were seen flying overhead, or in the case of the Grey-headed Flying Fox (*Pteropus poliocephalus*) foraging within the study area. No nesting or roosting sites for such species were detected within the study area, including for a number of threatened microbat species detected by echolocation. The Bush Stone-curlew (*Burhinus grallarius*) is known to nest within the current Senior's Living complex with several possible abandoned nests identified. The Wallum Froglet (*Crinia tinnula*) was heard calling after heavy rain on the southern and eastern boundaries of the subject site. The location of all threatened fauna records is shown in **Figure 9**.

Table 6 Threatened fauna detected from the study area

Common Name	Scientific Name	BC Act Status	EPBC Act Status	Foraging Only
Cattle Egret	*Ardea ibis*	Not listed	Marine	
Wallum Froglet	*Crinia tinnula*	Vulnerable	Not listed	
Bush Stone-curlew	*Burhinus grallarius*	Endangered	Not listed	
White-bellied Sea-eagle	*Haliaeetus leucogaster*	Vulnerable	Marine	Yes
Mangrove Honeyeater	*Lichenostomus fasciogularis*	Vulnerable	Not listed	
Eastern Osprey	*Pandion haliaetus*	Vulnerable	Marine	Yes
Grey-headed Flying Fox	*Pteropus poliocephalus*	Vulnerable	Vulnerable	Yes
Little Bent-wing Bat	*Miniopterus australis*	Vulnerable	Not listed	Yes
Yellow-bellied Sheath-tailed Bat	*Saccolaimus flaviventris*	Vulnerable	Not listed	Yes
Greater Broad-nosed Bat	*Scoteanax rueppellii*	Vulnerable	Not listed	
Southern Myotis	*Myotis macropus*	Vulnerable	Not listed	

3.4.3. Koala Habitat

The Koala Habitat Assessment (Report No. 21273 RP5) provides a detailed assessment of whether the vegetation within the study area aligns with Koala habitat as defined by the Tweed Coast Koala Habitat Study (Phillips et al. 2011). No preferred Koala Food Trees as defined by the Tweed Coast Koala Habitat Study (Phillips et al. 2011) were detected in the study area, and no evidence of Koalas was recorded in SAT surveys or in spotlighting surveys.

The Tweed Coast Koala Habitat Study (Phillips et al. 2011) defines the following classes of Preferred Koala habitat:

- **Primary Habitat** – areas of forest and/or woodland wherein primary food tree species comprise the dominant or co-dominant (i.e. ≥ 50%) overstorey tree species;
- **Secondary (Class A) Habitat** – areas of forest and/or woodland wherein primary food tree species are present but not dominant or co-dominant and usually (but not always) growing in association with one or more secondary food tree species.
- **Secondary (Class B) Habitat** – areas of forest and/or woodland wherein primary food tree species are absent, habitat containing secondary and/or supplementary food tree species only.
- **Other habitat** - communities within which Koala food trees are absent.

Based on the above, the area of PCT 3989 Intact would be Secondary (Class B) Habitat as it only contains *Melaleuca quinquenervia* which is a supplementary food species (Phillips et al. 2011). *Casuarina glauca* which is present in this community is rarely used by Koalas on the Tweed Coast (Phillips et al. 2011). It does not contain the preferred Koala Food Trees *Eucalyptus robusta* or *E. tereticornis* and as such would meet the definition of Secondary (Class B) Habitat.

The original restoration area (PCT 3132 Restoration) also contains *Melaleuca quinquenervia* together with *Casuarina glauca*, *Banksia integrifolia* and a range of planted rainforest species that are not Koala food species. Under the Tweed Coast Koala Habitat Study (Phillips et al. 2011), post-mining rehabilitation is considered to be 'Other' Koala habitat. However, given the occasional presence of the supplementary food species *Melaleuca quinquenervia* this area has also been assigned to Secondary (Class B) habitat. The areas dominated by *Ficus benjamina* (PCT 3132 Figs) although structurally similar does not contain supplementary food species and would be considered other Koala habitat.

Other vegetation such as PCT 3989 Grassland, PCT 4091 and Exotic Dominated Grassland do not contain Koala food trees. Mangrove is listed as under the Tweed Coast Koala Habitat Study (Phillips et al. 2011) as 'Other' habitat while areas substantially cleared of native vegetation (which include derived and exotic grassland) are assigned to 'Unknown'. These categories have been assigned to these vegetation communities accordingly.

The Mixed Native/Exotic Landscape Plantings align with the Tweed Shire Vegetation Community (Kingston et al. 2004) 1007 Urban Bushland, which is not assessed under the Tweed Coast Koala Habitat Study (Phillips et al. 2011). This vegetation does not contain Preferred Koala Food Trees or supplementary food trees, and as such is considered to be 'Other' habitat.

A summary of the Koala habitat type for each PCT and condition state is provided in **Table 7** below. Ground-tuthed Koala habitat mapping for the study area is shown in **Figure 10**.

Table 7 Koala habitat type for each PCT and condition state

PCT No and Name	Condition State (if relevant)	Tweed Shire Council Vegetation Unit	Koala Habitat Type
3989 Northern Paperbark Fern Swamp Forest	Intact	402 Broad-leaved Paperbark/Swamp She-oak Closed Forest to Woodland	Secondary (Class B)
3989 Northern Paperbark Fern Swamp Forest	Grassland	902 Native Grasslands	Other
3132 Northern Sands Tuckeroo -Banksia Forest	Restoration	1008 Post-mining Regeneration	Secondary (Class B)
3132 Northern Sands Tuckeroo -Banksia Forest	Figs	1008 Post-mining Regeneration	Other
4091 Grey Mangrove – River Mangrove Forest	Mangrove	602 Mangrove Low Closed Forest to Woodland	Other
NA	Exotic Dominated Grassland	1099 Substantially Cleared of Native Vegetation	Unknown
NA	Mixed Native/Exotic Landscape Plantings	1007 Urban Bushland	Other

4. Management Zones

4.1. Requirements

In identifying management zones, there are a range of different requirements that must be considered in co-coordination. These are additional to requirements detailed in ***Section 1.4*** and are summarised below.

4.1.1. Asset Protection Zones

An Inner Protection Area (IPA) as per the requirements of *Planning for Bushfire Protection 2019* is required between the proposed development and areas of retained bushland, including revegetation areas. The IPA is included in Management Zone 3.

4.1.2. Fauna Management

The Bush Stone-curlew has been identified within the study area. There are a range of management actions identified in the Threatened Biodiversity Data Collection (E&H 2024c) relevant to the Project. These include:

- Prohibiting the keeping and walking of dogs and cats, other than assistance dogs;
- Undertaking fox and feral cat control programs;
- Retain existing vegetation along roadsides, in paddocks and remnant stands of native trees
- Retain dead timber on the ground in open woodland areas;
- Fence off nesting sites;
- Fence off suitable woodland habitats, particularly those with unimproved pasture and an intact native ground plant layer;
- Increase the size of existing remnants, planting trees and establishing buffer zones of unimproved uncultivated pasture around woodland remnant; and
- Assess the importance of the site to the species' survival. Include the linkages the site provides for the species between ecological resources across the broader landscape.

Where appropriate these measures are included in the management zones.

A number of other threatened species have been detected in the study area including those listed in **Table 4**. For the majority of these species, suitable habitat is mangroves and other adjacent intact riparian vegetation. As such, management aims to protect, enhance and extend the width of this habitat through revegetation.

4.1.3. Koala Habitat

Appendix C of the Tweed Coast CKPoM details that offsets must be established at a ratio of 1:12 on site or 1:15 offsite to compensate the loss of Koala habitat.

As 0.036 ha of Secondary (Class B) will require clearing or modification for the establishment of APZs, a total area of 0. 432 ha will need to be offset on-site to meet the offset requirements.

The offset requirement is to be met on site, through the protection and management of areas of PCT 3989 Intact and the remaining areas of PCT 3132 Restoration. Additional plantings in areas of grassland of PCT 3989 are proposed that will develop into Secondary (Class B) Koala habitat. Part of the area occupied by a single tree of *Ficus benjamina* that sits outside of required APZs will also be restored to PCT 3989. Collectively, these areas total 0.467 ha and are sufficient to meet the offset requirement for removal/modification of Secondary (Class B Koala habitat). The total areas to meet the offset requirements are detailed in **Table 8** below. These areas are shown on **Figure 11**.

Table 8 Areas to meet offset requirements

Existing Community	Future/Proposed Community	Management Required	Area (ha)
PCT 3989 Intact	PCT 3989 Intact	Weed control	0.223
PCT 3132 Restoration	PCT 3132 Restoration	Weed control	0.111
PCT 3989 Grassland	PCT 3989 Intact	Restoration Plantings	0.030
PCT 3132 Figs	PCT 3989 Intact	Restoration Plantings	0.002
Exotic Dominated Grassland	PCT 3989 Intact	Restoration Plantings	0.071
Total			**0.467**

4.2. Management Zones

Three separate management zones have been identified within the restoration area, as shown in **Figure 12**, these include:

- Management Zone 1 Retained Vegetation covering areas of existing vegetation to be retained, including existing restoration plantings) covering 0.34 ha
- Management Zone 2 Restoration Planting covering new restoration plantings covering 0.31 ha; and
- Management Zone 3 APZs covering areas to be managed as APZs covering 0.29 ha.

4.3. Management Zone Objectives

4.3.1. Management Zone 1 Retained Vegetation

Management Zone 1 consists of predominantly native vegetation where the canopy remains intact and includes areas mapped as PCT 3989 – Intact and PCT 3132 – Restoration. This zone will require an assisted regeneration management approach, whereby the primary activity will be weed control. Removal of exotic vegetation, particularly more invasive species will allow native vegetation to grow and reproduce free from competitive pressure. The overall weed control objective will be to reduce the cover of woody weeds including garden escapes to >5%. Given the high value of vegetation within Zone 1 and the significant waterway values adjacent, weed control will require a cautious approach, with limited herbicide use and physical removal where possible. More intrusive management actions such as planting will not be required.

4.3.2. Management Zone 2 Restoration Planting

Management Zone 2 is highly degraded and contains little to no woody vegetation. The exception is part of the area occupied by the canopy of a large *Ficus benjamina* that contains some native tree seedlings and vines. The objective here will be to establish native vegetation through restoration works, primarily through planting of tubestock, such that these areas, in time, form an extension of existing vegetation in Zone 1. Restoration planting will target PCT 3989, the same community present in Zone 1 and would have extended into Zone 2 prior to clearing. The objective of this zone will be to recreate Koala habitat and extend the width of the existing riparian vegetation so as to improve connectivity and allow for the movement of fauna along Cudgera Creek.

4.3.3. Management Zone 3 APZs

Management Zone 3 will be maintained as an APZ in line with the Bushfire Assessment Report (Building Code and Bushfire Hazard Solutions 2024), the requirements of NSW Rural Fire Service *Planning for Bushfire Protection 2019* and will extend to the east of Management Zone 1 and 2. This will be split into three separate sub-zones depending on whether there is existing woody vegetation cover present. These zones are:

- Zone 3a covering the area of PCT 3132 Restoration that will require management as an APZ. Within this area, vegetation will be selectively cleared, with the preference for retaining the less flammable littoral rainforest species, and removing the more flammable sclerophyllous species. *Flindersia schottiana* will also preferentially removed, due to the potential to dominate, due to the larger overall tree size of this species;
- Zone 3b covering part of the fig tree to be removed and areas of grassland within APZs. These areas are to be planted in line with IPA requirements; and
- Zone 3c covering all remaining parts of the APZs that are not currently revegetated which will be included in landscape plantings in line with IPA requirements.

This RMP addresses the prescriptive requirements for the APZs as described in Appendix 4 of the Rural Fire Service guideline *Planning for Bushfire Protection 2019* and the NSW Rural Fire Service publication 'Standard for Asset Protection Zones'. The APZs will require compliance with an IPA.

Specific requirements for management of an IPA are:

- Trees
    - tree canopy cover should be less than 15% at maturity;
    - trees at maturity should not touch or overhang the building;
    - lower limbs should be removed up to a height of 2 m above the ground; and
    - preference should be given to smooth barked and evergreen trees.
- Shrubs
    - create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards the building should be provided;

- shrubs should not form more than 10% ground cover; and
- clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

- Grass
  - grass should be kept mown (as a guide grass should be kept to no more than 100mm in height); and
  - leaves and vegetation debris should be removed retaining at least a 75% cover to prevent soil erosion.

4.4. Management Actions for each Management Zone

4.4.1. Management Zone 1 Retained Vegetation

The primary management action for Management Zone 1 is weed control, with specific weed control measures described in **Chapter 5**.

4.4.2. Management Zone 2 Restoration Planting

Restoration plantings are to be undertaken in Management Zone 2 following primary weed control to remove exotic grasses. The methods for restoration plantings, including site preparation and maintenance are detailed in **Chapter 8**.

Parts of Management Zone 2 are currently occupied by the canopy of a large *Ficus benjamina* and contains some native tree seedlings and vines in the understorey. It is expected that following removal of the fig, increased light levels would promote the establishment of exotic grasses and other weeds, and could result in death of some seedlings and vines due to increased light levels. As such weed control will likely be required prior to undertaking restoration plantings. However, prior to undertaking weed control the area should be surveyed and all seedlings and vines remaining present should be identified and marked with a stake. A tree guard should be placed around each to prevent damage by herbicide drift. Any weeds growing around the base of the marked seedlings and vines should be removed by hand pulling.

4.4.3. Management Zone 3 APZs

4.4.3.1. Management Zone 3a

Prior to the establishment of APZs within Zone 3a the area of PCT 1232 Intact is to be surveyed to identify any littoral rainforest trees to be retained within this zone that can be retained to meet IPA requirements. Individual plants are to be marked with flagging tape or protective fencing to ensure they are not inadvertently damaged through clearing of adjacent vegetation. Specific measures for the protection of native trees are detailed in ***Section 6.1***. All woody weeds are to be removed from this management zone due to the fuel hazard created.

4.4.3.2. Management Zone 3b and 3c

For areas to be planted within Managements Zones 3b and 3c, planting will be limited to non-flammable rainforest species, spaced widely to meet IPA requirements. Prior to planting, grasses and other weeds are to be treated with herbicide at planting locations (primary weeding as detailed in ***Section 5.7.1***). Areas of open lawn will be maintained between plantings.

Details of species selection and plant densities are provided in **Chapter 8**.

4.4.3.3. Ongoing Maintenance for Zones 3a, 3b and 3c

Asset protection zones (Zone 3a, 3b and 3c) are to be maintained through mowing fortnightly between October and May, and at least monthly between June and September when grasses are not actively growing to ensure height is kept below 100mm. Tree guards should be placed around trees to prevent damage through mowing. Alternatively, herbicides can be used to treat grass at the base of trees, provided there are no visible suckers at ground level that could be impacted by herbicides. Brush-cutting should not be undertaken to reduce grass height below trees due to the potential for ringbarking damage.

5. Weed and Hygiene Management Plan

5.1. Introduction

This section provides an overview of legislation relevant to weed control, identifies the weed species present, and then identifies appropriate weed control methods and the stages of weed control to be implemented. Hygiene controls to prevent the spread of weeds and pathogens are also provided.

5.2. Legislative Requirements

5.2.1. Biosecurity Act 2015

Under the NSW *Biosecurity Act 2015* (Biosecurity Act) the state has been divided into 11 regions with weed management in each directed by a regional weed committee. Each committee has prepared a Regional Strategic Weed Management Plan.

Under the Biosecurity Act there are weeds which have legislated management requirements under controls and regulations of the act. These are known as State Priority Weeds. All 32 WoNS are now listed as State Priority Weeds. WoNS are species that have been identified by Australian governments based on their invasiveness, potential for spread, and environmental, social and economic impacts and are priorities for control.

A further two sets of weeds are detailed within the management plan for each region. Regional Priority weeds are required to be managed as per the proposed objectives in the management plan to fulfil a General Biosecurity Duty which applies to all landowners and managers under the Act. "Other weeds of regional concern" is the second category weeds have been assigned to. These weeds may have legal management requirements by a managing authority to be controlled as part of the General Biosecurity Duty in circumstances where they may impact upon an asset such as the environment or human health.

Several species are listed as a Priority weed under the Biosecurity Act through the North Coast Regional Weed Management Plan (North Coast LLS 2022). The North Coast Regional Weed Management Plan (North Coast LLS 2022) also contains weed watch species, which are emerging weed species that may require additional management. It also contains additional species of management concern for which asset protection is a high priority.

Priority weeds detected in the study area are listed in **Table 9**. Many other garden escapes and introduced pasture species with the study area have potential to be environmental weeds even though they are not listed as Priority weeds.

Table 9 Priority weeds listed under the *Biosecurity Act 2015* detected within the study area

Species Name	Priority Weed	Weed of National Significance	Species of Concern in North Coast LLS Region
Asparagus aethiopicus	Asset Protection	Yes	Yes
Chrysanthemoides monilifera var. *rotundata*	Containment	Yes	
Cinnamomum camphora			Yes

Species Name	Priority Weed	Weed of National Significance	Species of Concern in North Coast LLS Region
Desmodium uncinatum	Asset Protection		Yes
Gloriosa superba	Containment		
Lantana camara	Asset Protection	Yes	Yes
Merremia dissecta	Weed Watch		
Murraya paniculata	Asset Protection		
Ochna serrulata			Yes
Passiflora edulis			Yes
Schefflera actinophylla			Yes
Senecio madagascariensis	Asset Protection		Yes
Solanum chrysotrichum	Containment		
Strelitzia nicholii	Weed watch		Yes
Syagrus romanzoffiana	Containment		Yes

5.2.2. Pesticides Act 1999

The *Pesticides Act 1999* controls the use of herbicides within NSW. Under the Act is illegal to use herbicides for species not listed on a particular herbicides' label, or in a concentration or manner not outlined on the label. Off-label use of a particular herbicide is permitted only upon obtaining a specific permit.

5.3. Hygiene Protocols

5.3.1. Pathogen Management

To prevent the transportation of pathogens into and out the restoration area current hygiene procedures and guidelines will be followed. This includes the hygiene guidelines: Protocols to protect priority biodiversity areas in NSW from *Phytophthora cinnamomi*, myrtle rust, amphibian chyrtid fungus and invasive plants (DPIE 2020). Prevention of the spread of amphibian chyrtid fungus is required due to the presence of the threatened Wallum Froglet (*Crinia tinnula*) in the study area. Measures will involve the disinfection of all tools, equipment and clothing (such as boots and gloves) a prior to entering the restoration area.

Recommended disinfectant products include:

- Non corrosive disinfectants including Coolacide®, Phytoclean®, or Biogram® for cleaning footwear, tools, tyres, machinery and other items in contact with soil;
- 70% Methylated spirits solution in a spray bottle which is suitable for personal use (clothing); and
- Sodium hypochlorite 1%, which is effective, but can damage clothing and degrades rapidly in light.

The disinfection process must occur well away from frog sensitive areas such as drainage lines and wetlands.

5.3.2. Weed Hygiene Protocols

To prevent transportation of weed species into and out of the restoration area, weed hygiene and management protocols will be followed. These measures include:

- Ensuring all clothing and shoes are free of weed seed and vegetative material prior to entering the restoration area; and
- Bagging of all reproductive parts of weed species (i.e. seeds, flowers, vegetatively spread material) and removing from site during any manual weed control.

5.3.3. Weed Management during Construction

Exotic plant material should not be mulched on site due to the risk of weed spread through seed or vegetative propagules. Instead, all material should be taken to an approved green-waste disposal facility. All loads should be securely covered to prevent spread of weed material during transport.

Prior to clearing, all plant equipment entering the site will be inspected and recommended for wash down (in designated wash down areas off site) as required to ensure weed material from off-site locations do not establish or spread into native vegetation within the study area. Any weed materials will need to be carefully removed off site in so as to prevent the spread of propagules to the management area. Machinery involved in weed management will also be washed down prior to removal from site to prevent weeds from spreading into off site areas.

Any weed materials will need to be carefully removed off site in a manner appropriate to the species or at the direction of the ecologist and Tweed Shire Council guidelines so as to prevent the spread of propagules to undisturbed areas of native vegetation, both on and off site.

5.4. Weed Management Objectives

The overall weed management objective for the restoration area is to reduce the cover of environmental weeds including garden escapes in vegetation along Cudgera Creek in order to facilitate natural regeneration and revegetation success. This goal is a central to specific management objectives for each management zone identified in ***Section 4.2*** and monitoring performance criteria provided in ***Section 9.4***.

As part of BAM plot surveys, the cover of HTEs is recorded in each plot. **Table 10** below details the HTE cover of plots associated with the restoration area, along with an indicative cover that should be achieved at the completion of the management period. It is noted that a range of additional introduced species that are not HTEs are also present. The overall objective of management is that the cover for these species is <1% with the exception of the weedier PCT 3989 Intact that contains a high cover of garden escapes, for which HTE cover is to reduce to <5% within 5 years.

Weed cover is to be determined through visual inspection and monitoring of plots (where relevant) as detailed in ***Section 9.3***.

Table 10 HTE cover and target HTE cover for each PCT and condition state

BAM Plot	PCT Name	Target HTE Cover within 5 years (%)	Current HTE Cover (%)
3989	Northern Paperbark Fern Swamp Forest - Intact	<5	18.6
3989	Northern Paperbark Fern Swamp Forest - Grassland	<1	3.8
3132	Northern Sands Tuckeroo Banksia Forest - Restoration	<1	6.5
3132	Northern Sands Tuckeroo Banksia Forest - Figs	<1	1.2

5.5. Best Management Practice

Contractors for weed removal within the restoration area will have regard to the following, to minimise impacts upon existing vegetation and habitats:

- The main principles of the Bradley Method of bush regeneration, i.e. not over clearing (remove only targeted species), employment of minimal disturbance techniques to avoid soil and surrounding vegetation disturbance, and replacement of disturbed mulch/leaf-litter;
- Removal of fruiting/seeding parts of weeds carefully, to minimise spread of plant propagules;
- Minimise chemical use in all zones;
- Use of chemicals and sprays only when hand-removal cannot be used, and only during suitable weather conditions (i.e. not during wet or windy conditions), and only during appropriate seasons;
- All equipment should be thoroughly cleaned prior to entering the site to minimise contamination; and
- Presence of native fauna or nesting/breeding sites.

Any weed materials will need to be carefully removed off site in a manner appropriate to the species or at the direction of the ecologist or requirements of Council to prevent the spread of propagules to adjacent areas of native vegetation within adjacent reserves.

Machinery and tools involved in weed management will also be washed down prior to entry to the site and following activities on site to prevent new weed infestations on site and on-site weeds from spreading to offsite areas.

5.6. Weed Control Methods

Weed control is to be implemented throughout the restoration area using the strategies outlined below.

5.6.1. Manual Weed Removal

Manual removal, or hand weeding, is an effective form of weed control when all viable parts of the plant are removed from the soil (roots, fruiting material and rhizomes) where practical. All weeds removed by hand will be handled according to best practice bush regeneration techniques to prevent subsequent seed set from the removed weeds.

The bushland regenerator can manually clear small plants with mattocks, brush cutters or other suitable equipment. The root structures of exotic shrubs can be retained to stabilise the soil if required, and if the plant has been killed with herbicide to avoid re-sprouting.

Larger woody weed species will need other methods of removal besides spraying with herbicide, such as by cutting and painting cut stems with herbicide or stem injection, basal bark application or ring barking. Some trees such as *Cinnamomum camphora* can be killed with herbicide and left *in-situ* to provide shelter for regeneration developing below. Areas of occurrence of these weeds should be controlled prior to the spraying of the groundcover species. Exotic vine species that are climbing into native vegetation to be retained should also be removed by hand to prevent damage to native vegetation by herbicides.

5.6.2. Use of Herbicides

All herbicides should be used according to recommendations on the herbicide label. Appropriate Personal Protective Equipment should be worn and consideration given to time of day, likelihood of rainfall, wind direction and likely impact on native species as per guidelines on the label. Use of glyphosate will be appropriate for most species. Glyphosate is the preferred herbicide for use in environmentally sensitive areas as it is rapidly broken down by microbes in the soil so residue and is short lived and will not affect remnant and planted native individuals in the long-term following application. In areas near watercourses, an appropriate form of the herbicide should be used to minimise impact to aquatic life and amphibians. Herbicide use should be avoided within 2m of the banks of Cudgera Creek. Examples of appropriate herbicide forms are Roundup Biactive and Clearup Bio 360 which have surfactants that are formulated to minimise harm to amphibians. As runoff is a likely means of herbicide residue entering watercourses, chemical treatment should be avoided prior to or directly after rains.

It is important to note that there can be legal restrictions and permit requirements for use of specific herbicides for specific plants, and chemical labels and permit requirements always need to be read prior to herbicide application. While the recommended methods for weed treatment detailed in **Appendix C** are effective, some will require a permit. Some relevant permit numbers are PER9907, and PER11916. These permits need to be obtained from the Federal Government body, the Australian Pesticides and Veterinary Management Authority. Manual removal will be an appropriate form of control for some species, and all chemical treatment should be carried out according to best practice guidelines. Planting should not be undertaken within 10 days of herbicide application.

Appropriate PPE should be worn, and consideration given to time of day, likelihood of rainfall, wind direction and speed and likely impact on native species as per guidelines on the label. Use of Glyphosate will be appropriate for most species. As runoff is a likely way for herbicide residue to enter watercourses, chemical treatment should be avoided prior to or directly after rains. It is important to note that there can be legal

restrictions and permit requirements for use of specific herbicides for specific plants, and chemical labels and permit requirements always need to be researched prior to herbicide application.

5.7. Stages of Weed Control

5.7.1. Primary Weeding

Primary weeding is the first stage of bushland regeneration and may involve techniques such as:

- The selective spraying of weeds, with selective and non-selective herbicides;
- Cutting/scraping and painting deep rooted woody weeds and climbers with hand tools, chainsaws and brush cutters and painting cut stumps with herbicides containing Glyphosate or Picloram; and
- Selective hand removal of weeds and wicker wiping of tall herbaceous weeds in situations where damage to proximate, low growing native plants can be avoided.

The aims of primary weeding are to eliminate woody weed species and any large, dominant infestations of exotic herbs and grasses. Primary weed control is also required to remove exotic grasses and other weeds prior to undertaking restoration planting.

5.7.2. Maintenance Weeding

Follow-up or maintenance weeding will be undertaken a in areas that have received past primary weeding treatments in the preceding months, to treat any regrowth of weeds.

Follow-up weeding involves the selective removal or treatment of weeds, whilst allowing regenerating or planted native plants to increase in size, abundance and percentage cover. All weeds should be targeted during the follow-up weeding phase, although it is recommended that woody weeds, climbers, and key herbaceous weeds are subject to a programme of intense follow up weeding around any patches of regenerating native herbaceous plants to encourage the spread of the native plant species. During site visits for weed control, priority weeds and WoNS will be prioritised for control. Individual plants of these species on site should not be allowed to achieve a reproductive stage in their life cycles. To eliminate the occurrence of these species they need to be controlled before they have a chance to set seed, otherwise progress on the site will not be made.

The bush regeneration contractor should also remove any rubbish detected during weed control and restoration activities.

6. Construction Management Plan

This chapter outlines the protocols to be followed during clearing and construction in the development footprint to minimise the impacts on native flora and fauna occurring in the development footprint and in the areas of retained native vegetation in the study area.

6.1. Marking Limits of Clearing

Disturbance will be limited to the minimum necessary for clearing during each stage of the development. Prior to clearing being undertaken, the edge of the vegetation to be retained will be clearly identified and delineated. Clearing limits can be marked with high visibility tape, fencing, or other appropriate boundary markers. To avoid unnecessary damage to vegetation or inadvertent habitat removal, disturbance will be restricted to the delineated area. No stockpiling of equipment, soils, or machinery will occur beyond the boundary. Any temporary fencing proposed for the development site must be designed according to Appendix D.2 Fauna exclusion fencing of the Tweed Coast CKPoM.

Temporary signage will be provided along the boundary of the temporary fencing and the wetland vegetation during the construction phase stating: "Environmental Protection Zone – No Unauthorised Entry" and "No Dogs".

No machinery, rubbish or spoil will be stored within retained vegetation during the construction phase of the development. Vehicle/equipment wash-down areas or access tracks will not be located in or immediately adjacent to retained vegetation.

6.2. Tree Protection Measures

Trees to be retained within APZs (Management Zone 3a) should be identified and clearly marked with flagging tape prior to clearing of the surrounding vegetation. Immediately prior to and during clearing, temporary exclusion fencing should be placed around these trees to prevent damage from machinery, and to prevent compaction of the root zone. This will also enable branches to be salvaged.

The large *Ficus benjamina* should be felled branch by branch to prevent damage to retained vegetation that could occur during tree fall. Tree felling should be undertaken under the supervision of a qualified arborist.

In order to minimise impacts to trees to be retained within APZs, a number of tree protection measures are proposed as detailed in the Arborists Report (TPZ Project Arborists 2024). Tree protection measures apply specifically to a defined Tree Protection Zone (TPZ). These measures include:

- Engagement of a Project Arborist for the duration of the development project.
- Installation of TPZ fencing/alternative tree protection measures as appropriate for the site and agreed with the Project Arborist.
- Pre-start meeting with all stakeholders to discuss operational procedures within the TPZ (if/where required/unavoidable).
- Project Arborist to monitor any works within the TPZ including installation of tree protection measures.

- Any canopy pruning required to implement the proposed APZ must comply with guidelines as set out in the Australian Standard for Pruning of Amenity Trees (AS4373).

Details of additional tree protection measures can be found in the Arborists Report (TPZ Project Arborists 2024).

6.3. Hours of Work

Due to the potential for nocturnal species to be present, that could be disturbed by the noise and light of operating machinery, all works on site must not commence until one hour after sunrise and must be concluded within one hour prior to sunset. No machinery, including contractor/staff vehicles may operate on the site before or after these hours.

6.4. Pre-clearing Protocols

6.4.1. Inductions

All site personnel will undertake a brief induction to identify the areas of high ecological sensitivity, including the mangrove vegetation adjoining the subject site. The environmental site induction for all staff, contractors and sub-contractors will be prepared in consultation with a suitably qualified ecologist. All personnel will be made aware of the relevant measures to protect and restore native vegetation and sensitive coastal environments and respond to unexpected ecological finds during construction and operational outlined in this plan.

The inductions should include specific measures to prevent disturbance to the Bush Stone-curlew and other fauna that may not be present including:

- Hours of work (***Section 6.3*** above);
- No entry to areas outside the marked limits of clearing;
- Vehicles are to enter and operate at a speed of less than 15 km/h on site;
- No removal of timber/firewood;
- Dogs not to be permitted within the construction site;
- Identification of the Bush Stone-curlew;
- No work to be undertaken within 50 m of birds seen on the site, until the birds have moved on;
- In the event that birds are observed to be nesting on the site, a 50 m buffer is to be established, and the ecologist undertaking pre-clearing surveys is to be contacted. A temporary fence will be established around the buffer for a period of seven weeks after hatching of chicks (when birds reach adult size); and
- No feeding of birds.

6.4.2. Fauna Protection

6.4.2.1. Fauna Pre-clearing Surveys

In order to minimise impacts to fauna species during construction, pre-clearance surveys will be conducted in all areas of vegetation that are required to be cleared. Pre-clearing surveys will be undertaken within two weeks of clearing activities by a qualified ecologist.

Habitat features to be identified include:

- Any hollow-bearing trees;
- Logs or log piles; and
- Nests within tree canopy or shrubs.

Such features have the potential to contain native species. All habitat features will be identified, recorded and flagged with fluorescent marking tape and trees will have an "H" spray painted with marking paint on two sides of the tree.

Any clearing of land must not commence until the area proposed for clearing has been inspected for the presence of koalas and approval given in writing by a Suitably Qualified Person.

i. Staging of Clearing

The clearing will be conducted using a two-stage clearing process as follows:

Stage 1: Clearing will commence following the identification of potential habitat features by a qualified ecologist. Hollow-bearing trees marked during pre-clearing will not be cleared during the first stage; however, all vegetation around these trees will be cleared to enable isolation of the feature. Other habitat features, such as logs/log piles, can be removed during Stage 1 only if done under supervision by a qualified ecologist. Identified hollow-bearing trees will be left at a minimum overnight after Stage 1 clearing to allow resident fauna to voluntarily move from the area.

Stage 2: After hollow-bearing trees have been left overnight, the trees will be cleared using the following protocols:

- Trees marked as containing hollows will be shaken by machinery prior to clearing to encourage any animals remaining to leave the hollows and move on;
- Use a bulldozer or excavator to start pushing the tree over. Move the bulldozer over the roots and continue gently pushing the tree over;
- Remove branches with hollows and sections of trunk and set aside for immediate transfer to a storage area for placement within retained vegetation; and
- All hollows will be investigated by an ecologist for the presence of fauna following felling of the tree.

The felled habitat tree will be left overnight to allow any remaining fauna time to leave the hollows and move on.

Provisions will be made to protect any native fauna during clearing activities by the following means:

- All staff working on the vegetation clearing will be briefed about the possible fauna present and should avoid injuring any present;
- Animals disturbed or dislodged during the clearance but not injured will be assisted to move to adjacent bushland or other specified locations; and
- If animals are injured during the vegetation clearance, appropriate steps will be taken to humanely treat the animal (either taken to the nearest veterinary clinic for treatment, or if the animal is unlikely to survive, it will be humanely euthanized).

Provision of a report following the completion of clearing works will be provided detailing the total number and species of individuals recorded and details of their release/health.

ii. Habitat Feature Salvage

A single large *Ficus benjamina* will require clearing for the establishment of an APZ within Management Zone 3. Larger trunks and branch segments of the fig not containing reproductive material should be salvaged and placed directly into Zone 2 to create ground habitat or the Bush Stone-Curlew.

6.5. Sediment and Erosion Control

Sediment and erosion control requires addressing the potential for erosion to impact water quality and transport of soil into the adjacent ecologically sensitive wetland and mangrove communities. Erosion and migration of sediment from the study area into adjacent vegetation has the potential to facilitate weed invasion through the introduction of weed seeds and nutrients that favour weed species. As weed species are removed from the study area, the soil may become susceptible to erosion during periods of rain. As such erosion control measures will be installed where appropriate following weed removal.

The Erosion and Sediment Control Plan (Cozens Regan 2024) indicates that underlying soils comprise of sand, which are considered non-dispersive. The risk of erosion and sediment being transferred from site due to the soil type and gentle slope is considered low (Cozens Regan 2024). While the potential exists for sediment to be generated during construction, the potential sediment volume is dependent upon rainfall, site topography, the material type exposed, flow characteristics, and construction practices (Cozens Regan 2024). Potential impacts of sedimentation will be avoided through the implementation of appropriate erosion and sediment control measures detailed in the Stormwater Management Plan (Cozens Regan 2024). Measures include;

- Sediment fences, hay bale or coir roll barriers, diversion drains, and other site work practices should be installed during construction in order to control the potential erosion impacts. Installation of all devices as shown on drawings within the Stormwater Management Plan (Cozens Regan 2024) shall be considered as the minimum requirement. Additional measures to be considered include:
    - Install woven fabric sediment fences along the downstream boundaries of the subject land;

- Designation and marking of transport routes across undisturbed portions of the site to ensure minimal vegetation disturbance;
- Install diversion mounds to reduce the length of sheet flow across disturbed areas;
- Installation of diversion drains which include appropriate erosion and sediment controls such as sand bags.
- The drains are to direct runoff generated on the disturbed areas to the proposed sediment trap;
- Identify any areas that are not to be disturbed by construction activities and cordon off from vehicle traffic to prevent erosion; and
- Site personnel complete an environmental induction covering the erosion and sediment control strategy.

All erosion and sediment control structures are to be monitored and maintained. Monitoring will take place on a weekly basis and after each storm event to ensure that the proposed control measures are operating as intended and are being maintained in a suitable condition. In the event that erosion and sediment control structures are found to be ineffective, they must be repaired or replaced.

7. Fauna Management Plan

7.1. Introduction

This section includes measures to protect fauna and manage fauna habitat. These measures are relevant specifically to the following species:

- Bush Stone-curlew (*Burhinus grallarius*); and
- The Koala (*Phascolarctos cinereus)*

These measures will also act to protect habitat for other threatened fauna species including migratory bird species as listed in **Table 6.**

7.2. Bush Stone-curlew Protection

Management Zone 2 is be managed to create habitat for the Bush Stone-curlew. This area is to be enriched for habitat use by placement of salvaged logs.

In accordance with the habitat management guidelines as outlined in Appendix 2 of the Bush Stone-curlew Recovery Plan (DEC 2006), the following will be implemented including:

- Prohibition of dogs and cats beyond the proposed walking track (including walking on leads);
- Fox control measures;
- Fencing with educational signage placed on the outer edge of the proposed walking track; and
- Revegetation including placement of salvaged timber in Zone 2.

7.3. Koala Protection

Section 10 of the Tweed Coast CKPoM details a range of Koala Friendly development measures to minimise impacts to the Koala and Koala habitat. Section 10 of the Tweed Coast CKPoM does not apply to the Project because:

- The subject site is located outside a Koala Activity Precinct and a Koala Linkage Precinct; and
- The Koala is not present.

However relevant measures have been considered and applied where appropriate as detailed in **Table 11** below.

Table 11 Koala protection measures applied to the Project

Section of Tweed Coast CKPoM	Requirement	How addressed?
5.10.3.3 Fencing	Council will require a restrictive covenant under Part 6 (Division 4) of the *Conveyancing Act 1919* to ensure that any fencing is designed to allow free movement of koalas outside of any privately-owned allotments less than or equal to 1000m$_2$, or building envelope referred to in Part 5.10.3.1.	No fencing will be proposed within the restoration area.
	The design of fencing referred to above shall be consistent with the fauna friendly fencing guidelines presented in Appendix D or other Council approved contemporary design.	Does not apply
	Council will require a restrictive covenant under Part 6 (Division 4) of the *Conveyancing Act 1919* to ensure that any safety fencing required around swimming pools shall be constructed to prevent access by koalas (See koala proof pool fencing guidelines in Appendix D).	Safety fencing required around swimming pools shall be constructed to prevent access by koalas
5.10.3.5 Roads	On low use roads (less than 1500 car movements per day) a 40 km/h speed limit shall be implemented and appropriate traffic calming devices installed to effectively restrict motor vehicles to a maximum speed of 40 km/h.	A 40 km/h limit (or less) will apply. Speed humps can be included if required.
	On high-use roads (1500 car movements per day or more), appropriate connectivity measures such as overpasses, underpasses, grids and fauna exclusion fencing shall be installed in any areas that traverse or are adjacent to Preferred Koala Habitat or areas subject to a Habitat Restoration Plan prepared in accordance with Part 5.9.4.	Does not apply

Section of Tweed Coast CKPoM	Requirement	How addressed?
	The design of roads and associated infrastructure referred to above shall be consistent with the Wildlife Infrastructure Guidelines presented in Appendix D or other Council approved contemporary design.	To be confirmed
	Any wildlife infrastructure required under this part shall be maintained by the developer with prompt repair where necessary for a minimum period of 5 years, or as otherwise agreed, and thereafter by Council.	Does not apply
	Where possible the design and layout of the development shall include perimeter roads between urban development and Preferred Koala Habitat or areas subject to a Habitat Restoration Plan prepared in accordance with Part 5.9.4.	Design includes a perimeter road between the development and areas subject to restoration.
	Wildlife and road speed signage should be installed at appropriate locations to highlight wildlife hazards and the need to maintain speed limits.	Wildlife signage for other species present (i.e. Bush Stone-curlew) can be installed
5.10.3.6 Bush fire asset protection zones	Any new bush fire asset protection zones shall not encroach on any existing Preferred Koala Habitat or areas subject to a Habitat Restoration Plan prepared in accordance with Part 5.9.4.	Minor incursions of APZs into 0.036 ha of Secondary (Class B) Koala habitat.
5.10.6.7 Management of construction impacts on Koalas	Construction is to be carried out such that koalas are able to safely move between any retained Preferred Koala Food Trees or Preferred Koala Habitat.	Any retained Koala habitat along Cudgera Creek will be temporarily fenced during construction.
	Clearing of native vegetation and/or earthworks carried out as part of any development approval or consent from Council must be temporarily suspended within a range of	Will apply during construction

Section of Tweed Coast CKPoM	Requirement	How addressed?
	25m from any tree which is concurrently occupied by a koala and must not resume until the koala has moved from the tree of its own volition	
	Any clearing of land must not commence until the area proposed for clearing has been inspected for the presence of koalas and approval given in writing by a Suitably Qualified Person.	A preclearance survey will be undertaken by a suitably qualified ecologist for fauna including koalas immediately prior to clearing
	Approval to proceed with the clearing of vegetation in accordance with this part (Part 5.10.3.7) is only valid for the day on which the inspection has been undertaken.	Clearance supervision to be undertaken on the day(s) of clearing
	The person referred to in (iii) above, or a nominated representative, must remain on site during any approved clearing of vegetation.	The ecologist to remain on site to undertake clearance supervision until clearing is completed

7.4. Rubbish Removal

Prior to the commencement of works, any existing items from past land use that could represent a hazard to wildlife or an impediment to movement are to be removed. This is to include any non-biodegradable flood debris.

Rubbish removal is also to be undertaken annually, and after major flood events, covering the entire restoration area. Rubbish should also be removed prior to undertaking mowing to prevent rubbish being broken down into small pieces.

7.5. Bushfire Protection

The risk of bushfire to existing fauna habitat and to habitat to be created through restoration is low due to:

- The Existing Senior's Living development located to the east;
- The proposed development (the Project) and associated APZs to the east;
- Cudgera Creek and fringing mangroves to the west; and
- The inclusion of generally non-flammable littoral rainforest species in existing restoration plantings.

The risk of bushfire would primarily be from fires entering from bushland to the south. A proposed emergency access road around the proposed development will enable emergency vehicles to access the area, to fight a fire coming from the south, limiting the extent that a fire would likely penetrate into the area.

7.6. Nest Box Installation

No hollow-bearing trees are proposed for removal. However to increase the likelihood of vegetation along Cudgera Creek of being used by microbats in the future, it is recommended that a minimum of three nest boxes be installed in retained trees along Cudgera Creek. All nest boxes must be constructed of hardwood, and be of a design suitable for microbats. An ecologist must be on site during the installation of nest boxes to ensure they are appropriately positioned to maximise potential use by microbats.

8. Restoration Plan

8.1. Introduction

This Restoration Plan applies to the following zones:

- Management Zone 2 covering new restoration plantings; and
- Management Zone 3a including plantings within APZs.

The zones proposed for planting are shown in **Figure 12**.

8.2. Site Preparation

Site preparation is to take place following primary weed control to remove woody weeds, exotic grasses and other weeds prior to planting.

Parts of the restoration area have been subject to previous development, and contain areas of fill and rubble, and areas of gravel associated with former tracks. Any such areas in Management Zone 2 should be ripped to break up compaction, and to mix this material with the sandy soil below. Any larger pieces of concrete or bitumen, if present, should be removed and disposed of off-site and should not be mixed into the soil. Any areas containing a natural soil surface should not be ripped.

Following primary weed removal and ripping, the Management Zone 2 is to be mulched prior to planting with a well-decomposed wood chip or native leaf litter type mulch. Mulch should be applied to a depth of no more than 75 mm.

Surface stabilization is to be assessed throughout the works by the Bushland Regenerator and/or the Project Ecologist, particularly at the completion of primary weed control to remove exotic grasses. Supplementary erosion and sediment controls such as jute matting, or coir rolls are to be installed where necessary. This will mitigate erosion of the exposed topsoil. Weed removal is to be undertaken in a manner which does not cause excessive disturbance to the existing topsoil.

8.3. Target Community

8.3.1. Management Zone 2

Zone 2 is located directly adjacent to areas of PCT 3989 which aligns with Swamp Sclerophyll Forest TEC. As such PCT 3989 will be the target community for restoration. The species selection for planting in **Appendix D** is based on species detected within PCT 3989 within the study area, and additional species that occur in the PCT based on the PCT profile in the E&H VIS classification (E&H 2023). To ensure this develops into Koala habitat this includes the Preferred Koala Feed Tree species *Eucalyptus tereticornis* and *E. robusta*. Koala use tree species for planting and the recommended number of plants is detailed in **Table 12** below. Koala use trees are those defined under the Koala (*Phascolarctos cinereus*) Biodiversity Assessment Method Survey Guide (DPE 2022).

Table 12 Koala food species recommended for planting and the applicable zones

Species	Minimum No. of Plants	Tree Type
Eucalyptus tereticornis	5	Preferred Koala Food Tree
Eucalyptus robusta	5	Preferred Koala Food Tree
Casuarina glauca	10	Supplementary
Lophostemon suaveolens	10	Supplementary
Melaleuca quinquenervia	15	Koala use

8.3.2. Management Zone 3b and 3c

For Zone 3b and 3c that is to be managed as an IPA the target community will be PCT 3132 with planting limited to less flammable littoral rainforest species. Zone 3c is included in landscaping plantings. The species to be planted are included in **Appendix D.**

8.4. Plant Supply

Plantings are to be sourced from one of the following methods:

- A plant nursery which supplies endemic rainforest vegetation, cultivated using seed or cuttings sourced from north-eastern NSW;
- Plants propagated from cuttings or seed sourced from within the subject site;
- Plants propagated from cuttings or seed sourced within a nearby area.

A qualified and experienced bushland regenerator is to be engaged for any native plant propagation works required. Appropriate permissions for any collections undertaken and appropriate licensing under the BC Act will need to be obtained for any seed collected from offsite areas; this will be the responsibility of the bushland regenerator engaged to undertake the works.

8.5. Planting Densities

Planting density requirements for Zone 2 and Zone 3b and 3c are summarised below, with indicative planting densities for each zone detailed in **Table 13**.

8.5.1. Management Zone 2

Typically planting is undertaken at a low density for emergent and canopy trees, with higher densities for understorey species. The dominant tree species in canopy tree plantings must be *Melaleuca quinquenervia* (at least 70% of trees) which is the dominant species in PCT 3989. To ensure that vegetation develops into Koala habitat, at least 10% of canopy tree plantings must be the preferred Koala food trees *Eucalyptus robusta* and *E. tereticornis* with other supplementary Koala food species (*Casuarina glauca* and *Lophostemon suaveolens*) making up a further 10% off canopy tree plantings. Other species should make up the remaining 10% of canopy tree plantings. For other layers, no species should dominate the plantings overall, with as many species from **Appendix D** selected as possible depending on plant availability while ensuring that the plant numbers in

Table 13 are planted. No planting of understorey ferns is proposed as these species while likely establish naturally once the canopy layer becomes established. As these species require low light levels, they would be unlikely to establish successfully through planting until the canopy is established. Indicative planting densities for each stratum are provided in **Table 13** below.

Specific species should be selected from **Appendix D** depending on plant availability.

8.5.2. Management Zone 3b and 3c

Planting within Zone 3b and 3c is to be limited to trees and large shrubs only, as smaller shrubs, vines and ground layer species would be inconsistent with ground layer management through mowing. Trees and large shrubs are to be planted to be consistent with IPA requirements, being:

- Trees
    - tree canopy cover should be less than 15% at maturity;
    - trees at maturity should not touch or overhang the building;
    - lower limbs should be removed up to a height of 2 m above the ground; and
    - preference should be given to smooth barked and evergreen trees.
- Shrubs
    - create large discontinuities or gaps in the vegetation to slow down or break the progress of fire towards the building should be provided;
    - shrubs should not form more than 10% ground cover; and
    - clumps of shrubs should be separated from exposed windows and doors by a distance of at least twice the height of the vegetation.

Indicative plant densities are shown in **Table 13**, however interplanting or selective thinning may be required to ensure the above requirements are met as plantings mature.

The planting should include as many species as possible from **Appendix D** depending on plant availability with no one species dominant overall.

Table 13 Indicative planting density for each zone

Strata	Zone 2 Planting Density	Zone 3b and 3c Planting Density
Canopy trees	3 units per 5m^2	3 units per 10m^2
Mid layer (small trees and large shrubs)	1 unit per 2 m^2	3 units per 10m^2
Small shrubs	1 unit per 1 m^2	Not proposed
Grasses, sedges, rushes and forbs	2 units per m^2	Not proposed

8.6. Plant Sourcing

Plants should be obtained in forestry tubes, mega-tubes or similar that promote straight root growth, although more advanced plants can be used in Zone 3c.

Plants should be sourced from local plant material, preferably from within the Tweed Shire or adjacent areas (such as Byron and Ballina Shires). Burringbar Rainforest Nursery, located at Burringbar in the Tweed Shire can provide many of the rainforest species listed in **Appendix D**. Cultivars and hybrid plants should not be included in plantings within the restoration area, but may be included in landscaping outside this area as detailed in the landscaping plan (Arcadia 2024).

8.7. Planting Technique

8.7.1. Planting Technique

The following is a guide to ensure success of tube stock plantings:

- Mulch needs to be scraped back to expose soil surface;
- Holes for tube stock should be dug deep enough that at least a few centimetres of the plant are below the soil surface;
- Where tree roots or rocks are present, a hole should be dug in an alternate location;
- Soil should be filled back in surrounding the tube stock;
- Mulch should be spread back to surround the new planting, but not smother it; and
- Plants need to be watered immediately following planting.

8.7.2. Tree Protection

A plastic tree guard should be installed around each plant (or clump of plants) following planting and watering to protect them from herbivory, trampling and herbicide drift during site visits for weed control. Tree guards should be avoided on the lower bank of Cudgera Creek where there is a high risk of tree guards being washed away during flood events.

8.8. Maintenance of Plantings

During site visits for weed control, the contracted bushland regeneration team should monitor the plantings for death of individual plants. These should be replaced with another individual of the same vegetation form during subsequent site visits, noting that natural thinning is likely to take place due to high planting densities and that for some canopy trees some natural mortality due to thinning is to be expected as trees grow. Although native plants generally only need to be watered once upon planting, drought periods or hot, dry weeks in warmer months of the year can result in death of plantings. The contracted bushland regeneration team should water plantings during site visits or more frequently if required in these periods to prevent the loss of plantings from water stress. Where weeds are identified in planting areas these should be removed by hand to minimise herbicide damage to plantings. Tree guards should be replaced if damaged or removed once

plants grow to a size where guards are no longer required (i.e. plants are extending vertically or horizontally beyond guards). Any mulch that washes away or decomposes should be replaced until such time as natural leaf litter layer has developed. Note that mulch should not be applied in Zone 3 as it could create an additional fire hazard.

9. Monitoring and Reporting

9.1. Introduction

This chapter outlines the requirements for monitoring biodiversity across the management area and for checking the progress of various management measures intended to improve biodiversity. The success of management actions outlined in preceding chapters will be measured against performance criteria. Monitoring will furnish the data needed to check works done. If restoration planting, weed control or management measures are found wanting by monitoring, steps are to be taken to rectify the situation and will be used at the five yearly reviews of the RMP, which may be updated if required.

9.2. Construction Phase

9.2.1. Adaptive Management

The implementation of this RMP is intended to be adaptive and will be informed by monitoring and reporting as discussed in ***Section 9.3***. If management measures are identified during monitoring as being ineffective and/or resulting in environmental harm, recommendations will be made after monitoring events and the RMP will be amended if required and appropriate contingency measures will to be implemented. Management measures regarding koalas must adhere to section 5.10.3.7 Management of Construction Impacts on Koalas of the Tweed Coast CKPoM. Contingency measures for several potential impacts of the project are provided under subheadings below.

9.2.1.1. Excessive Run-off into the Adjoining Wetland Community

In the event of excessive run-off into adjoining wetlands, the following will be undertaken:

- Initiate a stop works order;
- Localise source of run-off e.g., entry or exit of the development area;
- Undertake emergency mitigation measures to reduce the flow of run-off e.g., straw bales, rock mulching, erosion control blanket, sediment fencing and/or earth moving to create retention basin; and
- Notify Council and undertake inspection of mitigation measures prior to re-commencement of construction.

9.2.1.2. Failure of Sediment and Erosion Control

If a failure to sediment and erosion control structures is identified, the following will be undertaken:

- Initiate a stop works order;
- Undertake emergency mitigation measures to reduce the impact on the adjoining wetlands e.g., straw bales, rock mulching, erosion control blanket, sediment fencing and/or earth moving to create retention basin;
- Repair, replace or rebuild sediment and erosion control; and
- Notify Council and undertake inspection of mitigation measures prior to construction re-commencement.

9.2.1.3. Presence of Koalas

If a Koala is found within 25 m of any proposed native vegetation clearing and/or earthworks, all works within that range must be temporarily suspended and must not resume until the koala has moved from the area of its own volition.

Any clearing of land must not commence until the area has been inspected for the presence of koalas and approval given by a suitably qualified person. This approval is only valid for the day on which the inspection takes place, and the suitably qualified person mentioned above must remain on site during any approved vegetation clearing.

9.3. Vegetation Monitoring Program

Vegetation monitoring is to be conducted at the completion of construction works, and five years after this date.

9.3.1. Plot Monitoring

A total of six BAM plots were surveyed to inform the vegetation mapping, with only one of these located entirely within the restoration area, and able to become a permanent vegetation monitoring plot. The start and end of the 50 m centre line of the permanent monitoring plot will be marked with steel pickets. Monitoring of the plot will be undertaken after the completion of subdivision works, and again every five years.

Photographs facing north, east, south and west will be taken at the start and end of each transect.

The plot is to be surveyed following the BAM and the Vegetation Integrity (VI) score will be calculated using the BAM-C to enable comparison with previous monitoring using the benchmark for PCT 3989. The cover of HTEs is also to be recorded. The location of the plot is summarised in **Table 14** below and shown in **Figure 13**. It is noted that this plot extends beyond the restoration area, into areas of Crown land that are not managed under this RMP, and as such parts of this plot are not subject to management and may continue to show increases in weed cover in the absence of management.

Table 14 GPS Co-ordinates of monitoring plots (GDA 94, UTS UTM Zone 56)

Plot No.	PCT	Condition Class	Easting	Northing	Bearing (°)
6	3989	Intact	555974	6861882	240

9.3.2. Photo Point Monitoring

The restoration areas are too small and narrow to be monitored by 50 x 20 m plots. As such, three photo points will be located in Management Zone 2, located in the north, centre and south of this zone. The location of proposed photo monitoring points is shown in **Figure 13**. Each photo point should be permanently marked with a steel picket or similar permanent marking. Photograph monitoring will be taken pointing north, east, south and west and facing the ground at each photo point. In addition to taking photographs, the following should be recorded:

- Height, cover and dominant species in each stratum;
- Percentage ground cover including litter, bare ground and native and exotic vegetation;
- Weed cover, and a list of all weed species visible: and
- Date and time of photo monitoring.

9.4. Monitoring Inspections

Monitoring inspections of weed control and restoration works, and photo monitoring are to be completed annually. The monitoring inspections must determine:

- The weeds to be targeted during maintenance weeding;
- The success of plantings;
- Any requirements for additional native plantings;
- Ground stability including evidence of wind erosion and bare sand, including requirements to place mulch, jute matting or coir rolls;
- Inspection of nest boxes to determine if maintenance or replacement is required; and
- Extent of rubbish requiring removal.

9.5. Performance Criteria

Performance criteria for PCT 3989 based on current VI scores calculated in the BAM-C and current HTE cover are provided in **Table 15** below. A target VI score and HTE cover after 5 years is provided. Only a small increase in the VI score is expected, as the score is already high due to having large old trees, and trees across all size categories (high Function score) and an intact tree canopy (high Structure score). Small increases in the VI score are predicted due to increases in understorey shrub and forb cover and species richness following weed treatment. Further to this, the plot extends beyond the restoration area into areas of Crown land, and as such reductions in weed cover are not expected for this portion of the plot.

Table 15 Performance criteria for PCT 3989 (Management Zone 1)

PCT No.	PCT/Condition Name	Plot No.	Current VI Score	Current HTE Cover (%)	Completion VI Score	Completion HTE cover (%)
3989	Northern Paperbark Fern Swamp Forest	6	81.3 (Composition 65.8, Structure 89.4, Function 91.3)	18.6	≥85.0	<5

9.5.1. Corrective Actions

In the event that monitoring suggests that performance criteria will not be met additional corrective actions may be required, which may include:

- Interplanting of additional native species;
- Placement of coarse woody debris;
- Additional erosion and sediment control measures; and
- Additional weed control works.

Additional corrective actions will include the replacement or repair of nest boxes is these are observed to be damaged.

9.6. Reporting

9.6.1. Annual Works Report

Based on the results of the monitoring inspections a brief and concise annual works report will be prepared and submitted to Council. This report will document the progress of works and provide recommendations for the next year's works. The report will include the following:

- Describe the works undertaken;
- State the findings of the monitoring activities;
- Discuss any problems encountered in implementing the RMP;
- Recommend any adaptations or additions to the RMP;
- Inclusion of photographs from photograph monitoring, together with a comparison of previous photo monitoring.

The report should contain photographs, as well as a short description of weeds present. Any other notable occurrences of weeds should also be reported. The report should also recommend and prioritise areas where weed control should be targeted.

9.6.2. Detailed Monitoring Report

Detailed monitoring reports outlining the progress of revegetation based on plot monitoring will be prepared after five years. The report will include VI Scores and HTE cover with comparison to previous monitoring including baseline values presented in this RMP.

10. Timing and Responsibilities

10.1. Responsibilities

A Bush Regeneration Contractor (BRC) should be employed to implement this RMP. This BRC should have a minimum qualification a Certificate IV in Conservation and Environment Management (or equivalent) and up to 5-years' industry experience in ecological restoration.

10.2. Timing

The study area is to be managed in a series of phases as follows:

- Phase 1 – Site preparation;
- Phase 2- Construction and clearing;
- Phase 3 – Vegetation management works including restoration plantings;
- Phase 4 – Maintenance; and
- Phase 5 – Monitoring and reporting.

Timing and responsibilities at each phase of management within the study area are shown below in **Table 16**.

Table 16 Timing and responsibilities

Action	Responsibility	Performance Criteria	Timing
Phase 1 Site Preparation			
Delineation of clearing boundary	Contractor	Marking using GPS and high visibility flagging tape and boundary markers.	Before construction works commence
Establish monitoring points	BRC or Ecologist	Using star pickets and GPS establish a series of monitoring sites that can be used for photograph comparison and measuring weed abundance	Prior to commencement of vegetation management works
Rubbish removal	Property Owner or Subcontractor	Removal of any existing rubbish items or debris	Before construction works commence
Nest box installation	Ecologist to supervise	Minimum three nest boxes installed	Before construction works commence
Phase 2 Construction and clearing			
Vegetation Protection	Contactor	Establish temporary fencing around vegetation to be protected	Prior to clearing
Pre-clearance surveys	Ecologist	Survey for fauna to be conducted prior to clearing. All habitat items marked clearly with a large H and flagging tape.	Prior to clearing

Action	Responsibility	Performance Criteria	Timing
Clearance supervision	Ecologist	Supervision of clearing and rescue of any fauna species present in the clearing area	During clearing
Salvage and placement of habitat features	Arborist/ Ecologist	Logs placed in Management Zone 2 to create ground habitat	During clearing
Phase 3 – Vegetation Management and Restoration			
Primary weeding	BRC	Main weed infestations and priority weeds and WoNS removed - Reproductively mature plants absent from site.	First two months of vegetation management works
Revegetation	BRC	Native plants have been planted (species from **Appendix D**) in all vegetation strata as required.	Following primary weeding
Secondary weeding	BRC	Weed regrowth following primary weeding removed. Work has commenced on control of annual weed species.	Following primary weeding, site visits monthly for year 1 and then every two months
Phase 4 – Maintenance			
Maintenance weeding throughout vegetation zones.	BRC	Existing weed growth minimised or controlled.	Annually
		Regrowth following secondary weeding controlled.	
		No new weed species or infestations.	
Maintenance of plantings	BRC	Any dead plantings replaced.	Annually for years 1-5
		Plants watered when drought stressed.	
		Weeding around base of trees	
		Removal of tree guards	
		Additional plantings where required due to observed gaps in any strata.	
APZ Maintenance	Property Owner or Subcontractor	Fuel reduced in Zone 3 as per IPA requirements	Ongoing
Rubbish removal	Property Owner or Subcontractor	Sweep of area, removing all rubbish items	Annually and after flood events
Phase 5 - Monitoring and reporting			
Construction Monitoring Reporting	Contractor and Ecologist	Monitoring of environmental conditions during construction	Once on completion of construction phase

Action	Responsibility	Performance Criteria	Timing
Annual report preparation	BRC or Ecologist	Annual Report prepared on progress of works.	Annually
Monitoring	Ecologist	Photo monitoring	Annually
Plot based monitoring	Ecologist	Performance criteria in ***Section 9.5*** met	After 5 years
Detailed Monitoring Report	Ecologist	Details of progress against performance criteria	Within three months of monitoring

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APPENDIX A :
Flora Species List

Table 17 Flora species list

Scientific Name	Common Name	Family	Exotic
Acacia concurrens	Curracabah	Fabaceae (Mimosoideae)	
Acacia longifolia subsp. *sophorae*	Coastal Wattle	Fabaceae (Mimosoideae)	
Acacia maidenii	Maiden's Wattle	Fabaceae (Mimosoideae)	
Acmena hemilampra	Broad-leaved Lilly Pilly	Myrtaceae	
Acronychia imperforata	Logan Apple	Rutaceae	
Aechmea spp.	Bromeliad	Bromeliaceae	*
Aegiceras corniculatum	River Mangrove	Primulaceae	
Agapanthus praecox subsp. *orientalis*	African Lily	Amaryllidaceae	
Agave americana	Century Plant	Agavaceae	*
Ageratum houstonianum		Asteraceae	*
Alectryon coriaceous	Beach Alectryon	Sapindaceae	
Allamanda cathartica	Yellow Allamanda	Apocynaceae	*
Alphitonia excelsa	Red Ash	Rhamnaceae	
Alyxia ruscifolia	Prickly Alyxia	Apocynaceae	
Ambrosia artemisiifolia	Annual Ragweed	Asteraceae	*
Archontophoenix alexandrae	Alexandra Palm	Arecaceae	*
Archontophoenix cunninghamiana	Bangalow Palm	Arecaceae	
Ardisia crenata	Coralberry	Primulaceae	*
Asparagus aethiopicus	Asparagus Fern	Asparagaceae	*
Atractocarpus fitzalanii	Native Gardenia	Rubiaceae	*
Austromyrtus dulcis	Midgen Berry	Myrtaceae	
Avicennia marina	Grey Mangrove	Acanthaceae	
Baccharis halimifolia	Groundsel Bush	Asteraceae	*
Backhousia myrtifolia	Grey Myrtle	Myrtaceae	
Banksia integrifolia	Coast Banksia	Proteaceae	
Baumea juncea	Bare Twig-rush	Cyperaceae	
Baumea teretifolia		Cyperaceae	
Bidens pilosa	Cobbler's Pegs	Asteraceae	*
Bismarkia nobilis	Bismark Palm	Arecaceae	*
Blechnum indicum	Swamp Water Fern	Blechnaceae	
Bryophyllum delagoense	Mother of millions	Crassulaceae	*
Callistemon viminalis	Weeping Bottlebrush	Myrtaceae	
Callistemon viminalis 'Little John'	Callistemon 'Little John'	Myrtaceae	
Canavalia rosea	Coastal Jack Bean	Fabaceae (Faboideae)	

Scientific Name	Common Name	Family	Exotic
Casuarina glauca	Swamp Oak	Casuarinaceae	
Centella asiatica	Indian Pennywort	Apiaceae	
Chloris gayana	Rhodes Grass	Poaceae	*
Chrysanthemoides monilifera subsp. *rotundata*	Bitou Bush	Asteraceae	*
Cinnamomum camphora	Camphor Laurel	Lauraceae	*
Clerodendrum floribundum		Lamiaceae	
Commelina cyanea	Native Wandering Jew	Commelinaceae	
Commersonia bartramia	Brown Kurrajong	Malvaceae	
Conyza bonariensis	Flaxleaf Fleabane	Asteraceae	*
Conyza canadensis	Canadian Fleabane	Asteraceae	*
Conyza sumatrensis	Tall fleabane	Asteraceae	*
Crinum pedunculatum	Swamp Lily	Amaryllidaceae	
Crotalaria lanceolata subsp. *lanceolata*		Fabaceae (Faboideae)	*
Cryptocarya obovata	Pepperberry	Lauraceae	
Cryptocarya triplinervis	Three-veined Cryptocarya	Lauraceae	
Cupaniopsis anacardioides	Tuckeroo	Sapindaceae	
Cuphea carthagenensis		Lythraceae	*
Cyathea cooperi	Straw Treefern	Cyatheaceae	
Cynanchum carnosum		Apocynaceae	
Cynodon dactylon	Common Couch	Poaceae	
Cyperus gracilis	Slender Flat-sedge	Cyperaceae	
Cyperus polystachyos		Cyperaceae	
Cyperus rotundus	Nutgrass	Cyperaceae	*
Delonix regia	Royal Poinciana	Fabaceae (Caesalpinioideae)	*
Desmodium incanum	Silver-leaf Desmodium	Fabaceae (Faboideae)	*
Desmodium uncinatum	Silver-leaved Desmodium	Fabaceae (Faboideae)	*
Dianella caerulea	Blue Flax-lily	Asphodelaceae	
Dianella caerulea var. *producta*		Asphodelaceae	
Dietes bicolor		Iridaceae	*
Digitaria didactyla	Queensland Blue Couch	Poaceae	
Digitaria eriantha	Finger Panic Grass	Poaceae	*
Digitaria violascens		Poaceae	*

Scientific Name	Common Name	Family	Exotic
Dodonaea triquetra	Large-leaf Hop-bush	Sapindaceae	
Doryanthes excelsa	Gymea Lily	Doryanthaceae	
Dracaena marginata		Asparagaceae	*
Duboisia myoporoides	Corkwood	Solanaceae	
Dypsis decaryi	Triangle Palm	Arecaceae	*
Dypsis lutescens	Yellow Butterfly Palm	Arecaceae	*
Elaeocarpus obovatus	Hard Quandong	Elaeocarpaceae	
Elaeocarpus reticulatus	Blueberry Ash	Elaeocarpaceae	
Emilia sonchifolia		Asteraceae	*
Endiandra discolor	Rose Walnut	Lauraceae	
Endiandra globosa	Black Walnut	Lauraceae	
Epiphyllum pumilum	Orchid Cactus	Cactaceae	*
Eragrostis interrupta		Poaceae	
Eragrostis leptocarpa	Drooping Lovegrass	Poaceae	
Eragrostis tenuifolia	Elastic Grass	Poaceae	*
Erythrina indica	Indian Coral Tree	Fabaceae (Faboideae)	*
Euroschinus falcatus	Ribbonwood	Anacardiaceae	
Eustrephus latifolius	Wombat Berry	Luzuriagaceae	
Ficus benjamina	Weeping Fig	Moraceae	*
Ficus coronata	Creek Sandpaper Fig	Moraceae	
Ficus macrophylla	Morton Bay Fig	Moraceae	
Flagellaria indica	Whip Vine	Flagellariaceae	
Flindersia schottiana	Cudgerie	Rutaceae	
Gahnia clarkei	Tall Saw-sedge	Cyperaceae	
Gamochaeta americana	Purple Cudweed	Asteraceae	*
Geitonoplesium cymosum	Scrambling Lily	Luzuriagaceae	
Gleichenia dicarpa	Pouched Coral Fern	Gleicheniaceae	
Glochidion ferdinandi	Cheese Tree	Phyllanthaceae	
Glochidion sumatranum	Umbrella Cheese Tree	Phyllanthaceae	
Gloriosa superba	Glory Lily	Colchicaceae	*
Glycine tomentella	Woolly Glycine	Fabaceae (Faboideae)	
Gomphocarpus physocarpus	Balloon Cotton Bush	Apocynaceae	*
Gomphrena celosioides	Gomphrena Weed	Amaranthaceae	*
Guioa semiglauca	Guioa	Sapindaceae	
Heliconia psittacorum	Parrot Flower	Heliconiaceae	*

Scientific Name	Common Name	Family	Exotic
Heliconia rostrata	Lobster Claws	Heliconiaceae	*
Hibbertia scandens	Climbing Guinea Flower	Dilleniaceae	
Hibiscus rosa-sinensis	Chinese Hibiscus	Malvaceae	*
Hibiscus tiliaceus	Cottonwood Hibiscus	Malvaceae	
Hylocereus undatus	Night-blooming Cactus	Cactaceae	*
Hypochaeris radicata	Catsear	Asteraceae	*
Imperata cylindrica	Blady Grass	Poaceae	
Inga edulis	Ice Cream Bean	Fabaceae (Mimosoideae)	*
Ipomoea cairica		Convolvulaceae	*
Iris germanica	Tall Bearded Iris	Iridaceae	*
Ischaemum triticeum		Poaceae	
Jagera pseudorhus	Foambark Tree	Sapindaceae	
Juncus aridicola	Tussock Rush	Juncaceae	
Kennedia rubicunda	Dusky Coral Pea	Fabaceae (Faboideae)	
Kummerowia striata	Japanese Clover	Fabaceae (Faboideae)	*
Lantana camara	Lantana	Verbenaceae	*
Livistona australis	Cabbage Palm	Arecaceae	
Livistona chinensis	Chinese fan palm	Arecaceae	*
Lomandra longifolia	Spiny-headed Mat-rush	Lomandraceae	
Lotononis bainesii		Fabaceae (Faboideae)	*
Lygodium microphyllum	Climbing Snake Fern	Schizaeaceae	
Macaranga tanarius	Blush Macaranga	Euphorbiaceae	
Maclura cochinchinensis	Cockspur Thorn	Moraceae	
Macroptilium atropurpureum	Siratro	Fabaceae (Faboideae)	*
Magnolia figo	Port Wine Magnolia	Magnoliaceae	*
Magnolia grandiflora	Southern Magnolia	Magnoliaceae	*
Megathyrsus maximum var. *pubiglumis*	Green Panic	Poaceae	*
Melaleuca quinquenervia	Broad-leaved Paperbark	Myrtaceae	
Melastoma affine	Blue Tongue	Melastomataceae	
Melicope elleryana	Pink-flowered Doughwood	Rutaceae	
Melinis minutiflora	Molasses Grass	Poaceae	*
Melinis repens	Red Natal Grass	Poaceae	*
Merremia dissecta	Noon Flower	Convolvulaceae	*

Scientific Name	Common Name	Family	Exotic
Metrosideros excelsa	New Zealand Christmas Bush	Myrtaceae	*
Microsorum pustulatum subsp. *pustulatum*		Polypoiaceae	
Mischocarpus pyriformis	Yellow Pear-fruit	Sapindaceae	
Monstera deliciosa	Fruit Salad Plant	Araceae	*
Murraya paniculata		Rutaceae	*
Myoporum acuminatum	Boobialla	Scrophulariaceae	
Nephrolepis cordifolia	Fishbone Fern	Davalliaceae	
Nephrolepsis exaltata	Sword Fern	Nephrolepidaceae	*
Oplismenus imbecillis	Basket Grass	Poaceae	
Ottochloa gracillima		Poaceae	
Oxalis articulata		Oxalidaceae	*
Oxalis corniculata	Creeping Oxalis	Oxalidaceae	*
Oxalis debilis var. *corymbosa*		Oxalidaceae	*
Oxalis perennans		Oxalidaceae	
Pandanus tectorius	Screw Pine	Pandanaceae	
Parsonsia straminea	Common Silkpod	Apocynaceae	
Paspalum conjugatum	Johnston River Grass	Poaceae	*
Paspalum mandiocanum	Broadleaf Paspalum	Poaceae	*
Paspalum notatum	Bahia Grass	Poaceae	*
Paspalum urvillei	Vasey Grass	Poaceae	*
Passiflora edulis	Common Passionfruit	Passifloraceae	*
Passiflora suberosa	Cork Passionfruit	Passifloraceae	*
Pennisetum clandestinum	Kikuyu Grass	Poaceae	*
Persoonia stradbrokensis		Proteaceae	
Philodendron bipinnatifidum	Philodendron	Araceae	*
Philodendron erubescens	Philodendron	Araceae	*
Phragmites australis	Common Reed	Poaceae	
Phyllanthus tenellus	Hen and Chicken	Phyllanthaceae	*
Pittosporum revolutum	Rough Fruit Pittosporum	Pittosporaceae	
Platycerium bifurcatum	Elkhorn Fern	Polypodiaceae	
Platycerium superbum	Staghorn Fern	Polypodiaceae	
Plumeria alba	White Frangipani	Apocynaceae	*

Scientific Name	Common Name	Family	Exotic
Psidium cattleianum	Strawberry Guava	Myrtaceae	*
Psidium guajava	Common Guava	Myrtaceae	*
Pteridium esculentum	Bracken	Dennstaedtiaceae	
Rhizophora stylosa	Red Mangrove	Rhizophoraceae	
Richardia brasiliensis	Mexican Clover	Rubiaceae	*
Sannantha angusta		Myrtaceae	
Sansevieria trifasciata	Mother-in-law's Tongue	Asparagaceae	*
Schefflera actinophylla	Umbrella Tree	Araliaceae	*
Senecio madagascariensis	Fireweed	Asteraceae	*
Senna pendula var. *glabrata*		Fabaceae (Caesalpinioideae)	*
Setaria sphacelata	South African Pigeon Grass	Poaceae	*
Siphonodon australe	Ivorywood	Celastraceae	
Smilax australis	Lawyer Vine	Smilacaceae	
Solanum chrysotrichum	Devil`s Fig	Solanaceae	*
Solanum nigrum	Black-berry Nightshade	Solanaceae	*
Sphagneticola trilobata	Singapore Daisy	Asteraceae	*
Sporobolus africanus	Parramatta Grass	Poaceae	*
Sporobolus elongatus	Slender Rat's Tail Grass	Poaceae	
Stenotaphrum secundatum	Buffalo Grass	Poaceae	*
Stephania japonica	Snake vine	Menispermaceae	
Sterculia quadrifida	Red-fruited Kurrajong	Malvaceae	
Strelitzia nicolai	Giant Bird of Paradise	Strelitziaceae	*
Syagrus romanzoffiana	Cocos Palm	Arecaceae	*
Syngonium podophyllum	Arrowhead Vine	Araceae	*
Syzygium australe	Brush Cherry	Myrtaceae	
Syzygium luehmannii	Small-leaved Lilly Pilly	Myrtaceae	
Syzygium oleosum	Blue Lilly Pilly	Myrtaceae	
Themeda triandra	Kangaroo Grass	Poaceae	
Tristaniopsis laurina	Kanooka	Myrtaceae	
Trochocarpa laurina	Tree Heath	Ericaceae	
Viburnum odoratissimum		Adoxaceae	*
Viola hederacea	Ivy-leaved Violet	Violaceae	
Wahlenbergia gracilenta	Annual Bluebell	Campanulaceae	

Scientific Name	Common Name	Family	Exotic
Xanthorrhoea johnsonii	Johnson's Grass Tree	Xanthorrhoeaceae	
Yucca aloifolia	Spanish Bayonet	Agavaceae	*
Zamia furfuracea	Cardboard Palm	Zamiaceae	*

APPENDIX B :
Fauna Species List

Table 18 Fauna species detected in the study area

Common Name	Scientific Name	Family
Birds		
Brown Thornbill	*Acanthiza pusilla*	Pardalotidae
Eastern Spinebill	*Acanthorhynchus tenuirostris*	Meliphagidae
Indian Myna	*Acridotheres tristis*	Sturnidae
Azure Kingfisher	*Alcedo azurea*	Alcedinidae
Australian Brush-turkey	*Alectura lathami*	Megapodiidae
Cattle Egret	*Ardea ibis*	Ardeidae
Intermediate Egret	*Ardea intermedia*	Ardeidae
Bush Stone-curlew	*Burhinus grallarius*	Burhinidae
Striated Heron	*Butorides striatus*	Ardeidae
Galah	*Cacatua roseicapilla*	Cacatuidae
Little Corella	*Cacatua sanguinea*	Cacatuidae
Shining Bronze-cuckoo	*Chrysococcyx lucidus*	Cuculidae
Golden-headed Cisticola	*Cisticola exilis*	Sylviidae
Black-faced Cuckoo-shrike	*Coracina novaehollandiae*	Campephagidae
Torresian Crow	*Corvus orru*	Corvidae
Pied Butcherbird	*Cracticus nigrogularis*	Artamidae
Grey Butcherbird	*Cracticus torquatus*	Artamidae
Black Swan	*Cygnus atratus*	Anatidae
Laughing Kookaburra	*Dacelo novaeguineae*	Halcyonidae
Spangled Drongo	*Dicrurus bracteatus*	Dicruridae
Little Egret	*Egretta garzetta*	Ardeidae
White-faced Heron	*Egretta novaehollandiae*	Ardeidae
Blue-faced Honeyeater	*Entomyzon cyanotis*	Meliphagidae
Dollarbird	*Eurystomus orientalis*	Coraciidae
Bar-shouldered Dove	*Geopelia humeralis*	Columbidae
Mangrove Gerygone	*Gerygone levigaster*	Pardalotidae
Magpie-lark	*Grallina cyanoleuca*	Dicruridae
Australian Magpie	*Gymnorhina tibicen*	Artamidae
White-bellied Sea-eagle	*Haliaeetus leucogaster*	Accipitridae
Brahminy Kite	*Haliastur indus*	Accipitridae
Welcome Swallow	*Hirundo neoxena*	Hirundinidae
Mangrove Honeyeater	*Lichenostomus fasciogularis*	Meliphagidae
Brown Honeyeater	*Lichmera indistincta*	Meliphagidae

Common Name	Scientific Name	Family
Red-backed Fairy-wren	*Malurus melanocephalus*	Maluridae
Noisy Miner	*Manorina melanocephala*	Meliphagidae
Lewin's Honeyeater	*Meliphaga lewinii*	Meliphagidae
Scarlet Honeyeater	*Myzomela sanguinolenta*	Meliphagidae
Nankeen Night Heron	*Nycticorax caledonicus*	Ardeidae
Crested Pigeon	*Ocyphaps lophotes*	Columbidae
Olive-backed Oriole	*Oriolus sagittatus*	Oriolidae
Eastern Osprey	*Pandion haliaetus*	Accipitridae
Striated Pardalote	*Pardalotus striatus*	Pardalotidae
Pied Cormorant	*Phalacrocorax varius*	Phalacrocoracidae
Noisy Friarbird	*Philemon corniculatus*	Meliphagidae
White-cheeked Honeyeater	*Phylidonyris nigra*	Meliphagidae
Royal Spoonbill	*Platalea regia*	Threskiornithidae
Crimson Rosella	*Platycercus elegans*	Psittacidae
Eastern Whipbird	*Psophodes olivaceus*	Cinclosomatidae
Grey Fantail	*Rhipidura albiscapa*	Dicruridae
Willie Wagtail	*Rhipidura leucophrys*	Dicruridae
White-browed Scrubwren	*Sericornis frontalis*	Pardalotidae
Pied Currawong	*Strepera graculina*	Artamidae
Australian White Ibis	*Threskiornis molucca*	Threskiornithidae
Forest Kingfisher	*Todiramphus macleayii*	Halcyonidae
Sacred Kingfisher	*Todiramphus sanctus*	Halcyonidae
Scaly-breasted Lorikeet	*Trichoglossus chlorolepidotus*	Psittacidae
Rainbow Lorikeet	*Trichoglossus haematodus*	Psittacidae
Masked Lapwing	*Vanellus miles*	Charadriidae
Silvereye	*Zosterops lateralis*	Zosteropidae
Amphibians		
Cane Toad	*Rhinella marina*	Bufonidae
Common Eastern Froglet	*Crinia signifera*	Myobatrachidae
Eastern Sign-bearing Froglet	*Crinia paeinsignifera*	Myobatrachidae
Wallum Froglet	*Crinia tinnula*	Myobatrachidae
Invertebrates		
Titan Stick Insect	Acrophylla titan	Phasmatidae
Triangular Spider	*Arkys lancearius*	Arkyidae
Monarch Butterfly	*Danaus plexippus*	Nymphalidae

Common Name	Scientific Name	Family
Common Jezabel	*Delias nigrina*	Pieridae
Brown Huntsman Spider	*Hetropoda jugulans*	Sparassidae
Common Evening Brown	*Melanitis leda*	Nymphalidae
Bush Cockroach	*Methana marginalis*	Blattidae
Fiery Skimmer	*Orthetrum villosovittatum*	Libellulidae
Pale Brown Hawk Moth	*Theretra latreillii*	Sphingidae
Varied Sword-grass Brown	*Tisiphone abeona regalis*	Nymphalidae
Rhinoceros Beetle	*Xylotrupes australis*	Scarabaeidae
Reptiles		
Three-clawed Worm-skink	*Anomalopus verreauxii*	Scincidae
Common Garden Skink	*Lampropholis guichenoti*	Scincidae
Yellow-faced Whipsnake	*Demansia psammophis*	Elapidae
Eastern Brown Snake	*Pseudonaja textilis*	Elapidae
Burton's Legless Lizard	*Lialis burtonis*	Pygopodidae
Blackish Blind Snake	*Anilios nigrescens*	Typhlopidae
Lace Monitor	*Varanus varius*	Varanidae
Mammals		
Grey-headed Flying Fox	*Pteropus poliocephalus*	Pteropodidae
Gould's Wattled Bat	*Chalinolobus gouldii*	Vespertilionidae
Little Bent-wing Bat	*Miniopterus australis*	Miniopteridae
White-striped Freetail Bat	*Austronomus australis*	Molossidae
Ride's Freetail Bat	*Ozimops ridei*	Molossidae
Yellow-bellied Sheath-tailed Bat	*Saccolaimus flaviventris*	Emballonuridae
Sugar Glider	*Petaurus breviceps*	Petauridae
Unresolved Bat Calls		
	Scotorepens orion or *Scoteanax rueppellii*	
	Scotorepens sp. (*sensu* Parnaby 1992) or *Vespadelus darlingtoni*	
Southern Myotis	*Myotis macropus* - possible social calls	Vespertilionidae

APPENDIX C :
Weed Treatment Methods

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Table 19 Weed control measures

Scientific Name	Common Name	Treatment Method
Aechmea spp.	Bromeliad	- Small individuals are easily removed by hand due to shallow root system - Cut larger plants at base with loppers and apply undiluted glyphosate to cut stump
Agave americana	Century Plan	- Hand dig small plants and destroy all vegetative material - Larger plants can be pierced at the centre with a crowbar and undiluted glyphosate applied to the wound via backpack sprayer.
Agapanthus praecox subsp. *orientalis*	African Lily	- Plant is resistant to herbicide - Needs to be dug out with a mattock, or hand mattock, with care taken to remove all rhizomes (rhizomes should be bagged and removed from site)
Ageratum houstonianum	Blue Billy Goat Weed	- Hand Weed (with PPE worn due to allergenic properties of plant) - Spot Spray with Glyphosate 10mL/1L
Allamanda cathartica	Yellow Allamanda	- Hand dig small plants - Cut larger plants close to the ground with a hand saw and apply undiluted glyphosate to cut stump
Ambrosia artemisiifolia	Annual Ragweed	- Hand Weed - Spot Spray with Glyphosate 10mL/1L
Archontophoenix alexandrae	Alexandra Palm	- Hand weed seedlings or spray with 10mL/1L glyphosate - Cut small plants close to the ground with a hand saw and apply undiluted glyphosate to cut stump - Drill or frill large stems at base and inject with undiluted glyphosate
Ardisia crenata	Coral Berry	- Hand weed juveniles - Dig mature plants out of the ground with a mattock;

Scientific Name	Common Name	Treatment Method
Asparagus aethiopicus	Asparagus Fern	- Any branches profuse with fruit should be cut with secateurs and bagged to prevent further spread of species by birds - Juvenile plants can be eased out of soil with a trowel or knife - care should be taken to remove below ground plant material - For large, mature plants the woody crown at the base can be cut around with a sharp knife, or hacked out with a mattock or peter lever and removed - it is easiest to cut all branches off near the base with secateurs prior to removing crown - plant will not resprout from water storing tubers or roots below ground so these can be left to rot to reduce soil disturbance. - Spray mature and juvenile plants with metsulfuron methyl 6g/100mL + surfactant
Baccharis halimifolia	Groundsel Bush	- Hand weed small plants - Spot Spray - Glyphosate 10mL/1L - Removal of flowers and immature fruit, preventing seed dispersal, will help reduce new infestations.
Bidens pilosa	Cobbler's Pegs	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
Bryophyllum delagoense	Mother of Millions	- Hand Weed and bag all plant parts. Destroy material by burial, burning or decomposition. - Spot Spray - Glyphosate 10mL/1L
Chloris gayana	Rhodes Grass	- Hand weed juveniles - Remove carefully with secateurs and bag seed plumes of mature plants - Dig mature plants out of the ground with a mattock; or - Brushcut mature plants to near ground level and spray with glyphosate 10mL/1L - During subsequent site visits spray regrowth foliage with glyphosate 10mL/1L
Chrysanthemoides monilifera subsp. *rotundata*	Bitou Bush	- Small individuals are easily removed by hand due to shallow root system - Cut larger plants at base with loppers and apply undiluted glyphosate to cut stump - Spray seedlings with glyphosate 10mL/1L

Scientific Name	Common Name	Treatment Method
Cinnamomum camphora	Camphor Laurel	- Hand weed seedlings or spray with 10mL/1L glyphosate - Cut saplings close to the ground with a hand saw and apply undiluted glyphosate to cut stump - Drill or frill large stems at base and inject with undiluted glyphosate - Spray regrowth foliage with glyphosate 10mL/1L
Crotalaria lanceolata subsp. *lanceolata*		- Hand Weed - Spot Spray with Glyphosate 10mL/1L
Cuphea carthagenensis		- Hand Weed - Spot Spray with Glyphosate 10mL/1L
Cyperus rotundus	Nutgrass	- Hand Weed - Spot Spray with Glyphosate 10mL/1L
Conyza spp.	Fleabane	- Hand Weed - Spot Spray - Glyphosate 10mL/1L - On-going grubbing (all year)
Desmodium incanum	Silver-leaf Desmodium	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
Desmodium uncinatum	Silver-leaved Desmodium	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
Dietes bicolor		- Hand Weed - Spot Spray - Glyphosate 10mL/1L - Dig mature plants out of the ground with a mattock

Scientific Name	Common Name	Treatment Method
Digitaria eriantha	Finger Panic Grass	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
Digitaria violascens		- Hand Weed - Spot Spray - Glyphosate 10mL/1L
Dracaena marginata	Dragon Plant	- Hand weed juveniles or spray with 10mL/1L glyphosate - Cut larger plants close to the ground with a hand saw and apply undiluted glyphosate to cut
Dypsis lutescens	Yellow Butterfly Palm/Golden Cane Palm	- Hand weed juveniles or spray with 10mL/1L glyphosate - Cut larger plants close to the ground with a hand saw and apply undiluted glyphosate to cut
Epiphyllum pumilum	Orchid Cactus	- Hand Weed - Cut larger plants close to the ground with a hand saw and apply undiluted glyphosate to cut
Eragrostis tenuifolia	Elastic Grass	- Spot Spray with Glyphosate 10mL/1L
Erythrina indica	Indian Coral Tree	- Hand weed juveniles or spray with 10mL/1L glyphosate - Cut larger plants close to the ground with a hand saw and apply undiluted glyphosate to cut - Stem inject large trees Glyphosate 50% v/v.
Gamochaeta americana	Purple Cudweed	- Spot Spray with Glyphosate 10mL/1L
Gloriosa superba	Glory Lily	- Dig out with hand tools - Care needs to be taken to removal all small cormels present under the main corm - May require bagging and removal of soil around the main corm to remove all cormels - Spray regrowth seedlings with glyphosate 10mL/1L
Gomphocarpus physocarpus	Balloon Cotton Bush	- Hand Weed - Spot Spray - Glyphosate 10mL/1L - On-going grubbing (all year)

Scientific Name	Common Name	Treatment Method
Gomphrena celosioides	Gomphrena Weed	- Hand Weed - Spot Spray with Glyphosate 10mL/1L
Heliconia psittacorum	Parrot Flower	- Hand Weed - Spot Spray with Glyphosate 10mL/1L - Cut larger plants close to the ground with a hand saw and apply undiluted glyphosate to cut
Hylocereus undatus	Night-blooming Cactus	- Hand Weed - Cut larger plants close to the ground with a hand saw and apply undiluted glyphosate to cut
Hypochaeris radicata	Cats Ear	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
Inga edulis	Ice Cream Bean	- Hand Weed - Cut larger plants close to the ground with a hand saw and apply undiluted glyphosate to cut
Ipomoea cairica	Coastal Morning Glory	- Roll up long ground-running stems, to within 1 m of their first firmly rooted point of contact with the ground. Cut the rolled stems, and either take them off-site for disposal, or leave them to dry out ensuring they do not remain in contact with the soil. Stem-scrape a long section of the remaining rooted stem (at least 20 cm) and apply the Glyphosate 50% v/v herbicide immediately (within 10 seconds of making the scrape)
Iris germanica	Tall Bearded Iris	- Hand weed juveniles - Remove carefully with secateurs and bag seed plumes of mature plants - Dig mature plants out of the ground with a mattock;
Kummerowia striata	Japanese Clover	- Hand Weed - Spot Spray with Glyphosate 10mL/1L
Lantana camara	Lantana	- Hand weed juveniles and regrowth from small pieces - Spot spray with glyphosate 10mL/1L - Slash using brushcutter, or hand cut with loppers, and spray regrowth foliage with glyphosate

Scientific Name	Common Name	Treatment Method
		10mL/1L - Cut near ground level and paint with undiluted glyphosate - Some individuals will have stumps which will still regrow foliage, spray regrowth foliage with glyphosate 10mL/1L
Lotononis bainesii		- Hand weed - Spot Spray- Glyphosate 10mL/1L
Macroptilium atropurpureum	Siratro	- Hand weed - Scrape stems with knife and paint exposed surface with undiluted glyphosate - Spray foliage with glyphosate 10mL/1L plus non-ionic surfactant
Megathyrsus maximum var. *pubiglumis*	Green Panic	- Hand Weed - Spot Spray - Glyphosate 10mL/1L - Dig mature plants out of the ground with a mattock
Melinis minutiflora	Molasses Grass	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
Melinis repens	Red Natal Grass	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
Merremia dissecta	Noon Flower	- Hand weed - Scrape stems with knife and paint exposed surface with undiluted glyphosate - Spray foliage with glyphosate 10mL/1L plus non-ionic surfactant
Monstera deliciosa	Fruit Salad Plant	- Spot Spray with Glyphosate 10mL/1L - Cut mature plants close to the ground with a hand saw and apply undiluted glyphosate to cut stump surface
Murraya paniculata		- Hand weed juveniles or spray with 10mL/1L glyphosate - Cut mature plants close to the ground with a hand saw and apply undiluted glyphosate to cut

Scientific Name	Common Name	Treatment Method
		stump - Spray any regrowth foliage from cut stumps with glyphosate 10mL/1L
Nephrolepis exaltata	Sword Fern	- Hand Weed - Spot Spray with Glyphosate 10mL/1L - Dig mature plants out of the ground with a mattock
Oxalis articulata		- Hand Weed - Spot Spray with Glyphosate 10mL/1L
Oxalis corniculata	Creeping Oxalis	- Hand Weed - Spot Spray with Glyphosate 10mL/1L
Oxalis debilis var. *corymbosa*		- Hand Weed - Spot Spray with Glyphosate 10mL/1L
Paspalum conjugatum	Johnston River Grass	- Hand Weed - Spot Spray with Glyphosate 10mL/1L
Paspalum mandiocanum	Broadleaf Paspalum	- Hand Weed - Spot Spray with Glyphosate 10mL/1L - Paspalum notatum
Paspalum notatum	Bahia Grass	- Hand Weed - Spot Spray with Glyphosate 10mL/1L
Paspalum urvillei	Vasey Grass	- Hand Weed - Spot Spray with Glyphosate 10mL/1L - Dig mature plants out of the ground with a mattock

Scientific Name	Common Name	Treatment Method
Passiflora edulis	Common Passionfruit	- Hand weed - Scrape stems with knife and paint exposed surface with undiluted glyphosate - Spray foliage with glyphosate 10mL/1L plus non-ionic surfactant
Passiflora suberosa	Cork Passionfruit	- Hand weed - Scrape stems with knife and paint exposed surface with undiluted glyphosate - Spray foliage with glyphosate 10mL/1L plus non-ionic surfactant
Pennisetum clandestinum (Cenchrus clandestinus)	Kikuyu Grass	- Hand Weed - Spot Spray with Glyphosate 10mL/1L
Philodendron bipinnatifidum	Philodendron	- Hand weed juveniles or spray with 10mL/1L glyphosate - Cut mature plants close to the ground with a hand saw and apply undiluted glyphosate to cut stump surface - Spray any regrowth foliage from cut stumps with glyphosate 10mL/1L
Philodendron erubescens	Philodendron	- Hand weed juveniles or spray with 10mL/1L glyphosate - Cut mature plants close to the ground with a hand saw and apply undiluted glyphosate to cut stump surface - Spray any regrowth foliage from cut stumps with glyphosate 10mL/1L
Phyllanthus tenellus	Hen and Chicken	- Spot spray with glyphosate 10ml/L
Psidium cattleianum	Strawberry Guava	- Hand weed juveniles or spray with 10mL/1L glyphosate - Cut mature plants close to the ground with a hand saw and apply undiluted glyphosate to cut stump surface - Spray any regrowth foliage from cut stumps with glyphosate 10mL/1L

Scientific Name	Common Name	Treatment Method
Psidium guajava	Common Guava	- Hand weed juveniles or spray with 10mL/1L glyphosate - Cut mature plants close to the ground with a hand saw and apply undiluted glyphosate to cut stump surface - Spray any regrowth foliage from cut stumps with glyphosate 10mL/1L
Richardia brasiliensis	Mexican Clover	- Spot spray with glyphosate 10ml/L
Schefflera actinophylla	Umbrella Tree	- Hand weed seedlings or spray with glyphosate 10mL/1L - Undiluted for cut stump treatments. - Large trees need to be felled by an arborist
Senecio madagascariensis	Fireweed	- Hand Weed - Spot Spray - Glyphosate 10mL/1L
Senna pendula var. *glabrata*	Easter Cassia	- Hand Weed - Spot Spray - Glyphosate 10mL/1L plus non-ionic surfactant - Cut stump larger plants with undiluted glyphosate
Setaria sphacelata	South African Pigeon Grass	- Hand Weed - Manually remove large individuals with mattock etc. - Spot Spray - Glyphosate 10mL/1L
Solanum chrysotrichum	Devil`s Fig	- Hand weed juveniles or spray with 10mL/1L glyphosate - Cut larger plants close to the ground with a hand saw and apply undiluted glyphosate to cut
Solanum nigrum	Black-berry Nightshade	- Hand Weed - Spot Spray with glyphosate 10ml/L
Sphagneticola trilobata	Singapore Daisy	- Hand-pull and dig up runners - - Spot Spray - Glyphosate 10mL/1L
Sporobolus africanus	Parramatta Grass	- Hand weed juveniles - Remove carefully with secateurs and bag seed plumes of mature plants

Scientific Name	Common Name	Treatment Method
		- Dig mature plants out of the ground with a mattock; or - Brushcut mature plants to near ground level and spray with glyphosate 10mL/1L - During subsequent site visits spray regrowth foliage with glyphosate 10mL/1L
Stenotaphrum secundatum	Buffalo Grass	- Hand Weed - Spot Spray with Glyphosate 10mL/1L
Strelitzia nicolai	Bird of Paradise	- Saw plant off at base and apply undiluted glyphosate to the cut stump. This species can grow over 10m tall, and contains a large amount of water, making the stem heavy. For this reason an arborist may be required for safety reasons to initially cut down mature individuals. Glyphosate should be applied to the stump immediately after cutting - To improve efficacy of herbicide application, dig around the base to expose roots which can be pierced with a knife or trowel and glyphosate applied - The plant may reshoot from the centre. The new shoot should be sawn off and glyphosate applied to freshly cut surface monthly until the plant is dead
Syagrus romanzoffiana	Cocos Palm	- Hand Weed - Spot Spray with glyphosate 10ml/L - Glyphosate 50% v/v for spot treatment into drill holes. Undiluted for cut stump treatments.
Syngonium podophyllum	Arrowhead Vine	- Hand Weed - Spot Spray with glyphosate 10ml/L

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APPENDIX D :
Planting List

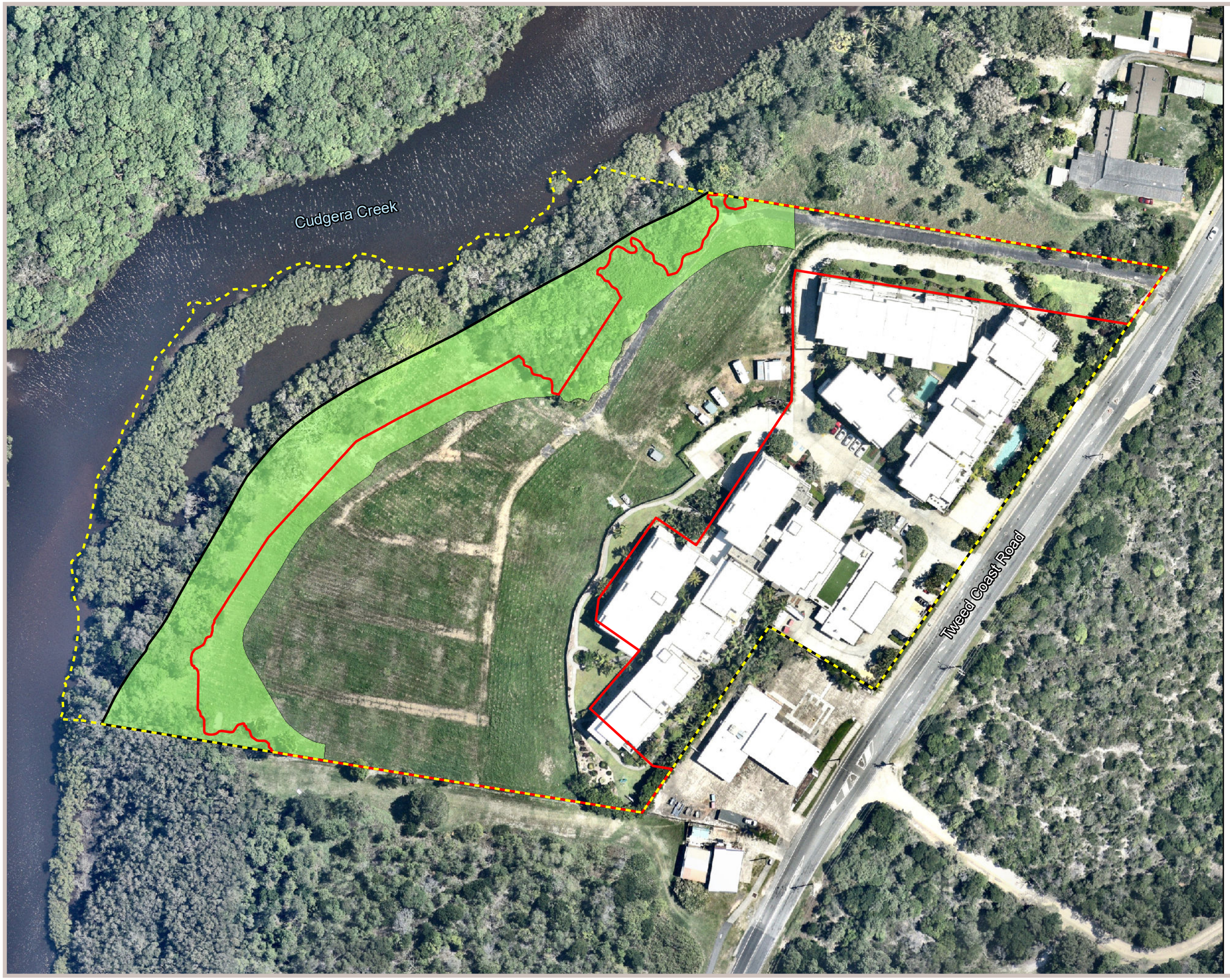
Table 20 Proposed planting list

Species Name	Common Name	Zone 2	Zone 3b and 3c
Canopy Trees			
Banksia integrifolia	Coast Banksia	x	
Casuarina glauca	Swamp Oak	x	
Cryptocarya triplinervis	Three-veined Laurel		x
Cryptocarya obovata	Pepperberry		x
Cupaniopsis anacardioides	Tuckeroo	x	x
Elaeocarpus obovatus	Hard Quandong	x	x
Elaeocarpus reticulatus	Blueberry Ash	x	x
Endiandra discolor	Rose Walnut		x
Endiandra globosa	Black Walnut		x
Elaeocarpus obovatus	Hard Quandong	x	x
Eucalyptus robusta	Swamp Mahogany	x	
Eucalyptus tereticornis	Forest Red Gum	x	
Euroschinus falcatus	Ribbonwood		x
Ficus macrophylla subsp. *macrophylla*	Moreton Bay Fig	x	
Ficus obliqua	Small-leaved Fig	x	
Guioa semiglauca	Guioa	x	x
Lophostemon suaveolens	Swamp Mahogany	x	
Melaleuca quinquenervia	Broad-leaved Paperbark	x	
Sterculia quadrifida	Peanut Tree		x
Syzygium luehmannii	Small-leaved Lilly Pilly		x
Tristaniopsis laurina	Water Gum		x
Mid-layer Small Trees and Shrubs			
Acacia maidenii	Maiden's Wattle	x	
Acacia melanoxylon	Blackwood	x	
Acmena smithii	Lilly Pilly	x	x
Acronychia imperforata	Logan Apple	x	x
Alectryon coriaceus	Beach Alectryon		x
Alphitonia excelsa	Red Ash	x	x
Archontophoenix cunninghamiana	Bangalow Palm	x	x
Backhousia myrtifolia	Grey Myrtle		x
Callicoma serratifolia	Black Wattle	x	x

Species Name	Common Name	Zone 2	Zone 3b and 3c
Callistemon salignus	Willow Bottlebrush	x	
Commersonia bartramia	Brown Kurrajong	x	x
Duboisia myoporoides	Corkwood	x	x
Ficus coronata	Creek Sandpaper Fig	x	x
Glochidion ferdinandi	Cheese Tree	x	x
Glochidion sumatranum	Umbrella Cheese Tree	x	x
Hibiscus tiliaceus	Cottonwood Hibiscus	x	x
Jagera pseudorhus var. *pseudorhus*	Foambark Tree	x	x
Livistona australis	Cabbage Palm	x	x
Macaranga tanarius	Blush Macaranga		x
Mallotus philippensis	Red Kamala	x	x
Melicope elleryana	Pink-flowered Doughwood	x	x
Myrsine howittiana	Brush Muttonwood	x	x
Myrsine variabilis	Muttonwood	x	x
Pittosporum undulatum	Sweet Pittosporum	x	x
Siphonodon australe	Ivorywood		x
Syzygium australe	Lilly Pilly		x
Syzygium oleosum	Blue Lilly Pilly	x	x
Small shrubs			
Austromyrtus dulcis	Midgen Berry	x	
Cordyline stricta	Narrow-leaved Palm Lily	x	
Hibiscus diversifolius	Swamp Hibiscus	x	
Melastoma affine	Blue Tongue	x	
Groundcovers and vines			
Baumea articulata	Jointed Twig-rush	x	
Blechnum indicum		x	
Carex appressa	Tall Sedge	x	
Commelina cyanea	Native Wandering Jew	x	
Crinum pedunculatum	Swamp Lily	x	
Dianella caerulea	Blue Flax-lily	x	
Eustrephus latifolius	Wombat Berry	x	
Gahnia clarkei	Tall Saw-sedge	x	
Gahnia sieberiana	Red-fruit Saw-sedge	x	

Species Name	Common Name	Zone 2	Zone 3b and 3c
Hibbertia scandens	Climbing Guinea Flower	x	
Ischaemum australe	Large Bluegrass	x	
Lepironia articulata	Grey Sedge	x	
Lomandra longifolia	Spiny-headed Mat-rush	x	
Parsonsia straminea	Common Silkpod	x	
Smilax australis	Lawyer Vine	x	
Stephania japonica var. *discolor*	Snake Vine	x	

FIGURES



Legend

- Subject Land
- Subject Site
- Study Area
- Restoration Area

Image Source:
Image © NearMap 2024
Dated: 22/01/2024

Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship'

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 40 m

I:\...\21273\Figures\RP6\20250212\Figure 1. Location

Figure 1. Location of the Study Area, Subject Site, Subject Land and Restoration Area

Figure 2. Project Layout including Landscaping

Image Source: Arquis Design (2025)

Arqus DESIGN

Integrated perspective

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Fax 07 3358 0899

Arqus Design acknowledges the Traditional Owners of Country on which we live, work and design and pay our respects to their Elders, past and present.

NOTES

Contractors are to verify all dimensions on site before commencing any work or producing shop drawings.

Detail applicable to the scale of the drawing published.

DATE	REVISION	ISSUE
23.12.01	DRAFT DA PACKAGE	A
23.12.15	DRAFT DA PACKAGE	B
24.01.23	DRAFT DA PACKAGE	C
24.03.08	FOR INFORMATION	D
24.04.15	FOR INFORMATION	E
24.08.12	FOR INFORMATION	F
24.08.16	DRAFT DA PACKAGE	G
24.10.03	UPDATED DRAFT DA PACKAGE	H
24.10.09	DA PACKAGE	I

ECOLOGICAL ZONES LEGEND

- CURRENT RIPARIAN VEGETATION TREE LINE
- CORE REHABILITATION ZONE
- RESIDUAL OUTER REHABILITATION ZONE
- APZ LINE

CLIENT

TriCare
Retirement Living. Home Care. Aged Care.

PROJECT

TRICARE HASTINGS POINT

87 TWEED COAST RD, HASTINGS POINT 2489, NSW

COUNTRY: BUNDJALUNG

DRAWING

SITE PLAN - GROUND FLOOR (AGED CARE FACILITY)

JOB NUMBER	DESIGN	DRAWN	CHECKED
23-0025	SP	KF,SS	SP

SCALE	DATE CREATED	NORTH
1 : 500 @A1 1 : 1000 @A3	29/08/23	

DRAWING NUMBER: DA-2-02

ISSUE: I

ISSUED FOR: DEVELOPMENT APPLICATION

I:\...\21273\Figures\RP6\20250212\Figure 3. Ground Floor Plan

Figure 3. Ground Floor Plan

Image Source: Arquis Design (2025)

Legend

- Subject Land
- Subject Site
- Study Area
- Current Riparian Vegetation Tree Line
- Original Development Layout
- Core Rehabilitation Zone
- Residual Outer Rehabilitation Zone

Image Source:
Image © NearMap 2024
Dated: 22/01/2024

Data Source:
NSW Government Spatial Services
SIX Maps 'Clip and Ship'

Coordinate System: MGA Zone 56 (GDA 94)

cumberland ecology

0 40 m

I:\...\21273\Figures\RP6\20250212\Figure 4. Approved Ecological Requirements

Figure 4. Approved Ecological Requirements

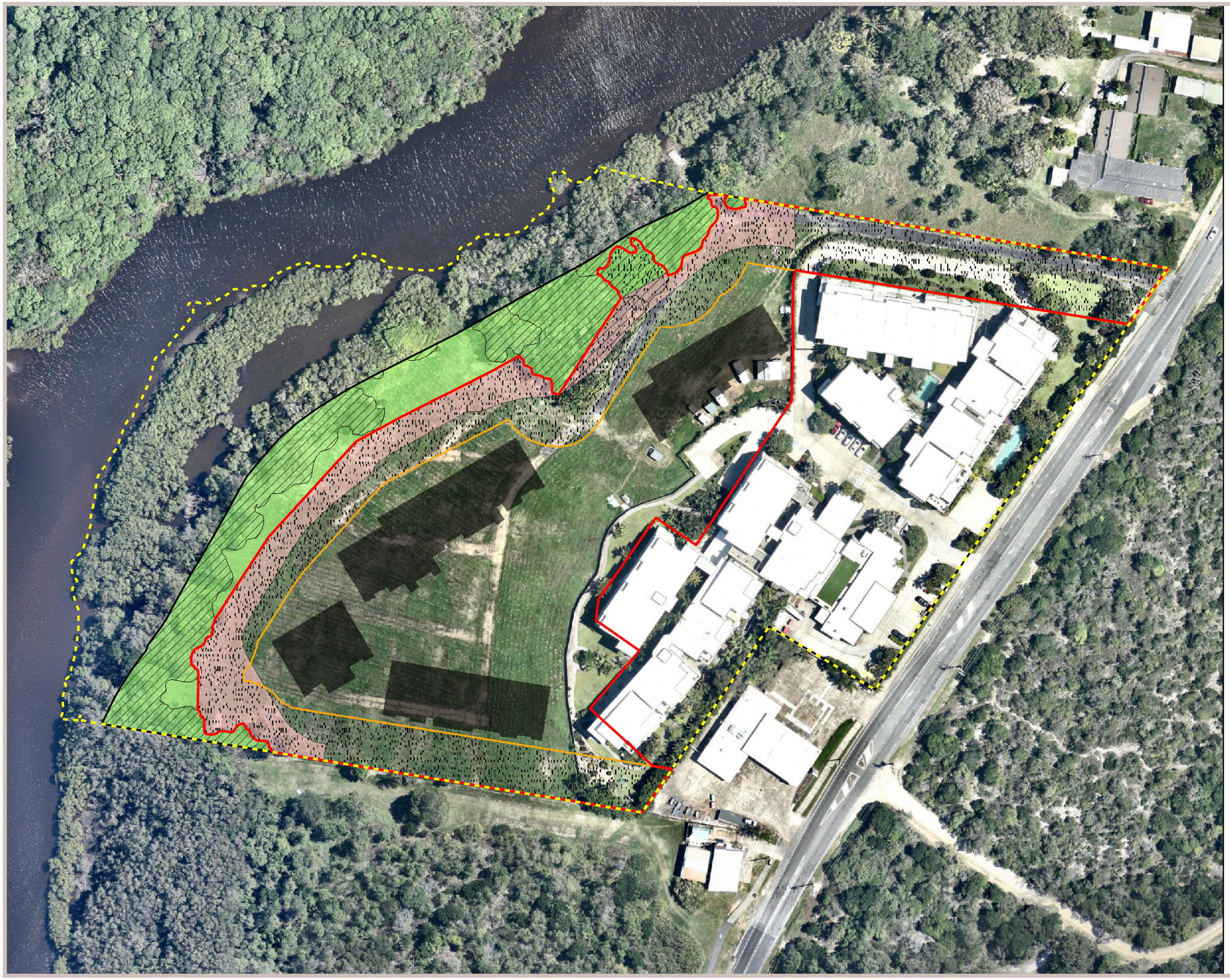
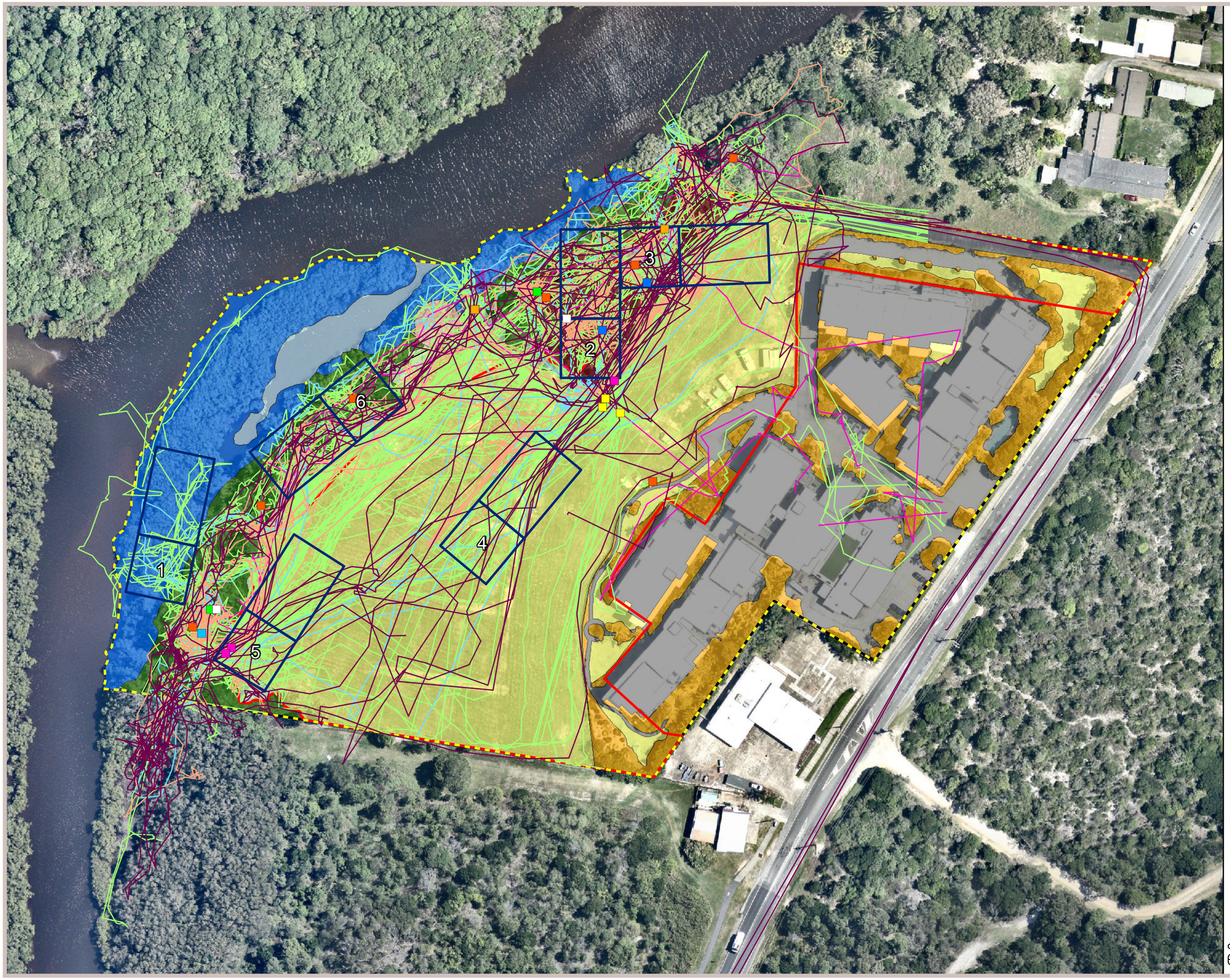


Figure 5. Proposed Ecological Outcome



Legend

- Subject Land
- Subject Site
- Study Area

Survey Effort

- BAM Plot Location
- October 2022 Survey Tracks
- February - March 2023 Survey Tracks
- July 2023 Survey Tracks
- November 2023 Survey Tracks
- Aural Visual Survey Tracks
- Spotlighting end
- Spotlighting start
- ANABAT
- Active search
- Diurnal bird survey
- Harp Trap
- IR Camera
- SAT Plot Location

Vegetation Community

- 3132: Northern Sands Tuckeroo-Banksia Forest
- 3132: Northern Sands Tuckeroo-Banksia Forest (Figs)
- 3989: Far North Paperbark Fern Swamp Forest
- 3989: Far North Paperbark Fern Swamp Forest (Grassland)
- 4091: Grey Mangrove-River Mangrove Forest
- Mixed Native/Exotic Landscape Plantings
- Exotic Dominated Grassland
- Cleared Land
- Water

Image Source:
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Coordinate System:
MGA Zone 56 (GDA 94)

0 50 m

I:\...\21273\Figures\RP6\20250212\Figure 6. Survey effort

Figure 6. Survey effort

Figure 7. Ground-truthed Vegetation Mapping

Figure 8. Location of BC Act listed Threatened Ecological Communities

Figure 9. Threatened Fauna Records

Figure 10. Ground-truthed Koala Habitat

Figure 11. Areas to meet Koala Habitat Offset Requirements

Figure 12. Management Zones

Figure 13. Areas Proposed for Planting

Legend

- Subject Land
- Subject Site
- Study Area
- Restoration Area
- Monitoring Plots
- Photo Monitoring Points

Vegetation Community

- 3132: Northern Sands Tuckeroo-Banksia Forest
- 3132: Northern Sands Tuckeroo-Banksia Forest (Figs)
- 3989: Far North Paperbark Fern Swamp Forest
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Image Source:
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SIX Maps 'Clip and Ship'

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0 40 m

I:\...\21273\Figures\RP6\20250212\Figure 14. Location of Monitoring Plots

Figure 14. Location of Monitoring Plots