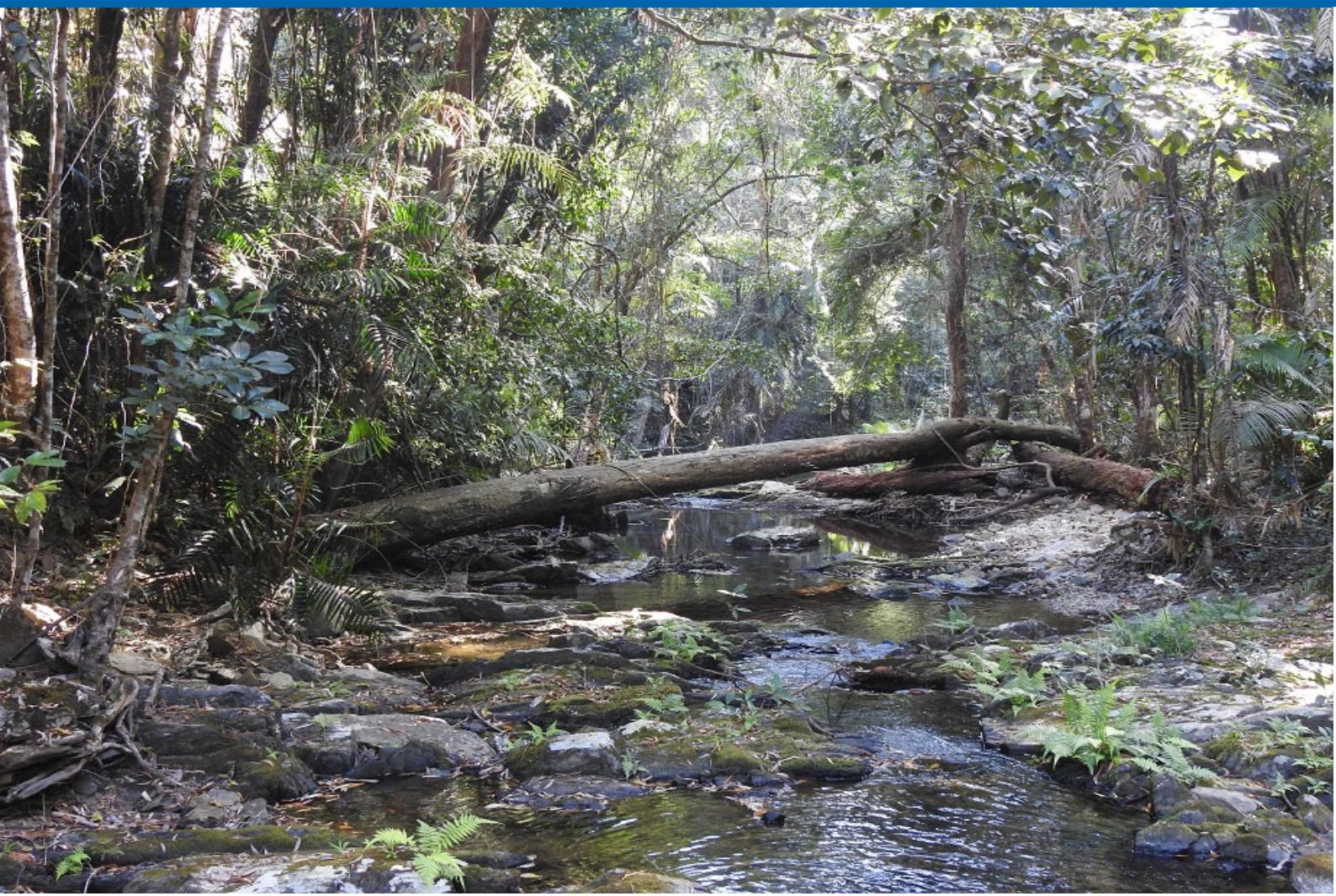


Department of State Development, Tourism, and Innovation

Wangetti Trail South Section (Wangetti to Palm Cove)

Matters of national environmental significance flora pre-clearance survey methodology

July 2021



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1. Introduction

1.1 Project background

1.1.1 Overview

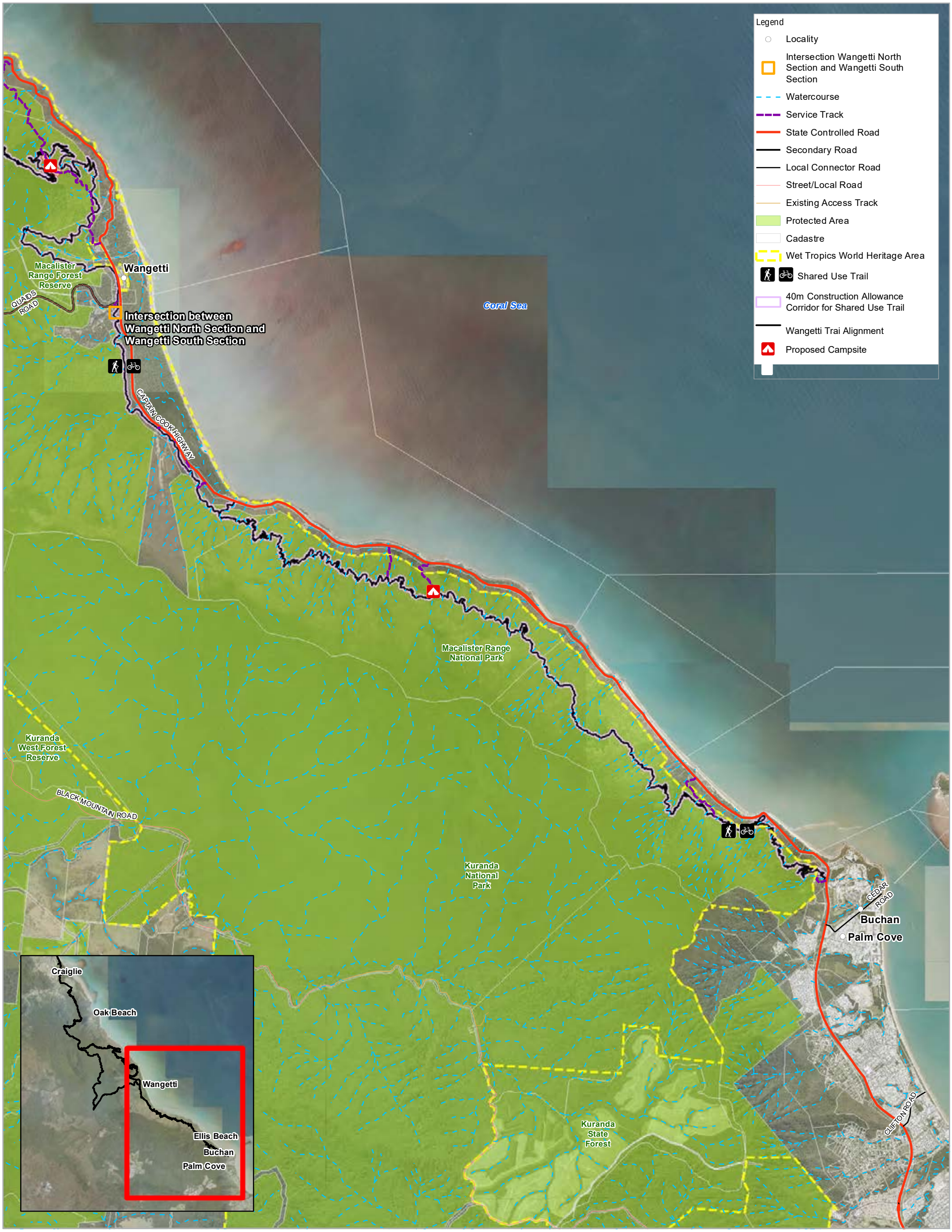
The Department of State Development, Tourism and Innovation (DSDTI) - Tourism Development Projects Division (TDPD) is proposing to establish the Wangetti Trail – Wangetti South Section, a 29.7 kilometre (km) shared use trail to accommodate both mountain bike users and hikers from Lot 2 SP309094 in the township of Wangetti, to Palm Cove. Figure 1.1 shows the location of the Wangetti South Section.

The Wangetti South Section will comprise the following components:

- 29.7 km shared use trail to accommodate both mountain bike users and hikers, consisting of natural ground and surface treatments, which will be a maximum of 1.5 m wide. The 1.5 m wide trail will be located within a 40 m survey corridor, referred to as the construction allowance corridor, to allow flexibility for the placement of infrastructure during the construction phase. The trail has been designed to be a 'Mountain Biking – intermediate (blue square with blue outline) as defined in the Australian Mountain Bike Trail Guidelines Trail Difficulty Rating System (MTBA TDRS) and grade 3 for hikers, as defined in the Australian Walking Track Grading System (AWTGS), which also equates to Class 3 in the Australian Standard for Walking Tracks, Part 1: Classification and Signage (AS 2156.1-2001). The trail will have an average gradient of <10% and a maximum gradient no greater than 15% (for short distances only). Built structures proposed as part of the trail include gully crossings, bridges, staircases, platforms, rock armouring and signage, where appropriate and required.
- A number of waterway crossings along the shared use trail that will comprise of the following: rock armouring, boulder crossings and low-level bridge (minor water crossing).
- Dark Jungle (public camping node and amenities block) which will have a footprint of 0.25 ha and will comprise of:
  - 10 x 4 m diameter elevated camping decks
  - 1 x 2.5 m x 2.5 m toilet block
  - 1 communal gathering area including bike rack, table and seating, cooking and bench area and shelter
  - Interconnecting pathways, boardwalks and access tracks.
- The formalisation of existing access tracks into service tracks to provide restricted access to the shared use trail and Dark Jungle for construction purposes, operational purposes, maintenance purpose and for emergency purposes.

The Wangetti South Section is being proposed over four properties located within the Douglas Shire Council and Cairns Regional Council local government areas. The project area intersects both the Macalister Range National Park and the Wet Tropics World Heritage Area (WTWHA).

The project is being delivered by TDPD as part of an adventure-based ecotourism development in north Queensland. The shared use trail will provide walkers and mountain bike riders with a unique experience to traverse through natural areas of north Queensland covering bushland and coastal areas, including the Wet Tropics of Queensland (Wet Tropics), and national parks.



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Kilometres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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DITID
Environment Assessment Stage 2 Wangetti Trail

Wangetti South Section
Project Locality Plan

Project No. 41-32458
Revision No. 5
Date 1/12/2020

FIGURE 1.1

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Data source: DITID/GHD: Wangetti Trail Alignment (11/2020); DNRME: Roads (2019), Cadastre (2019), Watercourse (2014), Place Names (2016), Rail (2016), Imagery (2016); DES: Protected Area (2018); WTMA: Proposed Camp and Amenities Block (2020), Zoning Boundary (2019); GHD:Section Intersections - Mowbray North, Wangetti North, Wangetti South (2020), Services Tracks (2020), 20m Construction Buffer for the Shared Use Trail (2020) . Created by: xlee

In August 2020, TDPD submitted a referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the proposed Wangetti South Section (ref: EPBC 2020/8722). As part of the referral, the Wangetti South Section (Wangetti to Palm Cove) Matters of National Environmental Significance Baseline Ecology and Impact Assessment Report was prepared by GHD (2020) noted the following regarding threatened flora species:

- No threatened flora species have been confirmed present within the project area during field surveys.
- Four threatened flora species were considered 'likely to occur' within the project area based on the presence of potentially suitable habitat and previous records, namely:
  - *Myrmecodia beccarii* (Ant plant*)* – Vulnerable
  - *Toechima pterocarpum* (Orange tamarind) – Endangered
  - *Vappodes lithocola*[1] (Dwarf butterfly orchid) – Endangered
  - *Zeuxine polygonoides*[2] (Velvet jewel orchid) – Vulnerable.
- Nine threatened flora species were rated as 'may occur' within the project area.

Following the assessment of the referral documentation by Commonwealth Department of Agriculture, Water and the Environment (DAWE), it was determined on 11 September 2020, that the Project would be a controlled action and would be assessed by preliminary documentation. DAWE requested that further information, in particular a pre-clearance survey methodology document be developed to demonstrate its predicted effectiveness to avoid listed threatened flora species during the construction stage. As a result, the Wangetti Trail – South Section (Wangetti – Palm Cove) MNES flora pre-clearance survey methodology document has been prepared.

1.2 Purpose of this report

The purpose of this document is to outline the pre-clearance survey methodology to be adopted before starting construction works for the Wangetti South Section to demonstrate how protected flora species will be identified and managed as part of the project. Protected flora considered by the document are those that are listed as Matters of National Environmental Significance (MNES) under the EPBC Act. This document outlines the timing of the MNES flora pre-clearance survey, the personnel required to undertake the MNES flora pre-clearance survey and the methods and reporting to be adopted.

This document will be incorporated in the Construction Environmental Management Plan for Wangetti South Section. This document has been developed with reference to the following documents:

- Department of State Development, Tourism and Innovation Wangetti Trail South Section (Wangetti to Palm Cove) - Matters of National Environmental Significance -Baseline Ecology and Impact Assessment Report prepared by GHD dated July 2020
- Wangetti Trail Construction Methodology Manual, prepared by World Trail dated April 2020
- Department of Environment and Science Flora Survey Guidelines (DES Flora Survey Guidelines) – Protected Plants Nature Conservation Act 1992 NCS/2016/2534 version 2.01 dated 22 August 2020.

[1] Also known as *Dendrobium lithocola*, and the Queensland Flora Census 2019 groups this species into *Dendrobium biggibum*
[2] Also known as *Rhomboda polygonoides*

2. MNES flora pre-clearance survey methodology

2.1 Overview of the Pre-Start Trail Review and pre-clearance surveys for Wangetti Trail South Section

At the commencement of the construction of the Wangetti Trail South Section, the entire trail will be broken into Construction Segments. The Construction Segments assist in reducing the amount of area to be exposed during the construction phase, which in turns reduces impacts to the natural environment and reduces the impact to the movement of wildlife in the area.

Before starting the construction of a Construction Segment, a Pre-Start Trail Review (PSTR) will be undertaken. The purpose of the PSTR is to review and inspect the proposed alignment of the trail with the TDPD Project Manager, prior to construction starting, to confirm the exact alignment within the groundtruthed corridor, identify any specific environmental values to be protected (including values identified to date together with any additional values identified during the PSTR) and to discuss and agree on specific construction treatments.

The following personnel will be involved in the PSTR:

- TDPD Project Manager
- Contractor's Project Manager
- Contractor's Trail Designer/Builder for that Construction Segment
- Suitably qualified botanist/ecologist
- DES Shadow Ranger.

A representative of the respective land manager(s), Queensland Parks and Wildlife Services (QPWS), Wet Tropics Management authority (WTMA), Douglas Shire Council, Cairns Regional Council, and the Traditional Owners will be invited to attend the PSTR.

Other personnel may also be required – for example, if the trail is in close proximity to areas of high environmental values, qualified environmental specialists should be present to provide assistance in micro-siting the trail to avoid impacts to these values. In areas of high cultural heritage values, qualified archaeologists and/or Traditional Owners should be present.

Prior to commencing the PSTR, known information about the Construction Segment will be gathered and assessed – length, proposed difficulty rating, likely construction treatments, known environmental issues that have been identified including protected flora species.

MNES flora pre-clearance survey will be undertaken during the PSTR and will be carried out across the entire project footprint.

The Construction Segments, PSTR and pre-clearance surveys are control measures being adopted by the Project to demonstrate how the Project can avoid, minimise and mitigate impacts on MNES:

- This process includes the delineation of the approved clearing area with flagging tape or survey pegs and this ensures that any areas of high ecological values encountered can be avoided in the first instance by the proposed works (including values identified to date together with any additional values identified during the PSTR). Where there is an environmental issue specific to the trail during the field inspection of the pre-start phase, the

environmental issue would be visually identified and then marked in the field as an exclusion zone (using different coloured flagging tape or bunting). The exact alignment of the trail is flagged and detailed documentation is gathered, including photographs showing the pre-existing conditions on site and photo points using GPS coordinates before any works are undertaken. This allows for post-construction photos to be taken, which will enable before/after comparison. A suitably qualified botanist/ecologist will be involved during the process.

- A QPWS ranger will be invited to attend the PSTR for areas with high environmental; significance in order to aid in micro-siting the trail to avoid impacts to environmental values.
- Record any MNES flora species encountered during the PSTR and pre-clearance survey. Where any MNES flora species are identified, the botanist/ecologist and trail builders will be able to collaborate and achieve a satisfactory solution to micro-site the trail and avoid potential impact to MNES flora species. Findings from the MNES flora pre-clearance survey will be discussed with TDPD Project Manager, Contractor's Project Manager and the Contractor's Trail Designer/Builder to determine if additional protection measures are required and/or if any changes need to be made to the alignment.
- Detailed documentation is gathered, including photographs showing the pre-existing conditions on site before any works are undertaken. This allows for post-construction photos to be taken and to create photo points using a GPS coordinate, which will enable before/after comparison. This information will be used to develop a monitoring plan of the MNES flora species to monitor the number and condition of MNES species within the project area.
- Hand construction may need to be undertaken in areas of high environmental values, therefore requiring minimal excavation and disturbance footprints.
- The construction segments allow for disturbed areas to be rehabilitated in a timely manner.

2.2 Target species

No MNES flora species have been confirmed present within the construction allowance corridor during field surveys. However, four MNES flora species were considered likely to occur by the MNES Baseline Report (GHD 2020), namely:

- Ant Plant (*Myrmecodia beccarii*) - Vulnerable
- Dwarf butterfly orchid (*Vappodes lithocola*[3]) – Endangered
- Orange Tamarind (*Toechima pterocarpum*) - Endangered
- Velvet jewel orchid (*Zeuxine polygonoides*[4]) – Vulnerable.

DAWE identified a further eight MNES flora species that have the potential to occur, however no historic records of these species were identified by the baseline assessment undertaken for the project such that they were not rated as 'likely to occur' by the MNES Baseline Report (GHD 2020). These additional species are identified by DAWE are as follows:

- *Canarium acutifolium* - Vulnerable
- Dark-stemmed Antler Orchid (*Dendrobium mirbelianum*) - Endangered
- *Diplazium cordifolium* - Vulnerable

[3] Also known as *Dendrobium lithocola*, and the Queensland Flora Census 2019 groups this species into *Dendrobium biggibum*
[4] Also known as *Rhomboda polygonoides*

- *Diplazium pallidum* - Endangered
- *Phaius pictus* - Vulnerable
- Native Moth Orchid (*Phalaenopsis amabilis* subsp. *rosenstromii*) - Endangered
- *Polyscias bellendenkerensis* - Vulnerable
- Cooktown Orchid (*Vappodes phalaenopsis*) – Vulnerable (also known as *Vappodes phalaenopsis* and the Queensland Flora Census 2019 recognises this species as *Dendrobium biggibum*)

2.3 Survey team

The MNES flora pre-clearance survey will be undertaken by a qualified botanist or ecologist. Given the complexity and diversity of ecosystems that characterise the construction area, the botanist/ecologist must have significant and demonstrable experience in survey of the relevant ecosystem types and identifying the specific target species.

Prior to the PSTR/pre-clearance flora survey commencing, the experience of the botanist/ecologist undertaking the requirements of the flora survey will be reviewed by TDPD Project Manager. The qualifications and experience of the botanist/ecologist will be included in the flora survey report.

During the MNES pre-clearance survey, the qualified botanist or ecologist will be accompanied by the Contractor's Trail Designer/Builder for that construction segment to facilitate clear communications and allow for development of on-the-ground practical solutions in the event than an MNES flora species is encountered.

2.4 Timing

Construction is anticipated to commence in April 2021. Accordingly, the MNES flora pre-clearance survey will be undertaken in March 2021 so as to complete this survey and reporting prior to commencement of construction activities.

This proposed timing is suitable for detection of all target species (refer Table 2.1). Specifically, the target species are all long-lived species, and the survey timing will coincide with the flowering season for many of the more cryptic species. Where any orchid species with an absence of flowers are recorded and the identity cannot be confidently determined at the time of survey, these plants will either be completely avoided (i.e. assumed to be a potential MNES species for the purpose of flora management) or works in that area will not be undertaken until identification during a suitable season can be undertaken.

Any areas that are not cleared within 18 months from the time of the MNES flora pre-clearance survey are to be re-surveyed prior to clearing.

Table 2.1 Seasonality for survey of target MNES flora species

Species	Seasonality for survey
Canarium acutifolium	Seasonality not critical (long-lived tree that can be identified based on vegetative features)
Dendrobium mirbelianum	Flowering is variable, generally August to November. However, it is a perennial species that can be detected outside of flowering season based on vegetative features (also see footnote* below).

Species	Seasonality for survey
Diplazium cordifolium	Seasonality not critical (long-lived fern that can be identified based on vegetative features)
Diplazium pallidum	Seasonality not critical (long-lived fern that can be identified based on vegetative features)
Myrmecodia beccarii	Seasonality not critical (long-lived plant that is highly distinctive based on vegetative features)
Phaius pictus	Flowers in April to June. This is a long-lived evergreen orchid and the genus is highly distinctive, such that the presence of this genus can be detected outside of the flowering season and therefore seasonality is not critical (also see footnote* below).
Phalaenopsis amabilis subsp. *rosenstromii*	Flowers in December to April such that the seasonality of the survey will be appropriate (also see footnote* below).
Polyscias bellendenkerensis	Seasonality not critical (long-lived shrub / small tree that can be identified based on vegetative features)
Toechima pterocarpum	Seasonality not critical (long-lived tree that can be identified based on vegetative features)
Vappodes lithocola	Flowers in March to July such that the timing of the survey will be appropriate (also see footnote* below)
Vappodes phalaenopsis	Flowers in March to July such that the timing of the survey will be appropriate (also see footnote* below)
Zeuxine polygonoides	The species flowers from June to August; however vegetative features are distinctive such that seasonality is not critical.

* Where any orchid species with an absence of flowers are recorded and the identity cannot be confidently determined at the time of survey, these plants will either be completely avoided (i.e. assumed to be a potential MNES species for the purpose of flora management) or works in that area will not be undertaken until identification during a suitable season can be undertaken.

2.5 Target area

The MNES flora pre-clearance survey will be undertaken across the entire project footprint.

For the purpose of identifying where particular species may occur, a map has been developed to identify habitats that may be suitable for the target MNES flora species. This map was developed by researching the habitat requirements of each species (based primarily on the DAWE's Species Profile and Threats Database (SPRAT), and then using Regional Ecosystem mapping to identify areas supporting potentially suitable vegetation communities. Where habitats are likely to be only marginally suitable, a precautionary approach was adopted, and these were included in the habitat map. Where relevant, geological and/or altitudinal information was used to refine the mapping for species with specific requirements relating to these characteristics.

The mapping is provided as Appendix A and the attributes on which the mapping was developed are provided in Appendix B.

2.5.1 Disturbance areas

Shared Use Trail

The width of the shared use trail will be a maximum of 1.5 m and the total length of the trail (excluding mountain bike trail) is 29.7 km. Details of the vegetation clearing technique to be adopted during the construction phase of the project is outlined in the Wangetti Trail Construction Methodology Manual (World Trail 2020). Vegetation clearing will be used to clear the pathway of vines, shrubs, bushes, ground covers and small trees, to allow clear access for construction equipment such as a small excavator.

Up to 1.0 m temporary disturbance (i.e. 0.5 m on either side of the 1.5 m trail) has been allowed during the construction phase in order to accommodate construction equipment including a small excavator. Up to 2.5 m height temporary disturbance has been allowed during the construction phase in order to accommodate construction equipment such as a small excavator.

A construction allowance corridor (20 m on either side of the trail for a total corridor of 40 m width) has been allowed for the trail to provide flexibility to the trail builders to deviate from the alignment up to 20 m to either side, in order to respond to any unexpected issues that may arise including avoiding any identified MNES flora species. Taking into consideration the population characteristics that are typical for the target species (i.e. no extensive populations of clustered individuals are anticipated to occur), the 40 m construction allowance corridor should be sufficient in most cases to enable the trail to be moved or adjusted to avoid any MNES plants.

Proposed single span bridges along Shared Use Trail

In order to accommodate the construction of the abutments and to allow for the installation of the single span bridge a maximum area of 21 m^2 has been allowed on either side of the waterway (total disturbance area 42 m^2) or a width of 1.5 m over the waterway.

Service tracks

Limited vegetation disturbance is required for only one service track to remove vegetation that has grown over the existing access track. In regard to the other service tracks, only overhanging vegetation over the existing access tracks will be cut back.

Dark Jungle

For Dark Jungle, an area of up to 0.25 ha will be permanently disturbed for the public camping node and amenities block camp site. The design of the public camping node will be refined during the detailed design phase by the nominated construction contractor with a maximum of 0.25 ha allowed.

2.6 Flora pre-clearance survey method

During the MNES flora pre-clearance survey, the botanist/ecologist will comprehensively traverse the project footprint on foot in search of MNES plants. This is feasible given that the total width of the footprint is 2.5 m (i.e. permanent and temporary footprints combined). Areas beyond the 2.5 m footprint will be surveyed within the 40 m wide corridor should the footprint require adjustment at any location.

Where an MNES plant species is detected, the botanist/ecologist will notify the trail builders, and an exclusion zone will be clearly demarcated using coloured flagging tape or bunting. The

precise location (including accuracy of recorded location) of all observed MNES flora species will be recorded with a hand-held global positioning system (GPS) for future reference and for notification to relevant parties (e.g. Queensland Herbarium) and inclusion on site plans. Supplementary information regarding the occurrence of the MNES flora species is to be recorded including a description of the supporting habitat, the size and maturity of individuals, the presence of reproductive output, and ay observations on health and condition.

The re-positioning of the footprint will be to an appropriate distance from the MNES plant within the 40 m wide construction allowance corridor to allow for a buffer from the impact, also taking into consideration indirect impacts that could occur such as reduction of canopy cover. In this regard, the buffer will be determined by the botanist/ecologist and will be based on *Australian Standard Protection of Trees on Development Sites* (AS 4970-2009). Application of AS 4970-2009 allows for determination of the structural root zone (SRZ) together with a wider tree protection zone (TPZ), based on a calculation formula that was developed to consider both above and below ground tree components.

In accordance with AS 4970-2009, the radius of the TPZ is determined by measuring the diameter at breast height (DBH) of the trunk at a height of 1.4 m above the ground, and multiplying this number by 12. For target MNES species that are not tree species, the approach will be to determine the TPZ for the host tree or an adjoining tree/s that functions in providing habitat conditions (primarily shading) required to sustain the MNES species. This approach is outlined in Table 2.2 below and a diagrammatic representation is provided as Figure 2.1.

By way of an example to demonstrate determination of the TPZ, a *Toechima pterocarpum* (orange tamarind) individual with a stem diameter of 0.1 m (measured at 1.4 m above the ground), the TPZ would comprise a radius of 1.2 m surrounding the individual.

As per AS 4970-2009, encroachment of up to 10 percent of the TPZ can occur without adverse impacts to tree health. Should encroachment into the TPZ be necessary, this will be assessed on a case-by-case basis by the botanist/ecologist and will depend on the characteristics and health of the tree together with the nature of any proposed encroachment.

Upon completion of works in the vicinity of an exclusion zone, all marking will be removed.

Table 2.2 Determination of protection zones for target MNES species

Category	Relevant species^	Determination of protection zone
Trees and shrubs	*Polyscias bellendenkerensis* *Toechima pterocarpum*	TPZ of individual plant calculated as DBH multiplied by 12 in accordance with AS 4970-2009.
Epiphytes	*Dendrobium mirbelianum* *Myrmecodia beccarii* *Phalaenopsis amabilis* subsp. *rosenstromii* *Vappodes phalaenopsis*	TPZ of host tree calculated as DBH multiplied by 12 in accordance with AS 4970-2009.
Lithophytes	*Dendrobium mirbelianum* *Phalaenopsis amabilis* subsp. *rosenstromii* *Vappodes lithocola*	Immediately surrounding tree/s assessed to identify tree/s functioning in providing suitable habitat conditions for MNES species. TPZ of those tree/s calculated as

	Vappodes phalaenopsis *Zeuxine polygonoides*	DBH multiplied by 12 in accordance with AS 4970-2009.
Ground layer species	*Diplazium cordifolium* *Diplazium pallidum* *Phaius pictus*	Immediately surrounding tree/s assessed to identify tree/s functioning in providing suitable habitat conditions for MNES species. TPZ of those tree/s calculated as DBH multiplied by 12 in accordance with AS 4970-2009.

^Some species occur in more than one category based on their habitat preferences

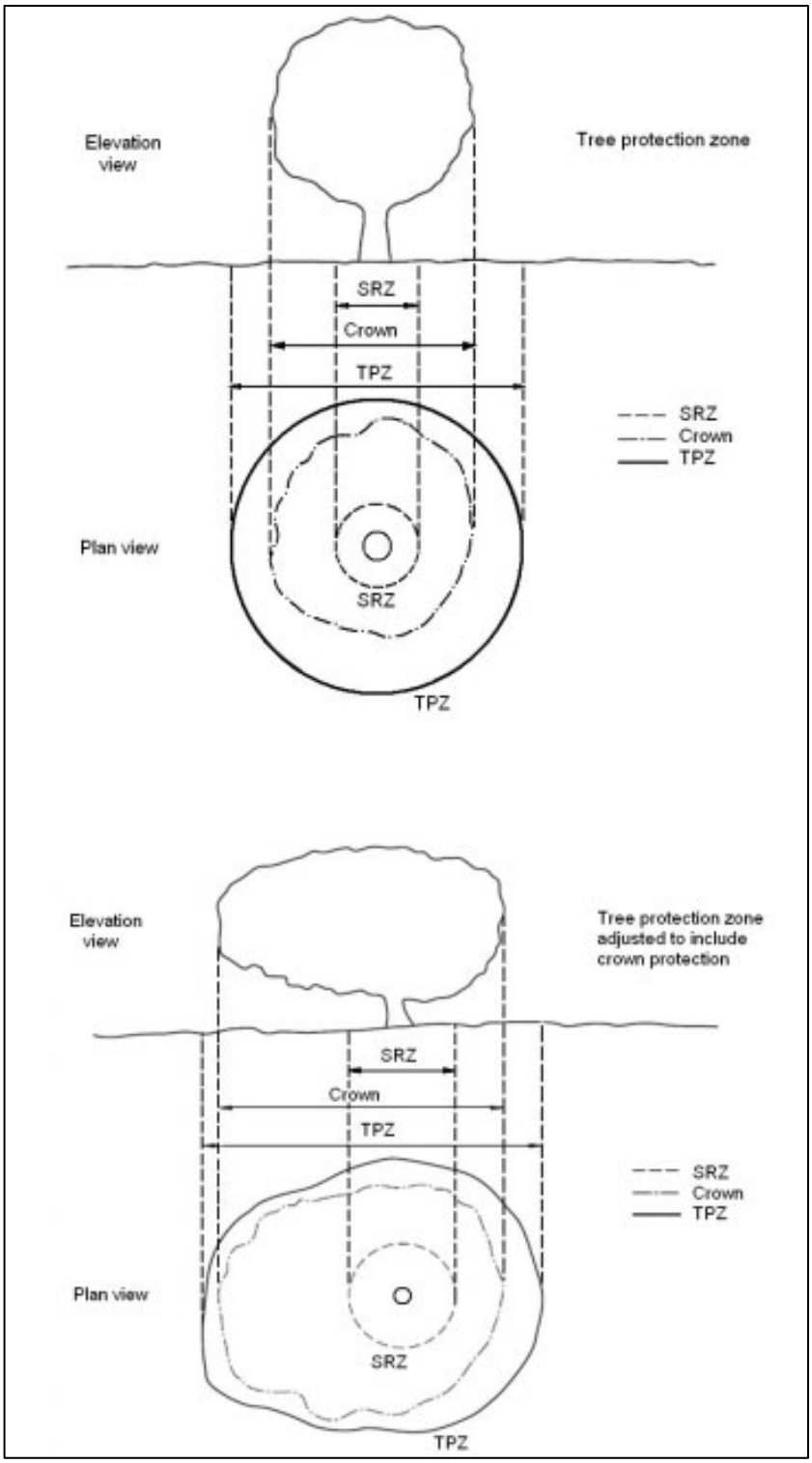

Figure 2.1 Tree protection zone (source: Australian Standard Protection of Trees on Development Sites AS 4970-2009)

3. Reporting

3.1 Reporting results of the MNES flora pre-clearance survey

During the MNES flora pre-clearance survey during the PSTR, findings will be recorded using a handheld GPS device and reported in a flora survey report. The flora survey report must include photos and specific GPS coordinates associated with the protected plant species. A copy of the completed and signed document must be provided to the TDPD Project Manager.

Findings from the MNES flora pre-clearance survey will be discussed with TDPD Project Manager, Contractor's Project Manager and the Contractor's Trail Designer/Builder to determine if additional protection measures are required and/or if any changes need to be made to the alignment.

Where a protected plant species has been identified within the disturbance area of the shared use trail, the following protocol would apply:

- TDPD Project Manager, Contractor's Project Manager and the Contractor's Trail Designer/Builder and the relevant regulatory authority would be contacted prior to the field inspection for specific recommendations and invited to attend if required (for example, micro-siting to avoid MNES flora sites).
- During the MNES flora pre-clearance survey, the plant would be visually identified and then marked in the field as an exclusion zone (using different coloured flagging tape or bunting). The exact alignment of the trail to be constructed would be flagged in the field, ensuring an adequate buffer from the exclusion zone.
- Detailed documentation will be gathered, including photographs showing the pre-existing conditions on site before any works are undertaken. This allows for post-construction photos to be taken, which will enable before/after comparison.

4. Predicted effectiveness

4.1 Identification of MNES flora

This survey method is expected to be highly effective in identifying any MNES flora species that are present within the project footprint for the following reasons:

- Given the narrow extent of the project footprint for the shared use trail (i.e. maximum of 2.5 m in width) and Dark Jungle (0.25 ha), it will be feasible to comprehensively ground-truth the entire project footprint.
- The seasonality of the survey will be appropriate for detection of the target species.
- The requirement for the botanist/ecologist to demonstrate significant experience in the specific ecosystems and relevant species provides assurance in the outcomes of the survey.

4.2 Avoidance of impacts

The approach is also expected to be highly effective in achieving avoidance of potential impacts to MNES flora species for the following reasons:

- Given the flexibility of the precise project footprint location within the construction allowance corridor, it will be achievable for the project footprint to be re-positioned as required so as to successfully avoid impact to any MNES flora species that are detected.
- The documented population characteristics that are typical of the target species are such that no large populations comprising numerous clustered individuals are anticipated to occur, and therefore the construction allowance corridor is expected to provide sufficient space for avoidance of impacts to an overall population, including consideration of indirect impacts such as reduced canopy cover.
- The presence of the Contractor's Trail Designer/Builder during the MNES flora pre-clearance survey will facilitate clear communication between the botanist/ecologist and the trail builder, such that there is no misinformation or misunderstanding regarding the presence of MNES flora species. Where any MNES flora species are identified, the botanist/ecologist and trail builders will be able to collaborate and achieve a satisfactory solution to micro-site the trail and avoid potential impact to MNES flora species.
- Where a MNES plant is encountered, the re-positioning of the footprint will be at an appropriate distance from the MNES plant within the construction allowance corridor to allow for a buffer from the impact. Applying *Australian Standard Protection of Trees on Development Sites AS 4970-2009* provides a sound base for determination of the buffer width as this standard has been widely and successfully used, and the calculation formula for tree protection zones was developed considering both above and below ground tree components.

5. References

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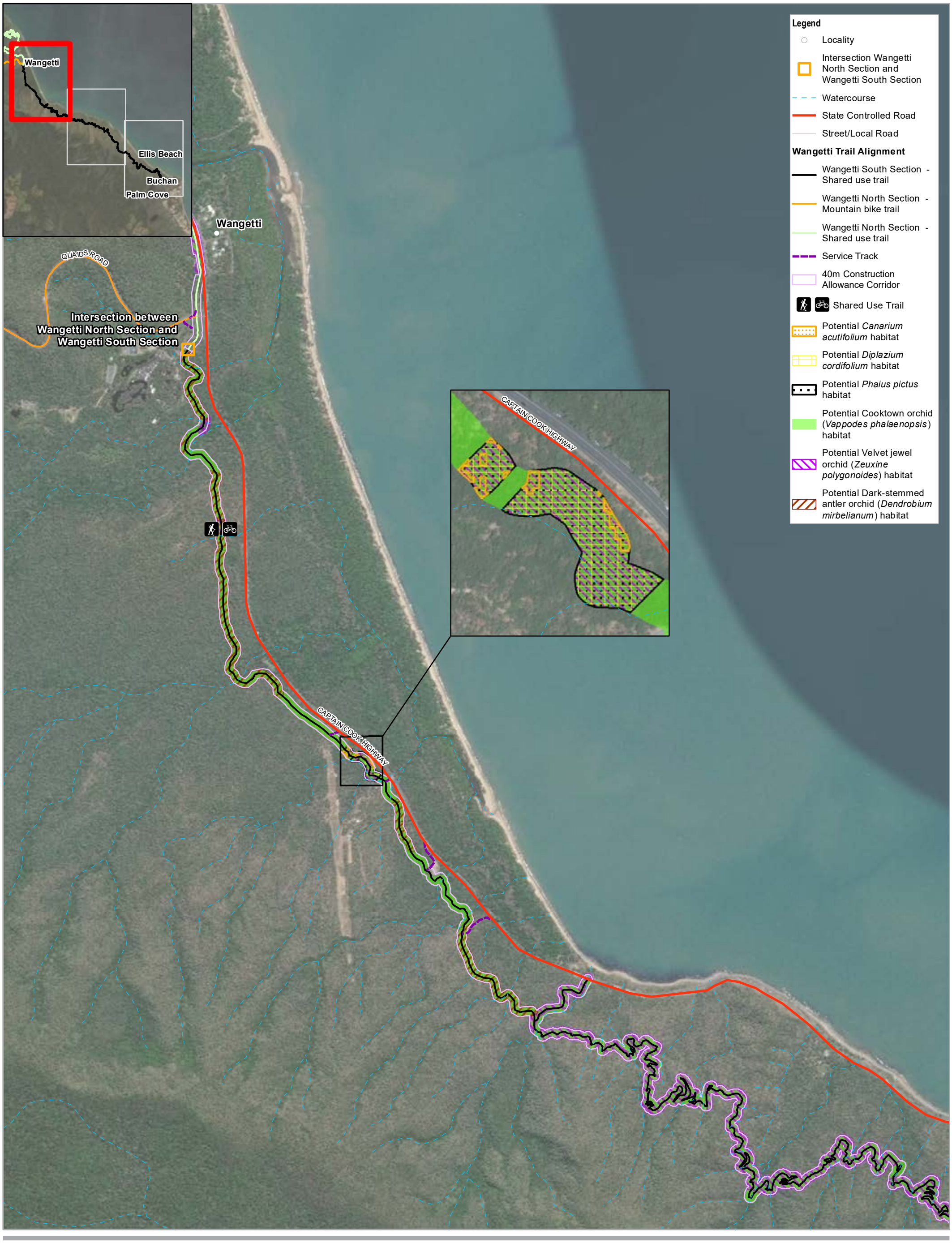
Appendix A – Mapping of the preferred habitat for MNES flora species within Wangetti South Section



Paper Size ISO A3

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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DITID
Environment Assessment Stage 2 Wangetti Trail

Wangetti Trail South Section - Wangetti to Palm Cove Potential habitat for threatened flora species

Project No. **41-32458**
Revision No. **B**
Date **30/04/2021**

Appendix A
(Sheet 1 of 3)

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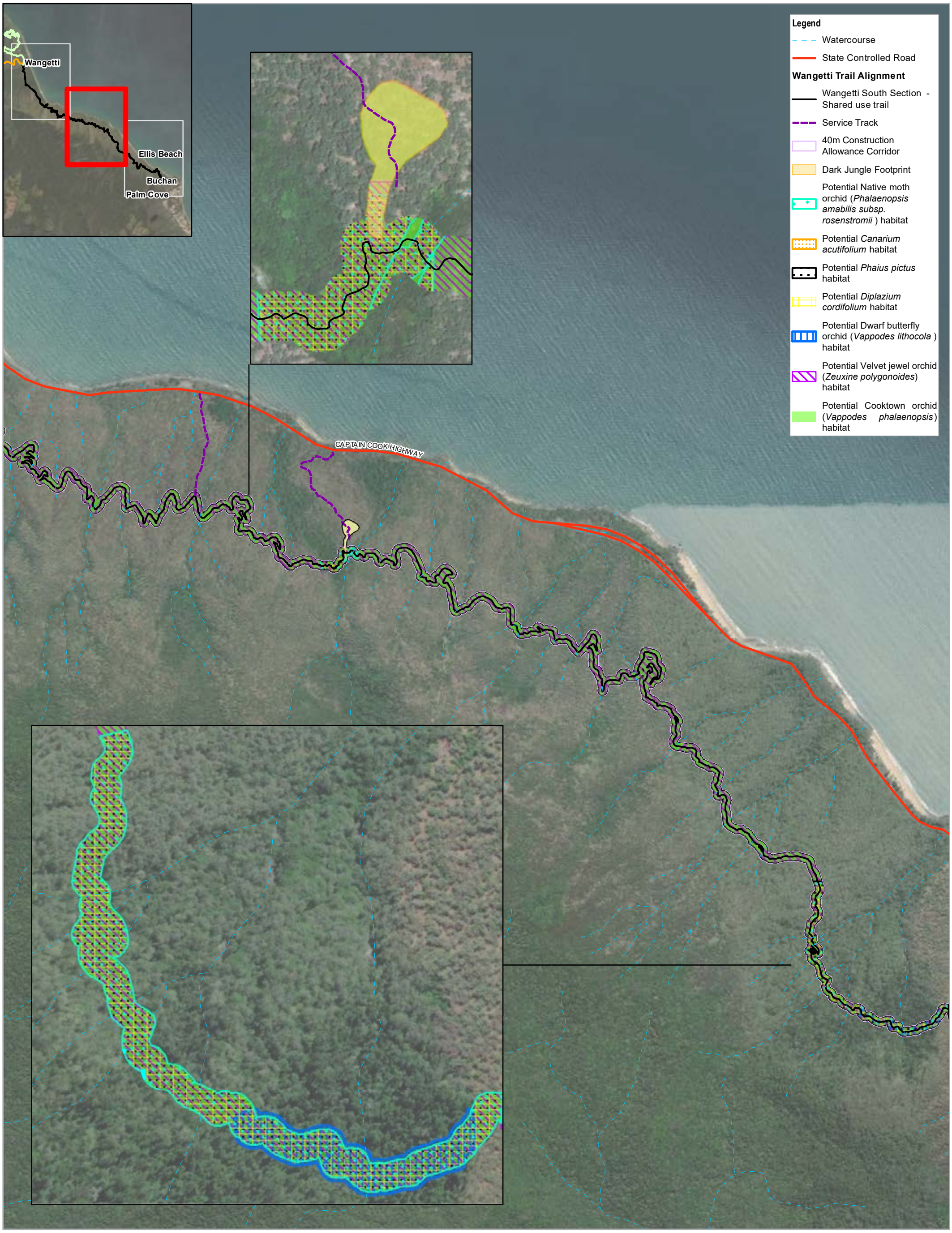
Print date: 23 Dec 2020 - 10:51

Data source: DITID/GHD: Proposed Infrastructure (2019), Wangetti Trail Alignment (04/2020); DNRME: Roads (2016), Watercourse (2014), Imagery (2015); GHD: Threatened Species Potential Habitat (2020) WTMA: Proposed Camp and Amenities Block (2020); Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: xlee



Paper Size ISO A3

0 100 200 300 400

Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

N

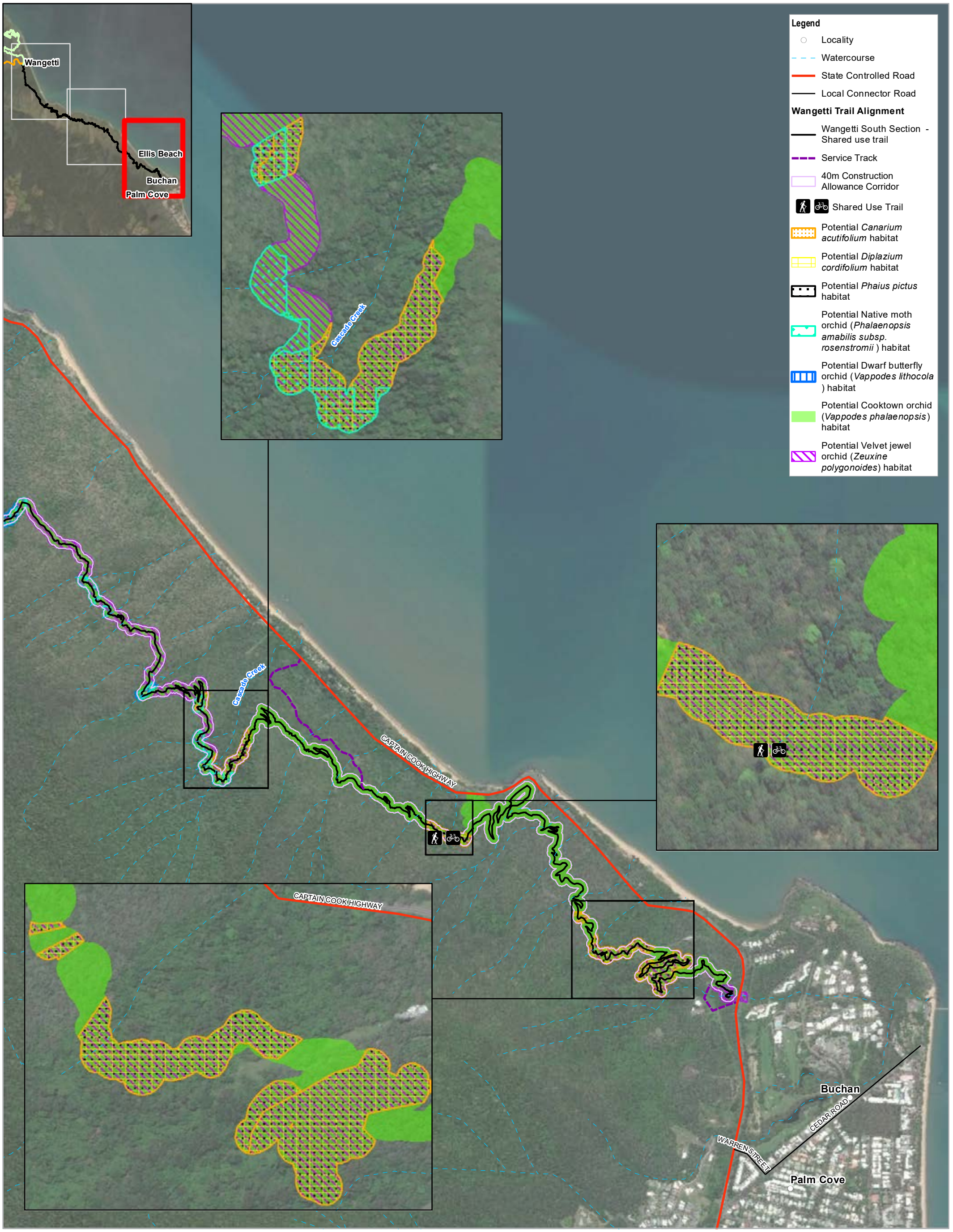
DITID
Environment Assessment Stage 2 Wangetti Trail

Wangetti Trail South Section - Wangetti to Palm Cove Potential habitat for threatened flora species

Project No. **41-32458**
Revision No. **B**
Date **30/04/2021**

Appendix A
(Sheet 2 of 3)

Data source: DITID/GHD: Proposed Infrastructure (2019), Wangetti Trail Alignment (04/2020); DNRME: Roads (2016), Watercourse (2014), Imagery (2015); GHD: Threatened Species Potential Habitat (2020) WTMA: Proposed Camp and Amenities Block (2020); Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: xlee



Paper Size ISO A3

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Metres

Map Projection: Transverse Mercator
Horizontal Datum: GDA 1994
Grid: GDA 1994 MGA Zone 55

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DITID
Environment Assessment Stage 2 Wangetti Trail

Wangetti Trail South Section - Wangetti to Palm Cove Potential habitat for threatened flora species

Project No. **41-32458**
Revision No. **B**
Date **30/04/2021**

Appendix A
(Sheet 3 of 3)

N:\AU\Brisbane\Projects\41\32458\GIS\Maps\MXD\4132458_065_WT_SP2_South_ThreatenedFloraSpecies_RevA.mxd
Print date: 24 Dec 2020 - 11:39

Data source: DITID/GHD: Proposed Infrastructure (2019), Wangetti Trail Alignment (04/2020); DNRME: Roads (2016), Watercourse (2014), Imagery (2015); GHD: Threatened Species Potential Habitat (2020) WTMA: Proposed Camp and Amenities Block (2020); Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community. Created by: xlee

Appendix B – Determination of preferred habitat for MNES flora species within Wangetti South Section

Threatened flora species	Preferred habitat	Relevant Regional Ecosystems (REs)	Altitudinal limits
Canarium acutifolium	Dense, primary rainforest, also in the more open, secondary formations; especially along forest-edges, riverbanks and in clearings (DEWHA 2008a).	7.3.10 – Mesophyll to notophyll vine forest 7.11.1 – Mesophyll vine forest 7.11.1a – Mesophyll vine forest 7.11.1b – Mesophyll vine forest 7.11.7 – Notophyll vine forest 7.11.7a – Notophyll vine forest 7.11.7b – Notophyll vine forest 7.12.1a – Mesophyll to notophyll vine forest 7.12.7 – Notophyll vine forest 7.12.7a – Notophyll vine forest 7.12.12 – Notophyll vine forest 7.12.48 – Notophyll vine forest	Occurring between 5 and 200 m AHD (DEWHA 2008a).
Dark-stemmed antler orchid (*Dendrobium mirbelianum*)	Grows mainly on trees (epiphytic) in mangroves and coastal swamps in humid locations and has also been recorded growing on rocks (Jones 2006).	7.3.8b - contains coastal melaleuca swamps	Occurring between 2 and 150 m AHD (Jones 2006).
Diplazium cordifolium	Occurs in rainforests and along creek banks (DEWHA 2008b).	7.3.10 – Mesophyll to notophyll vine forest 7.11.1 – Mesophyll vine forest 7.11.1a – Mesophyll vine forest 7.11.1b – Mesophyll vine forest 7.11.7 – Notophyll vine forest 7.11.7a – Notophyll vine forest 7.11.7b – Notophyll vine forest 7.12.1a – Mesophyll to notophyll vine forest 7.12.7 – Notophyll vine forest 7.12.7a – Notophyll vine forest 7.12.12 – Notophyll vine forest 7.12.48 – Notophyll vine forest	-
Diplazium pallidum	Fern growing in lowland rainforest, particularly near streams, but has not been found growing in creeks. It occurs on basalt soils (DEWHA 2008c).	Nil (This species requires soils derived of basalt, which are not known to be present in the project area).	-
Ant plant (*Myrmecodia beccarii*)	This species is known from the coastal woodlands between Cooktown and Ingham in Queensland and occurs in open woodland dominated by Melaleuca viridiflora or mangroves (DEWHA 2008d).	7.3.8 – Melaleuca woodland	-
Phaius pictus	This species is highly localised and restricted to rainforests from 0 to 600 m altitude. It usually occurs in sheltered humid sites, close to streams and seepage	7.3.10 – Mesophyll to notophyll vine forest 7.11.1 – Mesophyll vine forest 7.11.1a – Mesophyll vine forest 7.11.1b – Mesophyll vine forest 7.11.7 – Notophyll vine forest	Occurring between 0 and 600 m AHD (Jones 2006).

	among forest litter on boulders (Jones 2006).	7.11.7a – Notophyll vine forest 7.11.7b – Notophyll vine forest 7.12.1a – Mesophyll to notophyll vine forest 7.12.7 – Notophyll vine forest 7.12.7a – Notophyll vine forest 7.12.12 – Notophyll vine forest 7.12.48 – Notophyll vine forest	
Native moth orchid (*Phalaenopsis amabilis subsp. rosenstromii*)	Species is known to grow in trees in humid airy environments, on sheltered slopes and gullies in deep gorges and close to streams in rainforests (Jones 2006).	7.3.10 – Mesophyll to notophyll vine forest 7.11.1 – Mesophyll vine forest 7.11.1a – Mesophyll vine forest 7.11.1b – Mesophyll vine forest 7.11.7 – Notophyll vine forest 7.11.7a – Notophyll vine forest 7.11.7b – Notophyll vine forest 7.12.1a – Mesophyll to notophyll vine forest 7.12.7 – Notophyll vine forest 7.12.7a – Notophyll vine forest 7.12.12 – Notophyll vine forest 7.12.48 – Notophyll vine forest	Occurring between 200 and 500 m AHD (Jones 2006).
Polyscias bellendenkerensis	Grows in microphyll vine/fern thickets, notophyll vine forest and stunted shrublands (Elliot and Jones 1997).	Nil (No potential habitat was identified as altitude requirements for the species are not met).	Occurring between 1100 and 1600 m AHD (Elliot and Jones 1997).
Orange tamarind (*Toechima pterocarpum*)	Occurs in lowland tropical rainforest, often along watercourses, with an altitude range from sea level to 450 m. It occurs around Julatten, Mossman and Wangetti in north Queensland (DEWHA 2008f).	7.3.10 – Mesophyll to notophyll vine forest 7.11.1 – Mesophyll vine forest 7.11.7 – Notophyll vine forest 7.12.1 – Mesophyll to notophyll vine forest	-
Dwarf butterfly orchid (*Vappodes lithocola*) (also known as *Dendrobium lithocola* and recognised as *Dendrobium bigibbum* by the Queensland Flora Census 2019)	Species occurs in coastal ranges between Daintree and Cairns, growing in rainforest on rocks, boulders and cliff faces on ridges and slopes (Jones 2006).	7.3.10 – Mesophyll to notophyll vine forest 7.11.1 – Mesophyll vine forest 7.11.1a – Mesophyll vine forest 7.11.1b – Mesophyll vine forest 7.11.7 – Notophyll vine forest 7.11.7a – Notophyll vine forest 7.11.7b – Notophyll vine forest 7.12.1a – Mesophyll to notophyll vine forest 7.12.7 – Notophyll vine forest 7.12.7a – Notophyll vine forest 7.12.12 – Notophyll vine forest 7.12.48 – Notophyll vine forest	Occurring between 250 and 800 m AHD (Dockrill 1992; Barker 1997; Jones 2006).
Cooktown orchid (*Vappodes phalaenopsis*) (also known as *Dendrobium phalaenopsis* and recognised as *Dendrobium bigibbum* by	Species grows on trees and rocks in coastal scrub, littoral rainforest, riverine vegetation, monsoon thickets, swamps and gullies in open forests1 at altitudes of up to 400 m above sea level (Jones 2006).	7.3.8b - Contains coastal melaleuca swamps 7.3.10 – Mesophyll to notophyll vine forest 7.3.44 – Open forest to woodland 7.11.1 – Mesophyll vine forest 7.11.1a – Mesophyll vine forest 7.11.1b – Mesophyll vine forest	Occurring between 0 and 400 m AHD (Jones 2006).

the Queensland Flora Census 2019)	1Note - Mapping of this species for the purposes of this report is highly conservative as fine scale information to identify gullies was not available, such that a precautionary approach was adopted and all open forest was identified as potentially suitable.	7.11.5 – Open forest 7.11.5a – Open forest 7.11.5d – Open forest 7.11.7 – Notophyll vine forest 7.11.7a – Notophyll vine forest 7.11.7b – Notophyll vine forest 7.11.10 – Open to closed forest 7.11.16 – Open forest to woodland 7.11.26 – Open shrubland to closed scrub 7.11.44 – Open forest to woodland 7.11.49 – Open forest to woodland 7.11.51 – Open forest to woodland 7.11.51a – Open forest to woodland 7.11.51c – Open forest 7.12.1a – Mesophyll to notophyll vine forest 7.12.5 – Open forest or vine forest 7.12.7 – Notophyll vine forest 7.12.7a – Notophyll vine forest 7.12.9 – Open forest 7.12.12 – Notophyll vine forest 7.12.24 – Open forest to woodland 7.12.24c – Open forest to woodland 7.12.29 – Open forest to woodland 7.12.34 – Open forest to woodland 7.12.48 – Notophyll vine forest 7.12.53 – Open forest 7.12.59 – Open forest to woodland 7.12.61a – Open forest to tall open forest and woodland	
Velvet jewel orchid (*Zeuxine polygonoides*) (Also known as *Rhomboda polygonoides*)	Mesophyll vine forests and simple notophyll vine forests (DAWE 2020). This species grows in mostly moist, cloudy or wet rainfall zones on metamorphic substrates, granite or rhyolite (Jones 2006).	7.3.10 – Mesophyll to notophyll vine forest 7.11.1 – Mesophyll vine forest 7.11.1a – Mesophyll vine forest 7.11.1b – Mesophyll vine forest 7.11.7 – Notophyll vine forest 7.11.7a – Notophyll vine forest 7.11.7b – Notophyll vine forest 7.12.1a – Mesophyll to notophyll vine forest 7.12.7 – Notophyll vine forest 7.12.7a – Notophyll vine forest 7.12.12 – Notophyll vine forest 7.12.48 – Notophyll vine forest	-

GHD

8th floor Cairns Corporate Tower 15 Lake Street
PO Box 819
T: 61 7 4044 2222 F: 61 7 4044 2288 E: cnsmail@ghd.com

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Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	M. Ward	S. Potts		G Squires		15.12.20
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