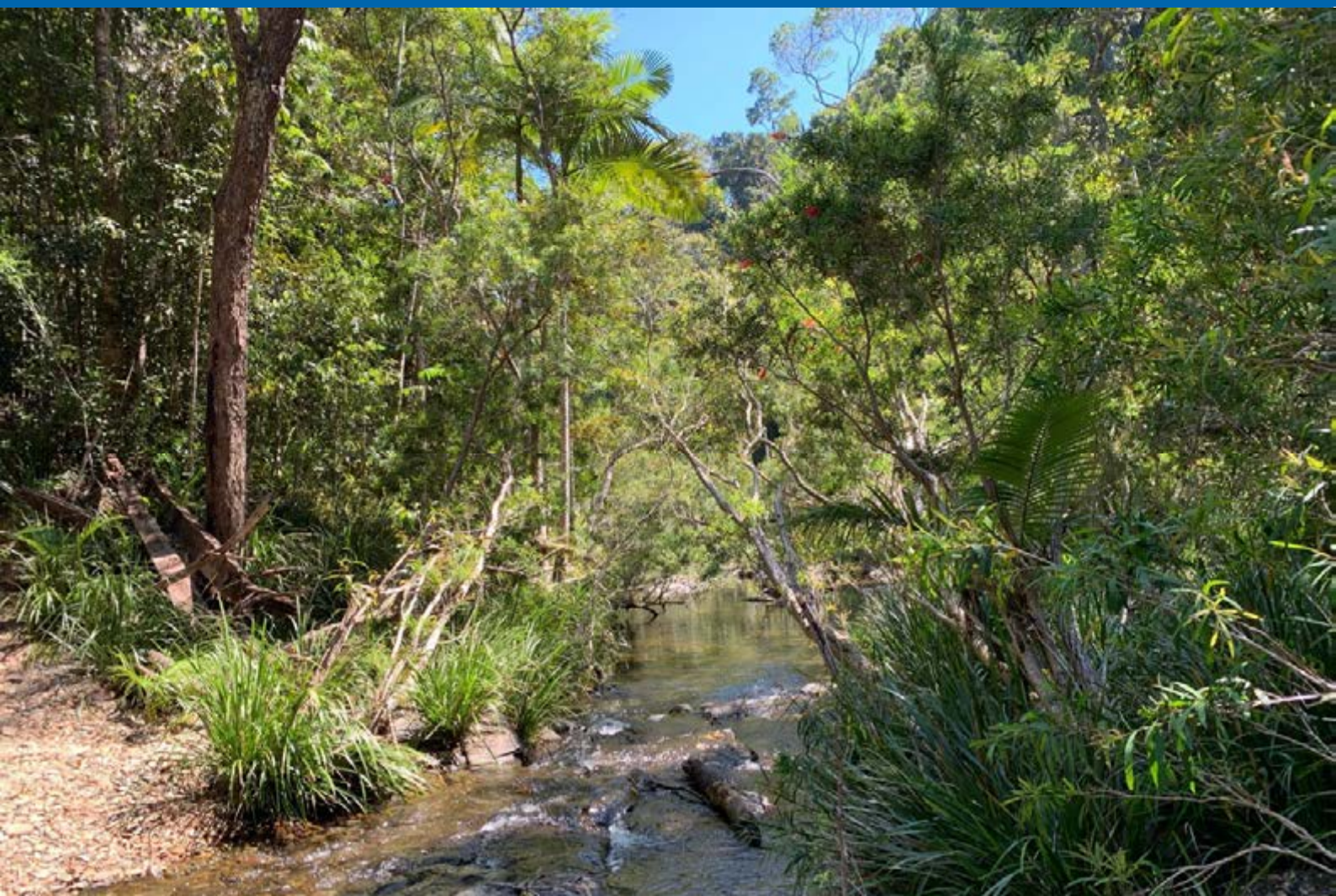


Department of State Development, Tourism, and Innovation

Wangetti South Section (Wangetti to Palm Cove)

Preliminary Documentation Response to Information Request (Ref: EPBC 2020/8722)

July 2021



Abbreviation and acronyms

Abbreviation/acronym	Definition
ANBTO	Adventure and Nature Based Tourism Opportunities
ASL	Above Sea Level
AWTGS	Australian Walking Track Grading System
CEMP	Construction Environmental Management Plan
CESCP	Concept Erosion and Sediment Control Plan
DAF	Department of Agriculture and Fisheries
DAWE	Department of Agriculture, Water and the Environment
DEMP	Department of the Environmental – Environmental Management Plan
DES	Department of Environment and Science
DEWHA	Department of the Environment, Water, Heritage and the Arts
DoE	Department of Environment
DR	Department of Resources
DSDILGP	Department of State Development, Infrastructure, Local Government and Planning
EMP	Environmental Management Plan
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESC	Erosion and Sediment Control
ESCP	Erosion Sediment and Control Plan
GHD	GHD Pty Ltd
IECA	International Erosion Control Association
ILUA	Indigenous Land Use Agreement
MBTG TDRS	Mountain Bike Trail Guidelines Trail Difficulty Rating System
MNES	Matter of National Environmental Significance
NC Act	Queensland Nature Conservation Act 1992
QPWS	Queensland Parks and Wildlife Service
SPRAT	Species Profile and Threats
TDPD	Tourism Development Projects Division
TMP	Traffic Management Plan
WPDMP	Weed, Pest and Disease Management Plan
WTMA	Wet Tropics Management Authority
WTNHP	Wet Tropics National Heritage Place
WTWHA	Wet Tropics World Heritage Area

Table of contents

Table index

Figure index

Appendices

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

Appendix B – Wangetti South Section Preliminary Environmental Management Plan

Appendix C – Potential habitat for the opal cling goby (Stiphodon semoni) in the vicinity of the Wangetti South Section Trail

Appendix D – Cassowary Recovery Plan Objectives and Actions

Appendix E - Existing cassowary conservation groups

Appendix F - Community Consultation Summary Report (DTIS, 2021)

1. Introduction

1.1 Background

In August 2020, the former Department of State Development, Tourism and Innovation (referred to now as the Department of Tourism, Innovation and Sport (DTIS) – Tourism Development Projects Division (TDPD) (referred to as TDPD or the proponent) submitted a referral under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) for the proposed Wangetti Trail – Wangetti South Section (referred to as Wangetti South Section or the Project), a 29.7 kilometre (km) shared use trail to accommodate both mountain bike users and hikers, from the southern boundary of Lot 2 on SP309094 in the township of Wangetti, To Palm Cove (Figure 1-1). Subsequently, on 11 September 2020, the Commonwealth Department of Agriculture, Water and the Environment (DAWE) determined the Project to be a controlled action and would be assessed by preliminary documentation.

This submission responds to the request for Preliminary Documentation Information to further support and enable assessment of the relevant impacts of the action in accordance with EPBC Act requirements.

1.2 Description of the action

The Wangetti South Section will comprise of a 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 and subsequent ancillary infrastructure including erosion and sediment control devices during the construction phase (Figure 1-1).

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). Majority of the trail will be natural surfaces apart from some built structures. The built structures proposed as part of the trail include gully crossings, bridges, staircases, platforms, rock armouring and signage, where appropriate and required.

These built structures are required for the long-term protection of the more vulnerable environmental features of the trail from frequent trampling or waste deposition from trail users.

- 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 back country 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.

Since the submission of the EPBC Referral, refinement of the proposed works has been undertaken. A section of the trail has been removed from Lot 31 on SP129117. A trail head has also been developed and is shown in Figure 1-1. The proposed trailhead is within existing impacted properties and does not impact any additional matters of national environmental significance.

Paper Size ISO A3

0 0.5 1 1.5 2

Kilometres

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

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Wangetti Trail Project Locality Plan
Wangetti South Section

Project No. **41-32458**
Revision No. **0**
Date **16/12/2020**

FIGURE 1-1

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Print date: 16 Dec 2020 - 15:41

Data source: DITID/GHD: Wangetti Trail Alignment (11/2020); DNRME: Roads (2019), Cadastre (2019), Watercourse (2014), Place Names (2016), Rail (2016), Imagery (2016), Local Government Area Boundary (2018); DAF: Waterway Barrier Works (2016) DES: Protected Area (2018); WTMA: Proposed Campsite(2020), Zoning Boundary (2019); GHD:Section Intersections - Wangetti North, Wangetti South (2020), Service Tracks (2020), 40m Construction Allowance Corridor (2020), Indicative Waterway Crossing Locations (2020) . Created by: xlee

1.3 Purpose of this report

The purpose of this report is to respond to DAWE's request for further information including:

1. General content, format and style
2. Impact assessment – listed threatened species and communities
3. Impact assessment – Wet tropics World Heritage Area and Wet Tropics National Heritage Place
4. Cumulative impacts
5. Avoidance, mitigation and management measures
6. Rehabilitation requirements
7. Environmental offsets – residual significant impacts
8. Social and economic matters
9. Ecologically sustainable development
10. Environmental record of person proposing to take the action

This report is supported by the following technical documents and figures provided as appendices:

- Appendix A– Mapping of the preferred habitat for MNES flora species within Wangetti South Section
- Appendix B– Wangetti South Section Preliminary Environmental Management Plan
- Appendix C– Potential habitat for the opal cling goby (*Stiphodon semoni*) in the vicinity of the Wangetti South Section Trail
- Appendix D– Cassowary Recovery Plan Objectives and Actions
- Appendix E- Existing cassowary conservation groups
- Appendix F- Community Consultation Summary Report (DTIS, 2021)

Table 1.1 summarises this request and cross-references to sections of this document where responses are provided. This report has been prepared to be read in conjunction with the EPBC Act referral Ref: EPBC 2020/8722.

Table 1.1 Summary of DAWE's information request

RFI No.	RFI	Where this is addressed in the document
1	General content, format and style	Addressed within this stand-alone report.
2	Impact assessment – listed threatened species and communities	**Section 2** Impact assessment – Listed threatened species and communities
	a) Listed threatened species	**Table 2.1, Section 2.2.1** outlines the assessment of threatened MNES species within the project area and controls to avoid mitigate and manage impacts
		Section 2.2.2: Significant impact assessment for *Vappodes lithocola*
		Section 2.2.3: Significant impact assessment for *Zeuxine polygonoides*
		Appendix A: Mapping of the preferred habitat for MNES flora species within Wangetti South Section This mapping identifies the preferred habitat for the MNES flora species identified as present or likely to occur within the Wangetti South Section, including the Cooktown Orchid, Velvet Jewel Orchid and the Dark-stemmed Antler Orchid.
		Appendix B: Preliminary Environmental Management Plan The Preliminary Environmental Management Plan details the performance objectives, actions and procedures to be carried out to minimise potential environmental impacts during construction phase and operational phase of the Wangetti South Section.
	b) Southern Cassowary	**Section 2.2.4:** Southern Cassowary
	c) Opal cling goby	**Section 2.2.5** Opal Cling Goby

RFI No.	RFI	Where this is addressed in the document
		Appendix C – Potential habitat for the Opal Cling Goby (*Stiphodon semoni*) in the vicinity of the Wangetti South Section Trail This mapping identifies the preferred habitat for the Opal Cling Goby within the Wangetti South Section.
3	Impact assessment – Wet Tropics World Heritage Area and Wet Tropics National Heritage Place	**Section 3** Impact Assessment – Wet Tropics World Heritage area (WTWHA) and Wet Tropics National Heritage Place (WTNHP)
	a) Details of the cultural heritage surveys completed in collaboration with Traditional Owners (or their representative bodies)	**Section 3.2.1** Cultural heritage surveys completed in collaboration with Traditional Owners (or their representatives)
	b) A description of how the design of the proposed action was informed by the outcomes of the surveys to minimise impacts on the WTNHP.	**Section 3.2.2** Description of how the design was informed by the outcomes of the surveys
	c) How the proposed action adheres to, and is not inconsistent with the World and National Heritage values of the Wet Tropics of Queensland	**Section 3.2.3** World and National Heritage values of the Wet Tropics of Queensland
		Table 3.1: Assessment against the world heritage values of the Wet Tropics
		Table 3.2: Assessment against the national heritage values of the Wet Tropics
	d) How the proposed action adheres to, and is not inconsistent with the Wet Tropics Management Plan 1998 and Wet Tropics Strategic Plan 2020 -2030	**Section 3.2.4** Wet Tropics Management Plan 1998 and Wet Tropics Strategic Plan 2020-2030
		Table 3.3: Assessment against the provisions of the Wet Tropics Management Plan 1998
		Table 3.4: Assessment against the provisions of the Wet Tropics Strategic Plan 2020-2030

RFI No.	RFI	Where this is addressed in the document
	e) How the proposed action adheres to, and is not inconsistent with the World and National Heritage management principles as set out in the *Environment Protection and Biodiversity Conservation Regulations 2000*.	**Section 3.2.5** World and National Heritage management principles as set out in the Environment Protection and Biodiversity Conservation Regulations 2000
		Table 3.5: Assessment against the principles of the World Heritage management principles
		Table 3.6: Assessment against the principles of the National Heritage management principles
4	Cumulative impacts	**Section 4** Cumulative impacts
	a) Southern Cassowary	**Section 4.2.1** Cumulative impact assessment southern cassowary
	b) Opal cling goby	**Section 4.2.2** Cumulative impact assessment opal cling goby
	c) World and National heritage values of the Wet Tropics of Queensland	**Section 4.2.3** Cumulative impact assessment World and National Heritage values of the Wet Tropics of Queensland
5	Avoidance, mitigation, and management measures	**Section 5** Avoidance, mitigation and management measures
	a) Preliminary Environmental management Plan (EMP)	**Section 5.2.1** Preliminary Environmental management Plan
		Section 5.2.1 Assessment of the expected or predicted effectiveness of the proposed mitigation measures
		Appendix E of the EMP (Appendix B of this document): Preliminary Construction Environmental Management Plan The Preliminary Construction Environmental Management Plan guides construction activities associated with the Wangetti South Section to prevent or minimise the environmental impacts and disturbance on site and to the surrounding environment during the construction phase. This document has

RFI No.	RFI	Where this is addressed in the document
		been prepared to satisfy the environmental obligations during the construction phase and complements the overarching Wangetti South Section Environmental Management Plan.
	b) Preliminary Construction Environmental Management Plan (CEMP)	**Section 5.2.2** Preliminary Construction Environmental Management Plan
		Section 5.2.2 Assessment of the expected or predicted effectiveness of the proposed mitigation measures
		Appendix E of the EMP (Appendix B) of this document): Preliminary Construction Environmental Management Plan The Preliminary Construction Environmental Management Plan guides construction activities associated with the Wangetti South Section to prevent or minimise the environmental impacts and disturbance on site and to the surrounding environment during the construction phase. This document has been prepared to satisfy the environmental obligations during the construction phase and complements the overarching Wangetti South Section Environmental Management Plan.
	c) Cassowary Management Plan (CMP)	**Section 5.2.3** Cassowary Management Plan
		Section 5.2.3 Assessment of the expected or predicted effectiveness of the proposed mitigation measures.
		Appendix B of the EMP (Appendix B) of this document): Cassowary Management Plan The Cassowary Management Plan guides planning/design, construction and operation/maintenance activities associated with the Wangetti South Section in consideration of the southern cassowary. The purpose of the plan is to provide

RFI No.	RFI	Where this is addressed in the document
		guidance in managing potential impacts and negative interactions between cassowaries and human activities.
	d) Concept Erosion and Sediment Control Plan	**Section 5.2.4** Concept Erosion and Sediment Control Plan
		Section 5.2.4 Assessment of the expected or predicted effectiveness of how the mitigation measures in the Concept Erosion and Sediment Control Plan reduces impacts on MNES.
		Appendix A – Concept Erosion and Sediment Control Plan of the EMP (Appendix B – Wangetti South Section Preliminary Environmental Management Plan of this document): Concept Erosion and Sediment Control Plan The Concept Erosion and Sediment Control Plan provides preliminary guidance to establish appropriate site erosion and sediment control management measures to reduce potential adverse impacts during the construction phase of the Project. International Erosion Control Association (IECA) best practice erosion and sediment control procedures have been incorporated into the Concept Erosion and Sediment Control Plan. A detailed work specific ESCP will be developed by the contractor as part of the CEMP and will use the Concept Erosion and Sediment Control Plan as a basis.
	e) Preliminary Weed, Pest and Disease management Plan	**Section 5.2.5** Preliminary Weed, Pest and Disease management Plan (WPDMP)
		Section 5.2.5 Assessment of the expected or predicted effectiveness of the proposed mitigation measures
		Appendix C of the EMP (Appendix B of this document): Preliminary Weed, Pest and Disease Management Plan

RFI No.	RFI	Where this is addressed in the document
		The Preliminary Weed, Pest and Disease Management Plan provides an overview of the strategy, methods and controls implemented as part of the Wangetti South Section to manage the issue of weeds, pests and diseases. Specifically, this WPDMP identifies weeds, pests and potential diseases within the Wangetti South Section and describes management strategy, to identify, avoid and, prevent/minimise and control the introduction of and spread of weeds, pests and diseases within the Wangetti South Section and to neighbouring areas.
	f) Preliminary Traffic Management Plan	**Section 5.2.6:** Traffic Management Plan
		Section 5.2.6: Assessment of the expected or predicted effectiveness of the proposed mitigation measures
		Appendix D of the EMP (Appendix B of this document): Preliminary Traffic Management Plan The Preliminary Traffic Management Plan provides preliminary guidance to help establish appropriate traffic control and traffic management procedures manage potential hazards associated with the traffic environment during the Project and to reduce potential adverse impacts to people and wildlife during the construction and operational phases of the Project.
	g) Matters of National Environmental Significance (MNES) flora pre-clearance survey methodology	**Section 5.2.7:** MNES flora pre-clearance survey methodology
		Section 5.2.7: Assessment of the expected or predicted effectiveness of the proposed mitigation measures
		Appendix F of the EMP (Appendix B of this document): MNES pre-clearance survey methodology The purpose of the Matters of National Environmental Significance flora pre-clearance survey methodology was to outline the pre-clearance survey

RFI No.	RFI	Where this is addressed in the document
		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.
6	Rehabilitation requirements Further, the stand-alone document must summarise the proposed rehabilitation activities for all disturbed areas associated with the proposed action. At a minimum, the stand-alone document must include details on: • Rehabilitation acceptance criteria, including a discussion of how the rehabilitation will restore habitat for relevant listed threatened species, in particular the southern cassowary and opal cling goby. • Procedures, including contingency measures that will be undertaken to achieve the rehabilitation acceptance criteria. • A monitoring program to determine the success of the rehabilitation activities implemented by the proponent.	**Section 6.2** Response to the information request
7	Environmental offsets – residual significant impacts	**Section 7 Environmental offset - Residual significant impacts**
	An assessment of residual significant impacts, in accordance with the Offsets Policy, on relevant listed threatened species and communities, and the World and National Heritage values of the Wet Tropics of Queensland. If it is determined that a residual significant impact is likely, include a draft Offset Management Strategy that provides, at a minimum:	**Section 7.2.1** Background
		Section 7.2.2 Offset methodology
		Section 7.2.3 Impact area
		Section 7.2.4 The cost estimate per hectare for rehabilitating an area from low to high quality habitat, provided in consultation with an NRM group

RFI No.	RFI	Where this is addressed in the document
	• the nature of the conservation gain to be achieved for relevant MNES; • details of the environmental offset/s (in hectares) for residual significant impacts of the proposed action on relevant MNES; • details of potential offset area/s (including a map) to compensate for the residual significant impact on relevant MNES; • details of how the environmental offset/s meets the requirements of the Offsets Policy, available at: www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy; • for each relevant listed threatened species and ecological community, the methodology, with justification and supporting evidence, used to inform the inputs of the Offsets Assessment Guide in relation to the project area, including: – quantum of impact – area (in hectares) – quantum of impact – quality (using the Queensland Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy [Version 1.2, April 2017], or subsequent revision) • for each relevant listed threatened species and ecological community, the methodology, with justification and supporting evidence, used to inform the inputs of the	**Section 7.2.5** Alternative offset approaches, being Queensland Environmental Offsets Policy proponent-driven land-based or financial settlement offset options **Section 7.2.6** Comparison with direct offset for a suitable area for a land-based offset that achieves an offset requirements for residual impacts **Section 7.2.7** Proposed total cost estimate for a suitable rehabilitation area that meets the offset calculator area requirements **Section 7.2.8** Selection of a preferred suitable NRM group **Section 7.2.9** Identifying the preferred offset approach, including conservation gain benefits **Appendix D:** Cassowary Recovery Plan Objectives and Actions Appendix E outlines the objectives of the Cassowary Recovery Plan, along with the relevant performance criteria, actions and potential contributors. **Appendix E:** Existing Cassowary conservation groups Appendix F outlines the existing Cassowary Conservation Groups that operate in the area, along with who they are and what programs they are involved in. It includes the following groups: • Daintree Region Cassowary Group Inc • Kuranda Conservation Community Nursery • Community for Coastal and Cassowary Conservation Inc • Terrain Natural Resource Management • Girringun Aboriginal Corporation

RFI No.	RFI	Where this is addressed in the document
	Offsets Assessment Guide in relation to each potential offset area/s, including: – –time over which loss is averted (max. 20 years) – –time until ecological benefit – –risk of loss (%) without offset – –risk of loss (%) with offset – –confidence in result (%) • evidence that the relevant listed threatened species and communities, and/or their habitat, can be present in the potential offset area/s; • information about how the potential offset area/s provides connectivity with other relevant habitats and biodiversity corridors; and • details of the mechanism to legally secure the environmental offset/s (under Queensland legislation or equivalent) to provide enduring protection for the potential offset area/s against development incompatible with conservation.	• Cassowary Recovery Team • Rainforest Reserves
8	Social and economic matters	**Section 8.2** Response to the information request
	a) details of any further public consultation activities undertaken since the referral was submitted, including any consultation with Indigenous stakeholders, and their outcomes	**Section 8.2.1** Public consultation

RFI No.	RFI	Where this is addressed in the document
	b) projected economic costs and benefits of the project (in dollars), including the basis for their estimation through cost/benefit analysis or similar studies	**Section 8.2.2** Projected economic costs and benefits and employment opportunities
	c) employment opportunities expected to be generated by the proposed action (including construction, operational and maintenance stages).	**Section 8.2.3** Non-monetisable benefits
9	Ecologically sustainable development	**Section 9.2** Response to the information request
10	Environmental record of person proposing to take the action	**Section 10.2** Response to the information request

This additional information, together with the referral and supporting attachments (EPBC 2020/8722) comprises the preliminary documentation. Where information is included in the referral suite it is not reproduced in this report. Appropriate references are provided.

The Referral documentation comprised:

- EPBC Act referral (EPBC 2020/8722)
- Attachment A Summary of Project
- Attachment B Construction Methodology
- Attachment C Baseline Ecology and Impact Assessment Report
- Attachment D Desktop searches
- Attachment E Ecology survey sites
- Attachment F Location of survey methods
- Attachment G Likelihood of occurrence
- Attachment H Shape Files
- Attachment I Orange Tamarind / Ant Plant Habitat Mapping
- Attachment J Cassowary Habitat Mapping
- Appendix K Cling Goby Habitat Mapping
- Appendix L Habitat Types
- Appendix M Migratory Birds Habitat Mapping
- Appendix N Mitigation methods
- Appendix O Wangetti Preliminary and Maintenance Schedule
- Appendix P Consultation Report
- Appendix Q Yirrganydji Letter of Support

2. Impact assessment – Listed threatened species and communities

2.1 Information request

Based on the information available to date, DAWE considers the proposed action will have a significant impact on the endangered Southern Cassowary (*Casuarius casuarius johnsonii*) as a result of habitat clearance (both permanent and temporary), fragmentation of habitat, increased human disturbance and other indirect impacts. DAWE also notes there are cumulative impacts on the species associated with the proposed Wangetti Trail North Project (EPBC 2020/8723).

DAWE notes the proponent's intent to avoid, mitigate and manage impacts on listed threatened species and communities as described in the referral documentation. However, DAWE considers that, in the absence of clarity and specificity for some key measures, there is potential for the proposed action to have a significant impact on:

- Opal Cling Goby (*Stiphodon semoni*) - Critically Endangered
- Australian Lace-lid (*Litoria dayi*) - Vulnerable
- Waterfall Frog (*Litoria nannotis*) - Endangered
- Mountain Mistfrog (*Litoria nyakalensis*) - Critically Endangered
- Common Mistfrog (*Litoria rheocola*) - Endangered
- *Canarium acutifolium* - Vulnerable
- *Diplazium cordifolium* – Vulnerable
- *Diplazium pallidum* - Endangered
- Ant Plant (*Myrmecodia beccarii*) - Vulnerable
- *Phaius pictus* - Vulnerable
- Native Moth Orchid (*Phalaenopsis amabilis* subsp. *Rosenstromii*) - Endangered
- *Polyscias bellendenkerensis* - Vulnerable
- Orange Tamarind (*Toechima pterocarpum*) - Endangered
- Dwarf Butterfly Orchid (*Vappodes lithocola*) – Endangered (also known as *Dendrobium lithocola* and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*)
- Cooktown Orchid (*Vappodes phalaenopsis*) – Vulnerable (also known as *Vappodes phalaenopsis* and the Queensland Flora Census 2019 recognises this species as *Dendrobium bigibbum*)
- Velvet Jewel Orchid (*Zeuxine polygonoides*) - Vulnerable (note – the Queensland Flora Census 2019 recognises this species as *Rhomboda polygonoides*)
- Dark-stemmed Antler Orchid (*Dendrobium mirbelianum*) - Endangered

Southern Cassowary

The referral states '*local species at risk, such as the southern cassowary have been shown to habituate to human activity at high use areas'* and the '*potential for disturbance of wildlife behaviour through noise and vibration is considered low'*. Justification is required to support these statements.

Provide further justification, with supporting evidence (e.g. published scientific literature, expert advice, monitoring data, etc.), that demonstrates that the operation of the proposed action will not result in ongoing indirect impacts on the Southern Cassowary. The discussion must consider potential changes to foraging and breeding/nesting behaviour of the species due to:

a. Barrier effects and fragmentation of habitat

b. Increased interactions with trail users, including from injury and mortality from bike collisions, increased noise and light impacts, and the risk of feeding and presence of dogs.

Opal Cling Goby

The referral states that the Opal Cling Goby occurs in two creeks within the project area (Turtle Creek and Spring Creek) based on surveys of three streams in the project area conducted for Ebner et al. (2016). DAWE's Species Profile and Threats (SPRAT) Database outlines habitat for the Opal Cling Goby as '*rainforest streams that have significant flow and direct access to marine habitats*' with a very restricted geographic distribution within the Wet Tropics region of far north Queensland.

Based on the information available to date, and the lack of targeted field surveys for the species in and around the project area, DAWE considers that the referral may underestimate the extent of habitat for the Opal Cling Goby to be potentially impacted by the proposed action.

Provide a revised impact assessment for the Opal Cling Goby, and its known and potential habitat, with consideration of:

a. The information available in the SPRAT Database and other desktop resources

b. Published scientific literature and/or expert advice

c. Information derived from field surveys undertaken for the proposed action (e.g. surface water flow data)

d. Other relevant sources.

The preliminary documentation must include updated mapping of all known and potential habitat for the Opal Cling Goby within, and upstream and downstream of, the project area. The maps must also include an overlay of the disturbance footprint for the proposed action.

All impacts, including direct, indirect and consequential, on the Southern Cassowary and Opal Cling Goby, and their habitat, must be assessed in accordance with relevant Departmental policies and guidelines, the SPRAT Database, and relevant conservation advices, recovery plans and threat abatement plans. Departmental documents regarding these listed threatened species can be found at: www.environment.gov.au/cgi-bin/sprat/public/sprat.pl.

2.2 Response to information request

2.2.1 Listed threatened species

Table 2.1 discusses the MNES species (identified by DAWE in Section 2.1) that were categorised as either 'may occur' or 'likely to occur' within the Wangetti South Section Project area based on the outcomes of the likelihood of occurrence assessment which has been informed by both a desktop and subsequent field validation. Table 2.1 discusses the environmental control measures to be implemented for the project to avoid, mitigate and manage impacts on MNES species. The effectiveness of the various environmental controls are also considered and are discussed in detail in Section 5 of this document.

Table 2.1 An assessment of listed threatened species and communities within Wangetti South project area and environmental controls to avoid, mitigate and manage impacts

Species	EPBC Act status	Desktop source	Habitat preference	Likelihood of occurrence	Comments
Canarium acutifolium	V	PMST	In Australia, this species occurs between Mossman and Tully in Queensland (Hyland and Whiffin 1993). Collections of this tree species have previously occurred in mesophyll vine forests along rivers and creeks at altitudes of 5 m to 200 m (Department of the Environment, Water, Heritage and the Arts (DEWHA) 2008a).	**May occur** Suitable habitat was recorded during the field survey; however no records occur in the desktop search extent.	The preferred habitat for this species is dense, primary rainforest, also in the more open, secondary formations; especially along forest-edges, riverbanks and in clearings (DEWHA 2008a). The species habitat is located between 5 and 200 m AHD (DEWHA 2008a). Potential *Canarium acutifolium* habitat within Wangetti South Project is shown in Appendix A. A Preliminary Construction Environmental Management Plan and a Matters of National Environmental Significance flora pre-clearance survey methodology document have been developed to manage potential impacts to threatened flora species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B). Matters of National Environmental Significance flora pre-clearance survey methodology document outlines 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. Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Dendrobium mirbelianum (Dark-stemmed antler orchid)	E	PMST	Occurs from the Daintree area to Innisfail. Grows mainly on trees (epiphytic) in mangroves and coastal swamps in humid locations and has also been recorded growing on rocks (epilithic). This species grows at altitudes of 2 m to 150 m (DEWHA 2008b). Flowering is variable, generally occurring between August and November (Jones 2006).	**May occur** Marginal habitat was recorded during the field survey, however no records occur in the desktop search extent.	Potential Dark-stemmed antler orchid habitat within Wangetti South Project is shown in Appendix A. A Preliminary Construction Environmental Management Plan and a Matters of National Environmental Significance flora pre-clearance survey methodology document have been developed to manage potential impacts to threatened flora species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B). Matters of National Environmental Significance flora pre-clearance survey methodology document outlines 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. Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Diplazium cordifolium	V	PMST	Occurs in north-east Queensland around Cairns, Herberton and Wooroonooran, mostly on private land (Croft 1999; Queensland EPA 2008). Occurs in rainforests, along creek banks.	**May occur** Marginal habitat was recorded during the field survey, and no records occur in the desktop search extent.	Potential *Diplazium cordifolium* habitat within Wangetti South Project is shown in Appendix A. A Preliminary Construction Environmental Management Plan and a Matters of National Environmental Significance flora pre-clearance survey methodology document have been developed to manage potential impacts to threatened flora species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B). Matters of National Environmental Significance flora pre-clearance survey methodology document outlines 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. Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Diplazium pallidum	E	PMST	A Wet Tropics fern growing in lowland rainforest, particularly near streams, but has not been found growing in creeks. It occurs on basalt soils. This species is conserved in Wooroonooran National Park (DEWHA 2008c).	**May occur** Marginal habitat was recorded during the field survey, and no records occur in the desktop search extent.	Potential *Diplazium pallidum* habitat within Wangetti South Project is shown in Appendix A. A Preliminary Construction Environmental Management Plan and a Matters of National Environmental Significance flora pre-clearance survey methodology document have been developed to manage potential impacts to threatened flora species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B).

Species	EPBC Act status	Desktop source	Habitat preference	Likelihood of occurrence	Comments
					Matters of National Environmental Significance flora pre-clearance survey methodology document outlines 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. Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Myrmecodia beccarii (Ant plant)	V	PMST	This species is known from the coastal woodlands between Cooktown and Ingham in Queensland (DEWHA 2008c) and occurs in open woodland dominated by *Melaleuca viridiflora* or mangroves (Forster 2000; DEWHA, 2008d).	**Likely to occur** Suitable habitat was recorded in areas of the RE 7.3.8 during the field survey, primarily in the vicinity of Palm Cove and Wangetti Beach. No records were identified in the desktop searches; however, field surveys confirmed the species presence within the Mowbray North survey area which is outside of Wangetti South Section.	Potential Ant Plant habitat within Wangetti South Project is shown in Appendix A. A Preliminary Construction Environmental Management Plan and a Matters of National Environmental Significance flora pre-clearance survey methodology document have been developed to manage potential impacts to threatened flora species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B). Matters of National Environmental Significance flora pre-clearance survey methodology document outlines 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. Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Phaius pictus	V	PMST	This species is highly localised and restricted to rainforests from 0 m to 600 m altitude. It usually occurs in sheltered humid sites, close to streams and seepage among forest litter on boulders (Jones 2006). Flowering occurs between April and June (Jones 2006).	**May occur** Suitable habitat was recorded in the project area; however, no records occur in the desktop search extent.	*Phaius pictus* 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 among forest litter on boulders (Jones 2006). Potential *Phaius pictus* habitat within Wangetti South Project is shown in Appendix A. A Preliminary Construction Environmental Management Plan and a Matters of National Environmental Significance flora pre-clearance survey methodology document have been developed to manage potential impacts to threatened flora species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B). Matters of National Environmental Significance flora pre-clearance survey methodology document outlines 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. Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Phalaenopsis amabilis subsp. *rosenstromii* (Native moth orchid)	E	PMST	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, at altitudes between 200 m-500 m (DAWE 2019). Flowering occurs between December and April (Jones 1988).	**May occur** Suitable habitat was recorded in the project area; however, no records occur in the desktop search extent.	Native moth orchid 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). It occurs between 200 and 500 m AHD (Jones 2006). Potential habitat for the species within Wangetti South Project is shown in Appendix A. A Preliminary Construction Environmental Management Plan and a Matters of National Environmental Significance flora pre-clearance survey methodology document have been developed to manage potential impacts to threatened flora species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B). Matters of National Environmental Significance flora pre-clearance survey methodology document outlines 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.

Species	EPBC Act status	Desktop source	Habitat preference	Likelihood of occurrence	Comments
					Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Polyscias bellendenkerensis	V	PMST	Occurs in north-east Queensland in mountain rainforests. Records have been collected from Mount Bartle Frere, Mount Bellenden Ker, Mossman Bluff and the upper reaches of Saltwater Creek, north-west of Mossman, at altitudes of 1100 m to 1600 m. Grows in microphyll vine/fern thickets, notophyll vine forest and stunted shrublands (Elliot and Jones 1997).	**May occur** Marginal habitat was recorded during the field survey, and no records occur in the desktop search extent.	The *Polyscias bellendenkerensis* Grows in microphyll vine/fern thickets, notophyll vine forest and stunted shrublands (Elliot and Jones 1997). The species occurs between 1100 and 1600 m AHD (Elliot and Jones 1997). Due to the elevation requirement, the species is not considered to occur within the project area. Despite this a Preliminary Construction Environmental Management Plan and a Matters of National Environmental Significance flora pre-clearance survey methodology document have been developed to manage potential impacts to threatened flora species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B). Matters of National Environmental Significance flora pre-clearance survey methodology document outlines 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. Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Toechima pterocarpum (Orange tamarind)	E	PMST; Wildlife Online; Essential Habitat	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).	**Likely to occur** Suitable habitat was recorded in the project area, generally in association with stream crossings, and this species has been previously recorded in the Hartley Creek and Turtle Cove/Oak Beach areas.	The orange tamarind 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). Potential orange tamarind habitat within Wangetti South Project is shown in Appendix A. A Preliminary Construction Environmental Management Plan and a Matters of National Environmental Significance flora pre-clearance survey methodology document have been developed to manage potential impacts to threatened flora species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B). Matters of National Environmental Significance flora pre-clearance survey methodology document outlines 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. Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Vappodes lithocola (Dwarf butterfly orchid) (Also known as *Dendrobium lithocola,* and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*)	E	PMST; wildlife online	Species occurs in coastal ranges between Daintree and Cairns, growing in rainforest on rocks, boulders and cliff faces on ridges and slopes at altitudes of 250 m to 800 m above sea level (Dockrill 1992; Barker 1997; DAWE 2019).	**Likely to occur** Suitable habitat was recorded in mesophyll and notophyll vine forest along much of the project area, and records exist within the desktop search extent. Note – Wildlife Online identifies records for *Dendrobium bigibbum* within the desktop search. Correspondence with the Queensland Herbarium and collector of these records has been undertaken and it was confirmed that the records are for *Dendrobium bigibbum* var. *compactum* which is the synonym for *Vappodes lithocola*.	The dwarf butterfly orchid occurs in coastal ranges between Daintree and Cairns, growing in rainforest on rocks, boulders and cliff faces on ridges and slopes (Jones 2006). It occurs between 300 and 800 m AHD (Jones 2006). Potential habitat for the species within Wangetti South Project is shown in Appendix A. A Preliminary Construction Environmental Management Plan and a Matters of National Environmental Significance flora pre-clearance survey methodology document have been developed to manage potential impacts to threatened flora species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B). The Matters of National Environmental Significance flora pre-clearance survey methodology document outlines 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.

Species	EPBC Act status	Desktop source	Habitat preference	Likelihood of occurrence	Comments
					Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Vappodes phalaenopsis (Cooktown orchid) (Also known as *Dendrobium phalaenopsis* and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*)	V	PMST	Species occurs from Cooktown to Font Hills west of Mt Molloy, Queensland and within the Cape York Bioregion and is locally common within its restricted range. Species grows on trees and rocks in coastal scrub, littoral rainforest, riverine vegetation, monsoon thickets, swamps and gullies in open forests at altitudes of up to 400 m above sea level (DAWE 2019). Flowering occurs between March and July (Jones 2006).	**Likely to occur** Due to the presence of historic records within the desktop search extent together with the presence of potentially suitable habitat in mesophyll and notophyll vine forest in the project area.	The Cooktown orchid grows on trees and rocks in coastal scrub, littoral rainforest, riverine vegetation, monsoon thickets, swamps and gullies in open forests at altitudes of up to 400 m above sea level (Jones 2006). Potential Cooktown orchid habitat within Wangetti South Project is shown in Appendix A. A Preliminary Construction Environmental Management Plan and a Matters of National Environmental Significance flora pre-clearance survey methodology document have been developed to manage potential impacts to threatened flora species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B). Matters of National Environmental Significance flora pre-clearance survey methodology document outlines 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. Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Zeuxine polygonoides (Velvet jewel orchid) (also known as *Rhomboda polygonoides*)	V	PMST; Wildlife Online	Confined to north-east Queensland, occurring from near Kuranda to the Cardwell Range. It inhabits moist shady sites in rainforests (mesophyll vine forests and simple notophyll vine forests). This species grows in mostly moist, cloudy or wet rainfall zones on metamorphic substrates, granite or rhyolite. The species can be found in humus on flat topped rocks in association with *Anoectochilus yatesiae*, *Goodyera viridiflora* and *Liparis simmondsii.* The distribution of this species overlaps with the "Mabi Forest (Complex Notophyll Vine Forest 5b)" EPBC Act-listed Critically Endangered ecological community (DAWE 2019).	**Likely to occur** Potentially suitable habitat was recorded in mesophyll and notophyll vine forest in the project area, and records exist within the desktop search extent.	The velvet jewel orchid occurs in notophyll vine forest. This species grows in mostly moist, cloudy or wet rainfall zones on metamorphic substrates, granite or rhyolite (Jones 2006). Potential velvet jewel orchid habitat within Wangetti South Project is shown in Appendix A. A Preliminary Construction Environmental Management Plan and a Matters of National Environmental Significance flora pre-clearance survey methodology document have been developed to manage potential impacts to threatened flora species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B). The Matters of National Environmental Significance flora pre-clearance survey methodology document outlines 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. Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Litoria dayi (Australian lace lid)	E	PMST	Species inhabits rainforest communities. Species prefers fast-flowing rocky streams as well as slower streams with ample vegetation in montane areas, whilst prefers rock soaks, narrow ephemeral streams and rock outcrops in larger watercourses (DAWE 2019). According to the conservation advice for the species prepared by Threatened Species Scientific Committee in 2018,	**May occur** Potentially suitable habitat was recorded during the field survey along the waterways intersected by the shared use trail. However, no records occur within the desktop search extent. No sighting of this species or evidence of this species within the Wangetti South Section during the ecological surveys in 2019.	A Preliminary Construction Environmental Management Plan (CEMP) have been developed to manage potential impacts to threatened frog species during the construction phase (refer to the Preliminary Environmental Management Plan in Appendix B). A Preliminary Weed, Pests and Disease Management Plan (WPDMP) has been developed to manage potential impacts to threatened frog species during the construction phase (refer to the Preliminary Environmental Management Plan in Appendix C). The WPDMP provides an overview of the strategy, methods and controls implemented as part of the Wangetti South Section to manage the issue of weeds, pests and diseases. Specifically, this WPDMP identifies weeds, pests and potential diseases within the Wangetti South Section and describes management strategy, to identify, avoid and, prevent/minimise and control the introduction of and spread of weeds, pests and diseases within the Wangetti South Section and to neighbouring areas.

Species	EPBC Act status	Desktop source	Habitat preference	Likelihood of occurrence	Comments
			the Lace-eyed Tree Frog is endemic to the Wet Tropics Bioregion from Paluma to Cooktown, northern Queensland, at altitudes between sea level and 1200 m above sea level. The species disappeared from altitudes above 400 m in the early 1990s, however lowland populations still persist (McDonald and Alford 1999). Before its decline, the extent of occurrence of this species was approximately 9000 km².		Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Litoria nannotis (Waterfall frog)	E	PMST	Species is restricted to rocky stream habitats in rainforest or wet sclerophyll forests with fast-flowing water, waterfalls and cascades (DAWE 2020; Hodgkison and Hero 2001).	**May occur** Potentially suitable habitat was recorded during the field survey along the waterways intersected by the shared use trail. However, no records occur within the desktop search extent. The majority of watercourses within the study area were ephemeral and did not contain fast-flowing water. No sighting of this species or evidence of this species within the Wangetti South Section during the ecological surveys in 2019.	A CEMP and WPDMP have been developed to manage potential impacts to threatened frog species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B). The WPDMP provides an overview of the strategy, methods and controls implemented as part of the Wangetti South Section to manage the issue of weeds, pests and diseases. Specifically, this WPDMP identifies weeds, pests and potential diseases within the Wangetti South Section and describes management strategy, to identify, avoid and, prevent/minimise and control the introduction of and spread of weeds, pests and diseases within the Wangetti South Section and to neighbouring areas. Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Litoria nyakalensis (Mountain Mistfrog)	CE	PMST	This species has not been sighted since 1990, despite intensive investigations since that year up to 2013. This species formerly occurred across two-thirds of the Wet Tropics Region from Douglas Creek near Cardwell to Alexandra Creek and Thornton Peak. It is a rainforest specialist species, endemic to the Wet Tropics Bioregion. It is found in upland rainforest and wet sclerophyll forest along fast-flowing streams (DAWE 2019).	**May occur** Potentially suitable habitat was recorded during the field survey along the waterways intersected by the shared use trail However, no records occur within the desktop search extent. No sighting of this species or evidence of this species within the Wangetti South Section during the ecological surveys in 2019.	A CEMP and WPDMP have been developed to manage potential impacts to threatened frog species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B). The WPDMP provides an overview of the strategy, methods and controls implemented as part of the Wangetti South Section to manage the issue of weeds, pests and diseases. Specifically, this WPDMP identifies weeds, pests and potential diseases within the Wangetti South Section and describes management strategy, to identify, avoid and, prevent/minimise and control the introduction of and spread of weeds, pests and diseases within the Wangetti South Section and to neighbouring areas. Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.
Litoria rheocola (Common mistfrog)	E	PMST	Species is restricted to fast-flowing rocky creeks and streams in rainforest as well as wet sclerophyll forest. Within these streams, the species is often found in the slower sections, away from waterfalls (DAWE 2019). The common mistfrog occurs in rainforests north of the Herbert River in the Wet Tropics Biogeographical Region from Broadwater Creek National Park to Amos Bay from 0 - 1180 m above sea level. The species	**May occur** Potentially suitable habitat was recorded during the field survey along the waterways intersected by the shared use trail. However, no records occur within the desktop search extent. No sighting of this species or evidence of this species within the Wangetti South Section during the ecological surveys in 2019.	A CEMP and WPDMP have been developed to manage potential impacts to threatened frog species during the construction phase (they are found in the Preliminary Environmental Management Plan in Appendix B). The WPDMP provides an overview of the strategy, methods and controls implemented as part of the Wangetti South Section to manage the issue of weeds, pests and diseases. Specifically, this WPDMP identifies weeds, pests and potential diseases within the Wangetti South Section and describes management strategy, to identify, avoid and, prevent/minimise and control the introduction of and spread of weeds, pests and diseases within the Wangetti South Section and to neighbouring areas. Section 5 of the document outlines the key environmental controls to be implemented for the project and their effectiveness to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.

Species	EPBC Act status	Desktop source	Habitat preference	Likelihood of occurrence	Comments
			disappeared from all upland areas (higher than 400 m) south of the Daintree River in the early 1990's (Richards et al. 1993). Lowland populations still persist (McDonald and Alford 1999).		

2.2.2 Cooktown orchid (*Vappodes lithocola)*

Species description

Vappodes lithocola was rated as likely to occur within the project area due to the presence of historic records within the desktop search extent together with the presence of potentially suitable habitat. This species is listed as endangered under the EPBC Act.

This species is a lithophytic (rock-growing) orchid with prominently swollen, conical pseudobulbs that are green or purplish and leafy in the upper third (DAWE 2020). Each pseudobulb has 3 to 5 green leaves that grow to 12 cm long and 25 mm wide. Racemes are 10 to 30 cm long and carry one to eight flowers. Flowers are usually lilac-purple, or occasionally white or bluish. Flowering occurs between March and July and flowers last for one month (DAWE 2020).

Vappodes lithocola is highly localised, occurring in the coastal ranges between Daintree and Cairns, Queensland (Jones, 2006). It is confined to the Macalister Range between the Barron and Mossman Rivers and a record exists from Hartley Creek near Cairns (DAWE 2020). *Vappodes lithocola* grows in rainforest areas on rocks, boulders and cliff faces on ridges and slopes at altitudes of 300 to 800 m above sea level. Plants are often exposed to the sun and can withstand long periods of hot, dry conditions (Jones 2006; DAWE 2020).

Recognised threats to the species include illegal collection, inappropriate fire regimes; vegetation clearing and weed infestation (DAWE 2020).

Nature and extent of impact

No *Vappodes lithocola* individuals were recorded within the project area, and no direct impact to the species is proposed.

Potentially suitable habitat for *Vappodes lithocola* is present within the project area. An extent of 0.07 ha is located within the permanent footprint and 0.05 ha within the temporary footprint, representing 2.6 percent and 1.7 percent, respectively, of the local habitat for this species (being habitat within 5 km from project footprint, not including footprint).

Potential impacts to the species and its potentially suitable habitat include the following:

- Reduction in the extent of the habitat as a result of vegetation clearing
- Fragmentation of habitat as a result of vegetation clearing
- Degradation of the habitat as a result of the following:
  - Disturbance during construction
  - Introduction and/or spread of weeds during and/or post construction
  - Damage due to recreation use post construction
- Illegal collection of individuals due to increased accessibility to the habitat

Important populations and habitat critical to survival

Habitat critical to the survival of *Vappodes lithocola* has not been formally defined and it is currently not known whether the habitat in the local landscape represents ‘habitat critical to the survival of the species’ as described by the MNES Significant Impact Guidelines 1.1 (Department of Environment (DoE) 2013). Determination of whether the habitat supports a local population that is necessary for the long-term maintenance of the species or the maintenance of genetic diversity will largely be dependent on the size of the local population. Given the surveys undertaken to date have not detected the species, it is unlikely that a large population will be present within the project area. Nevertheless, as the size of a population that may be detected in the future is not currently known, a precautionary approach was adopted for the purposes of

this assessment and it was assumed that any detected population of this species may constitute an important population and that the habitat may be critical to survival of the species.

Significance of impact

No significant impact to *Vappodes lithocola* is anticipated to occur as a result of the proposed works, as described in Table 2.2.

Table 2.2 Significant impact assessment for *Vappodes lithocola*

An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:	Response
Lead to a long-term decrease in the size of a population; or	Unlikely No long-term decrease in the size of a population is expected to occur as no loss of *Vappodes lithocola* individuals is anticipated, as described below. Prior to construction, a pre-clearance survey will be undertaken to search for *Vappodes lithocola* (and other threatened species). The details of the survey have been documented within the project specific MNES Flora Pre-clearance Survey Methodology (GHD 2020). This survey 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 width of the project footprint (i.e. maximum 2.5 m width including temporary and permanent footprints), 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 undertaking the survey to demonstrate significant experience in the specific ecosystems and relevant species provides assurance in the outcomes of the survey. Where any *Vappodes lithocola* (or other threatened species) are observed, it will be possible to achieve avoidance of impact to any recorded individuals. Specifically, given the flexibility of the precise project footprint location (1.5 m wide) within the construction allowance corridor (40 m wide), 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 approach is expected to be highly effective in achieving avoidance of potential impacts to MNES flora species for the following reasons: • The size of individuals and population characteristics of *Vappodes lithocola* are such that the 40 m wide construction allowance corridor is expected to provide sufficient space for avoidance of impacts to a 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.

An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:	Response
	• Where an MNES flora species is encountered, the tree protection zone of the individual tree (or the host tree / adjacent tree, as relevant to the particular flora species) is to be determined and an exclusion zone established. In accordance with Australian Standard Protection of Trees on Development Sites (AS 4970-2009), the formula to use is: Tree Protection Zone radius = DBH (trunk diameter measured at 1.4 m above ground) x 12 For trees with a diameter at breast height larger than 1.5 m, a maximum tree protection zone radius of 18 m is to be established. As per AS 4970-2009, encroachment of up to 10 percent of the tree protection zone is allowable when the suitably qualified and experienced the botanist/ecologist assesses that this will not adversely affect plant health. Of particular importance, this will take into consideration the risk of illegal collection of *Vappodes lithocola* individuals due to the increased accessibility of its habitat as a result of the project.
Reduce the area of occupancy of the species; or	Unlikely As no loss of *Vappodes lithocola* individuals is anticipated to occur due to the flexibility of the project footprint location (see response to criterion above for further details), no reduction in the area of occupancy of *Vappodes lithocola* is anticipated to occur.
Fragment an existing population into two or more populations; or	Unlikely Based on the very narrow permanent disturbance footprint (1.5 m), the project will not fragment a *Vappodes lithocola* population into two or more populations. Specifically, following vegetation removal within the 1.5 m wide footprint, it is expected that the remaining *Vappodes lithocola* population will continue to function as a contiguous unit as the clearing width and proposed operation and land use activities is not sufficient to cause isolation of habitat or disruption of ecological processes.
Adversely affect habitat critical to the survival of a species; or	Unlikely Aside from the very localised reduction in the extent of potentially suitable habitat for *Vappodes lithocola* within the 1.5 m wide footprint (as described below), no further adverse effects to habitat are anticipated to occur. Specifically, the following project-specific plans have been prepared to provide strategies to avoid adverse impacts to habitat: • WPDMP • Concept Erosion and Sediment Control Plan (CESCP) (GHD 2020) • CEMP with relevant components including the following: – Biodiversity – Bushfire – Chemical and fuel management – Water management – Waste management
Disrupt the breeding cycle of a population; or	Unlikely Due to the complexity of the flower, orchids typically require an insect pollinator to transfer pollinia from one flower to another (rather than

An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:	Response
	being wind-pollinated or autonomously self-fertilising). Due to the very narrow proposed permanent footprint of the project (1.5 m) and benign and intermittent land use activities proposed, no impact to the presence or movement of insect pollinators is anticipated to occur such that dispersal of *Vappodes lithocola* pollinia across the local landscape is expected to continue into the future.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; or	Unlikely Destruction of potentially suitable habitat for *Vappodes lithocola* will occur on a very localised scale (1.5 m wide project footprint). Specifically, an extent of 0.07 ha is located within the permanent footprint and 0.05 ha within the temporary footprint, representing 2.6 percent and 1.7 percent, respectively, of the total mapped habitat within the construction corridor allowance. However, no decline of the species is anticipated to occur based on the following reasons: • No loss of individuals is anticipated to occur. • No edge effects or modification of remaining habitat is anticipated to occur owing to the project-specific management plans that will be implemented to mitigate potential impacts to habitat (see response above for further details). • The project footprint is very narrow (1.5 m width) such that no isolation of habitat will occur as it is expected that the remaining vegetation will continue to function as a contiguous unit.
Result in invasive species that are harmful to an endangered species becoming established in the endangered species' habitat; or	Unlikely Disturbance works during construction as well as recreational activity during operation have the potential to facilitate establishment of invasive species. Therefore, a project-specific Weed, Pest and Disease Management Plan has been prepared (GHD 2020a) to detail strategies to mitigate the risk of invasive species introduction and spread. Strategies detailed by the WPDMP are based on the following principals: 1. Identify – weeds and pest species and diseases 2. Avoid – traversing and placing infrastructure in areas of known infestation 3. Prevent/Minimise – the translocation/spread of pest and weed species by implementing sound work practices and promotion of risk awareness. 4. Control – Identified pest and weeds to contain, reduce or eradicate population as required
Introduce disease that may cause the species to decline; or	Unlikely Disease is not documented to be a threat to *Vappodes lithocola.* Nevertheless, a project-specific WPDMP to detail strategies to mitigate the risk of disease introduction and spread.
Interfere with the recovery of the species.	Unlikely The proposed works are considered highly unlikely to adversely affect the potential recovery of *Vappodes lithocola*, specifically: • No loss of individuals is anticipated to occur owing to the comprehensive pre-clearance surveys together with the flexibility of the project footprint location; • Loss of potentially suitable habitat will be very localised within a very narrow footprint; • No fragmentation of habitat or disruption of breeding processes is anticipated to occur owing to the very narrow project footprint; and

An action is likely to have a significant impact on an endangered species if there is a real chance or possibility that it will:	Response
	• Adverse impacts to potentially suitable habitat during construction and operation can be mitigated through implementation of a number of site-specific management plans.

2.2.3 Velvet jewel orchid (*Zeuxine polygonoides)*

Species description

Zeuxine polygonoides was rated as likely to occur within the project area due to the presence of historic records within the desktop search extent together with the presence of potentially suitable habitat. This species is listed as vulnerable under the EPBC Act.

This species is a terrestrial orchid growing to 15 to 30 cm tall. The stem is 5 to 10 cm long and bears three to five leaves clustered at the apex and two to four reduced leaves scattered lower down. The upper leaves have blades 3 to 8 cm long and 1.2 to 2.2 cm wide and are dark velvet green or bronze green with a broad white stripe running along the middle of the leaf. The inflorescence is 8 to 15 cm long and bears five to 14 loosely arranged flowers 5–6. The three sepals are green, the two petals and the labellum (lip) is white. Flowering occurs mainly from June to August (DAWE 2020).

Zeuxine polygonoides occurs in three locations in north-east Queensland between the Paluma Range and the Daintree River, at altitudes of 450 to 600 m (DAWE 2020). It inhabits moist shady sites in rainforests (mesophyll vine forests and simple notophyll vine forests) in leaf litter on the ground or on large boulders adjacent to streams (DAWE 2020).

Recognised threats to the species include illegal collection and disturbance of habitat by pigs (DAWE 2020).

Nature and extent of impact

No *Zeuxine polygonoides* individuals were recorded within the project area, and no direct impact to the species is proposed.

Potentially suitable habitat for *Zeuxine polygonoides* is present within the project area. An extent of 3.2 ha is located within the permanent footprint and 1.9 ha within the temporary footprint, representing 2.7 percent and 1.6 percent, respectively, of the local habitat for this species (being habitat within 5 km from project footprint, not including footprint).

Potential impacts to the species and its potentially suitable habitat include the following:

- Reduction in the extent of the habitat as a result of vegetation clearing
- Fragmentation of habitat as a result of vegetation clearing
- Degradation of the habitat as a result of the following:
  - Disturbance during construction
  - Introduction and/or spread of weeds during and/or post construction
  - Damage due to recreation use post construction
- Illegal collection of individuals due to increased accessibility to the habitat

Important populations and habitat critical to survival

Habitat critical to the survival of *Zeuxine polygonoides* has not been formally defined and it is currently not known whether the habitat in the local landscape represents ‘habitat critical to the survival of the species’ as described by the MNES Significant Impact Guidelines 1.1 (DoE 2013). Determination of whether the habitat supports a local population that is necessary for the long-term maintenance of the species or the maintenance of genetic diversity will largely be dependent on the size of the local population. Given the surveys undertaken to date have not detected the species, it is unlikely that a large population will be present within the project area. Nevertheless, as the size of a population that may be detected in the future is not currently known, a precautionary approach was adopted for the purposes of this assessment and it was

assumed that any detected population of this species may constitute an important population and that the habitat may be critical to survival of the species.

Significance of impact

No significant impact to *Zeuxine polygonoides* is anticipated to occur as a result of the proposed works, as described in Table 2.3.

Table 2.3 Significant impact assessment for *Zeuxine polygonoides*

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	Response
Lead to a long-term decrease in the size of an important population of a species; or	Unlikely No long-term decrease in the size of an important population is expected to occur as no loss of *Zeuxine polygonoides* individuals is anticipated, as described below. Prior to construction, a pre-clearance survey will be undertaken to search for *Zeuxine polygonoides* (and other threatened species). The details of the survey have been documented within the project-specific MNES Flora Pre-clearance Survey Methodology (GHD 2020b). This survey 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 width of the project footprint (i.e. maximum 2.5 m width including temporary and permanent footprints), 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 undertaking the survey to demonstrate significant experience in the specific ecosystems and relevant species provides assurance in the outcomes of the survey. Where any *Zeuxine polygonoides* (or other threatened species) are observed, it will be possible to achieve avoidance of impact to any recorded individuals. Specifically, given the flexibility of the precise project footprint location (1.5 m wide) within the construction allowance corridor (40 m wide), 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 approach is expected to be highly effective in achieving avoidance of potential impacts to MNES flora species for the following reasons: • The size of individuals and population characteristics of *Zeuxine polygonoides* are such that the 40 m wide construction allowance corridor is expected to provide sufficient space for avoidance of impacts to a 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.

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	Response
	• Where an MNES flora species is encountered, the tree protection zone of the individual tree (or the host tree / adjacent tree, as relevant to the particular flora species) is to be determined and an exclusion zone established. In accordance with Australian Standard Protection of Trees on Development Sites (AS 4970-2009), the formula to use is: Tree Protection Zone radius = DBH (trunk diameter measured at 1.4 m above ground) x 12 For trees with a diameter at breast height larger than 1.5 m, a maximum tree protection zone radius of 18 m is to be established. As per AS 4970-2009, encroachment of up to 10 percent of the tree protection zone is allowable when the suitably qualified and experienced the botanist/ecologist assesses that this will not adversely affect plant health. Of particular importance, this will take into consideration the risk of illegal collection of *Zeuxine polygonoides* individuals due to the increased accessibility of its habitat as a result of the project.
Reduce the area of occupancy of an important population; or	Unlikely As no loss of *Zeuxine polygonoides* individuals is anticipated to occur due to the flexibility of the project footprint location (see response to criterion above for further details), no reduction in the area of occupancy of *Zeuxine polygonoides* is anticipated to occur.
Fragment an existing important population into two or more populations; or	Unlikely Based on the very narrow permanent disturbance footprint (1.5 m), the project will not fragment a *Zeuxine polygonoides* population into two or more populations. Specifically, following vegetation removal within the 1.5 m wide footprint and proposed operation and land use activities, it is expected that the remaining *Zeuxine polygonoides* population will continue to function as a contiguous unit as the clearing width is not sufficient to cause isolation of habitat or disruption of ecological processes.
Adversely affect habitat critical to the survival of a species; or	Unlikely Aside from the very localised reduction in the extent of potentially suitable habitat for *Zeuxine polygonoides* within the 1.5 m wide footprint (as described below), no further adverse effects to habitat are anticipated to occur. Specifically, the following project-specific plans have been prepared to provide strategies to avoid adverse impacts to habitat: • WPDMP • CESCP • CEMP with relevant components including the following: – Biodiversity – Bushfire – Chemical and fuel management – Water management – Waste management
Disrupt the breeding cycle of an important population; or	Unlikely Due to the complexity of the flower, orchids typically require an insect pollinator to transfer pollinia from one flower to another (rather than being wind-pollinated or autonomously self-fertilising). Due to the very

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	Response
	narrow proposed permanent footprint of the project (1.5 m) and benign and intermittent land use activities proposed, no impact to the presence or movement of insect pollinators is anticipated to occur such that dispersal of *Zeuxine polygonoides* pollinia across the local landscape is expected to continue into the future.
Modify, destroy, remove or isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; or	Unlikely Destruction of potentially suitable habitat for *Zeuxine polygonoides* will occur on a very localised scale (1.5 m wide project footprint). Specifically, an extent of 3.2 ha is located within the permanent footprint and 1.9 ha within the temporary footprint, representing 2.7 percent and 1.6 percent, respectively, of the total mapped habitat within the construction corridor allowance. However, no decline of the species is anticipated to occur based on the following reasons: • No loss of individuals is anticipated to occur. • No edge effects or modification of remaining habitat is anticipated to occur owing to the project-specific management plans that will be implemented to mitigate potential impacts to habitat (see response above for further details). • The project footprint is very narrow (1.5 m width) such that no isolation of habitat will occur as it is expected that the remaining vegetation will continue to function as a contiguous unit.
Result in invasive species that are harmful to a vulnerable species becoming established in the vulnerable species' habitat; or	Unlikely Disturbance works during construction as well as recreational activity during operation have the potential to facilitate establishment of invasive species. Therefore, a project-specific WPDMP to detail strategies to mitigate the risk of invasive species introduction and spread has been prepared (GHD, 2020a). Strategies detailed by the WPDMP are based on the following principals: 1. Identify – weeds and pest species and diseases 2. Avoid – traversing and placing infrastructure in areas of known infestation 3. Prevent/Minimise – the translocation/spread of pest and weed species by implementing sound work practices and promotion of risk awareness. 4. Control – Identified pest and weeds to contain, reduce or eradicate population as required
Introduce disease that may cause the species to decline; or	Unlikely Disease is not documented to be a threat to *Zeuxine polygonoides.* Nevertheless, a project-specific WPDMP to detail strategies to mitigate the risk of disease introduction and spread.
Interfere substantially with the recovery of the species.	Unlikely The proposed works are considered highly unlikely to adversely affect the potential recovery of *Zeuxine polygonoides*, specifically: • No loss of individuals is anticipated to occur owing to the comprehensive pre-clearance surveys together with the flexibility of the project footprint location; • Loss of potentially suitable habitat will be very localised within a very narrow footprint; • No fragmentation of habitat or disruption of breeding processes is anticipated to occur owing to the very narrow project footprint; and

An action is likely to have a significant impact on a vulnerable species if there is a real chance or possibility that it will:	Response
	• Adverse impacts to potentially suitable habitat during construction and operation can be mitigated through implementation of a number of site-specific management plans.

2.2.4 Southern Cassowary

Southern Cassowary

The referral states '*local species at risk, such as the southern cassowary have been shown to habituate to human activity at high use areas'* and the '*potential for disturbance of wildlife behaviour through noise and vibration is considered low'*. Justification is required to support these statements.

Provide further justification, with supporting evidence (e.g. published scientific literature, expert advice, monitoring data, etc.), that demonstrates that the operation of the proposed action will not result in ongoing indirect impacts on the Southern Cassowary. The discussion must consider potential changes to foraging and breeding/nesting behaviour of the species due to:

e. Barrier effects and fragmentation of habitat

f. Increased interactions with trail users, including from injury and mortality from bike collisions, increased noise and light impacts, and the risk of feeding and presence of dogs.

Introduction

A Cassowary Management Plan (CMP) has been developed by Environment Pacific Pty Ltd for the proposed Wangetti Trail Project – Wangetti North and Wangetti South Sections. It assists in the planning/design, construction and operation/maintenance aspects of the Project in consideration of the southern cassowary ('cassowary' *Casuarius casuarius johnsonii).* The primary purpose of the CMP is to provide guidance in managing potential impacts and negative interactions between cassowaries and human activities. The CMP draws upon a range of literature to provide justification and supporting evidence that demonstrates that the operation of the proposed action will not result in ongoing indirect impacts on the southern cassowary. This includes research from Bentrupperbäumer (1998), Buosi and Burnett (2006), Campbell et al. (2012), Crome (1976), Croome and Moore (1990), Latch (2007), Moore (2007), Kofron (2003) Kutt et al. (2004), Mack et al (2006) and Westcott et al (2014). Information from this Management Plan has been included within this Preliminary Documentation to response to the information request. The CMP is provided in Appendix B in the Preliminary Environmental Management Plan which forms Appendix B in this document.

Section 5.2.3 provides an overview of the structure of the CMP, along with the effectiveness of the mitigation measures.

Habitat values and behavioural aspects

As discussed within the CMP, the cassowary is primarily frugivorous, their core habitat being rainforest communities that are characterised by a wide diversity of fleshy fruited species. Cassowaries have been documented as being the primary dispersal agent of at least 238 plant species (Environment Pacific Pty Ltd, 2021). Cassowaries will however feed on a variety of invertebrates (including crustaceans), carrion, and small vertebrates (Environment Pacific Pty Ltd, 2021).

Of importance to this plan is that cassowaries are not restricted to rainforest areas, but require a mosaic of habitats that offer resources, e.g., fruiting plants, that are seasonally only available outside of rainforests (Environment Pacific Pty Ltd, 2021). Their foraging is also strictly diurnal, meaning that cassowaries will not be active in the evenings and being bipedal, their habitat preference is for areas of milder terrain and flatter land (Environment Pacific Pty Ltd, 2021). Subsequently the most significant wet tropics populations are to be found in the coastal lowlands where preferential habitat is most at risk from development (Environment Pacific Pty Ltd, 2021).

Access to anthropogenic food sources and/or hand feeding appears to increase the changes of negative interactions with cassowaries (Environment Pacific Pty Ltd, 2021). Behavioural changes relevant to then Wangetti Trails project may include:

- Persistent access to camp areas as a result of availability of anthropogenic food sources e.g. rubbish bins, food left in untended open areas, or hand feeding.
- Persistent occupation of trail areas in home ranges resulting from hikers/riders leaving food scraps or hand feeding birds, and subsequent potential confrontation with users on the trail.
- An increase in aggressive behaviour towards hikers/riders in defending chicks and nest areas in proximity to the trail/camp areas.
- An increase in aggressive behaviour towards hikers/riders in defending food sources, e.g. particular fruiting trees, adjacent to the trail/camp areas.

Other, more generally behavioural responses noted with cassowaries that may arise as a direct result of the Project include the following (Environment Pacific Pty Ltd, 2021):

- Response to noise and light at night. Noise has the potential to adversely impact their behaviour which may include abandoning or limiting access to part of their range which may include water sources (permanent and seasonal), important staple food sources (e.g. access to fruiting trees). At the most extreme noise may preclude cassowaries from finding breeding partners in situations over large home ranges. Construction noise may result in only temporary displacement of the cassowary to other parts of their range.
- Cassowaries will readily adopt clearings into their movement patterns, and will use available paths, trails and minor roads to traverse their ranges.

Abundance and distribution in the project area

While there have been intensive surveys for specific localities in the Wet Tropics, for example the work undertaken by Moore in 2007 in Mission Beach, specific information on the abundance and distribution of cassowaries in the project area is extremely limited (Environment Pacific Pty Ltd, 2021). The most substantive recent work is that of Westcott et al (2014), who in the period 2012 to 2014 undertook an extensive survey of the Wet Tropics using information obtained through direct observation and faecal-DNA analysis of dung samples and feathers collected. Subsequent complexing modelling utilizing a number of tools and including habitat condition and type (identified as essential habitat through Kutt et al. 2004) were used to obtain an estimate of cassowary density and population based on sub-regional areas (Environment Pacific Pty Ltd, 20201.

Under optimal conditions, home ranges may vary between around 0.52 km² to 2.35 km² (Moore 2007) with an average of approximately 0.8km² (Bentrupperbäumer 1998). These optimal conditions are primarily represented in lowland coastal areas, but in upland areas with less favourable habitat conditions cassowaries have been observed with home ranges of up to approximately 7 km^2 (Bentrupperbäumer 1998; Campbell *et al*. 2012).

Westcott et al (2014) modelled an estimated total population of 37 cassowaries in the Black Mountain corridor, with an overall average density of 1 bird every 8.3 km^2 between Kuranda and Julatten (end of Black Mountain Road). However, Wangetti South Section, based on lack of essential habitat and being located east of the Macalister Range, there are no cassowaries with home ranges potential intersecting the trail.

Habitat management areas

The Wangetti South Section has been broken down into various habitat management areas based on the presence of core habitat factors located either directly along the trails and camp areas, and/or within an estimate home range of 500 m to 1,000 m radius (Environment Pacific Pty Ltd, 2021). The home range area adopted is larger than estimated for cassowary habitat in the coastal lowlands in accordance with the research literature which suggests cassowary ranges in the uplands are larger than optimal coastal habitats owing to the less favourable environmental conditions, i.e. lesser complex habitat, lesser permanent water availability and higher topographical constraints (Environment Pacific Pty Ltd, 2021). These larger home ranges for upland cassowaries are reflected in the low abundance, and wide distributions as identified in field observations (Environment Pacific Pty Ltd, 2020).

The criteria, their relative importance, and notes used for identifying priority management areas are presented in the CMP in Appendix B in the Preliminary Environmental Management Plan which forms Appendix B in this document. The definitions of these areas are summarised below (Environment Pacific Pty Ltd, 2021):

- **Highest priority habitat management area**

These are localities within and/or immediately adjacent to essential habitat factors (core foodplant resources, permanent water availability) and supported by direct evidence of resource utilisation (actual birds or scats). Highest priority areas provide critical resources to the survival of cassowaries where seasonal or permanent occupation is supported by habitat components needed for the survival and recovery of the species, or a localised portion of the population.
There is a high to very high probability that interactions between cassowaries and users of the infrastructure in these localities will occur within the construction, operation and maintenance phase of the project.

- **High priority habitat management area**

These areas are allocated to infrastructure locations where the majority of the essential habitat factors are represented within an estimated home range area of 500 m to 1000 m radius of the infrastructure and supported by direct evidence of resource utilisation (actual birds or scats). Some habitat factors e.g. forest structure integrity, may be diminished but still provide critical resources to the survival of cassowaries where seasonal or permanent occupation is supported by habitat components needed for the survival and recovery of the species, or a localised portion of the population.
The probability is moderate to high that interactions between cassowaries and users of the infrastructure in these localities will occur within the project construction operation and maintenance phases.

- **Moderate priority habitat management area**

Moderate priority areas are localities in which there are habitat factors that may provide important seasonal resources, but potential core habitat features are either diminished or lacking. There are no records of cassowaries, or observations of scats in these areas. These areas may provide important seasonal resources, or resources in the event of a cyclonic damage to core habitat.
Birds may use these areas on a seasonal, transitory and opportunistic basis, however the probability of interactions with users of the facilities is moderate to low and would only occur over a longer timespan during the operational and maintenance phase of the trails.

- **Low priority habitat management area**

These areas have greatly reduced habitat factors, and any factors present are small in extent, usually isolated from key habitat resources by topography, and/or large distances of intervening unsuitable habitat types (e.g. rocky sclerophyll woodlands). There are no recent verifiable

records of cassowaries in these areas.
Published literature/research also identifies these areas as non-preferential cassowary habitat and the likelihood of interactions between cassowaries and trail users is very low to nil.

- **Lowest priority habitat management area**

Locations within developed areas, extensively cleared or with existing infrastructure with no supporting habitat for cassowaries. Habitat factors elsewhere are either absent or exist in isolation with no other resource capacity to support cassowaries. Areas of mapped essential habitat either have a known history of local extirpation (i.e., coastal Wangetti area), or are too small to support cassowary home ranges. No likelihood of interactions between cassowaries and trail users.

The Wangetti South Section intersects the priority habitat management area as described in Table 2.4.

The priority habitat management areas have been identified during multiple site visits in 2020 and through refinement and modelling undertaken by Environment Pacific (2021).

Table 2.4 Priority habitat management areas within Wangetti South Section (Environment Pacific Pty Ltd, 2021)

Location	Condition of the priority habitat management area	Comment	Footprint of infrastructure (ha)
Highest priority habitat management area			
No areas along the Wangetti South Section meets the criteria for highest priority		NA	
High priority habitat management area			
No areas along the Wangetti South Section meets the criteria for high priority		NA	
Moderate priority habitat management area			
No areas along the Wangetti South Section meets the criteria for moderate priority		NA	
Low priority habitat management area			
WS3: A section of notophyll vine forest in a gully behind Ellis Beach. Between -16.7291°/ 145.6419° and -16.7282° / 145.6437°	Dislocated from preferable core habitat areas (>1 km) on the western side of Macalister Range by steep escarpment. Habitat is marginal but may offer seasonal resources. The entirety of the vegetation is within a steep to very steep gully on the eastern fall of the Macalister Range that may significant obstructions to ready cassowary movement. Any cassowary utilisation (if at all) would be transitory and opportunistic and at best is considered to be extremely unlikely.	**Infrastructure proposed:** • Shared use trail • Waterway crossings **Duration of the activities being proposed** Intermittently and short term - During construction phase - strict adherence to daytime construction times only, 7am to 5pm, and timed to avoid highest cassowary activity times. Intermittently and long term - During operational phase Cyclists and hikers must not use any trail before first light and after last light each day, times dependent on the season. Times to be set by camp/trail operators with consideration of seasonal visibility early morning/late afternoon. Cassowaries may settle for the evening on road/track verges. Vehicles will be required to service the operation/maintenance of the facilities. All drivers are to be compliant with speed directions with no travel undertaken between 5pm and 7am (overnight) on any track through moderate/high priority management sections.	0.06

Location	Condition of the priority habitat management area	Comment	Footprint of infrastructure (ha)
Lowest priority habitat management area			
WS1: Shared use trail between Wangetti township trail head and Dark Jungle. Between -16.6629° / 145.5657° and - 16.7008° / 145.6092°	No core rainforest habitat within 2 km of the trail. A long section of coastal walk, most of it within 150 m of the Captain Cook Highway. Essential habitat features are present in the form of seasonal littoral swamp mosaics but are separated from the trail by the highway. There is no core mesophyll rainforest habitat within 2 km of the trail, and this is restricted to the uplands Mona Mona / Black Mountain corridor. The trail also passes by the Wangetti firing range. There have been no confirmed cassowary sightings in the Wangetti lowlands since European settlement (circa 1907), and the probability of cassowaries using any resources along the trail in this section is negligible.	**Infrastructure proposed:** • Shared use trail • Waterway crossings **Duration of the activities being proposed** Intermittently and short term - During construction phase - strict adherence to daytime construction times only, 7am to 5pm, and timed to avoid highest cassowary activity times. Intermittently and long term - During operational phase Cyclists and hikers must not use any trail before first light and after last light each day, times dependent on the season. Times to be set by camp/trail operators with consideration of seasonal visibility early morning/late afternoon. Cassowaries may settle for the evening on road/track verges. Vehicles will be required to service the operation/maintenance of the facilities. All drivers are to be compliant with speed directions with no travel undertaken between 5pm and 7am (overnight) on any track through moderate/high priority management sections.	1.98
WS2: Camp 1 to Ellis Beach. Between - 16.7008° / 145.6092° and -16.7282° / 145.643725°	There are no suitable habitat mosaics adjacent this section that would provide seasonal resources to cassowaries. A long section of the trail that is almost exclusively through rocky sclerophyll woodland on ridges above the Captain Cook Highway. Nearest core rainforest is over 1 km to the west, and the trail is only accessible via steep to very steep gullies and drainage line from these areas. Small gullies with notophyll vine forest are present across the trail, some mapped as having permanent water however inspections have conformed these are ephemeral drainage lines only. Given the lack of permanent water, the distance from core mesophyll forest habitat and difficult access down steep to very steep slopes, cassowary utilisation (if at all) would be transitory and opportunistic and at best is considered to be extremely unlikely.		1.3
WS 4:Ellis Beach to Palm Cove Trail Head. Between -16.7282° / 145.64323° and -16.7391° / 145.6634°	No core habitat (contiguous mesophyll vine forest) represented within 1 km of the trail, and then only on the western side of the range in the upper Flaggy Creek catchment. This section of trail between Ellis Beach and Palm Cove trail head is on the lower slopes of the Macalister range, mostly less than 200 m from the Captain Cook Highway. Habitat values for cassowaries are negligible, with the primarily Acacia and other sclerophyll forests having very limited to no representation by important cassowary foodplants, and no access to permanent water. A small section of mesophyll / notophyll vine forest on the trail is separated over 1 km from core rainforest habitats to the		1.03

Location	Condition of the priority habitat management area	Comment	Footprint of infrastructure (ha)
	west in the Flaggy Creek catchment (which discharges to the Barron River). Topography in the area is steep to very steep and presents a significant impediment to cassowary movement. Cassowaries would not be expected to access any part of the trail in this section for core or seasonal resources.		
Dark Jungle Between -16.7008 /145.6092	Core mesophyll rainforest > 5 km from camp Camp area is located at the top of a ridge overlooking a notophyll vine forest series of gullies and permanent water is absent. The camp site is more than 1 km from core contiguous mesophyll vine forest, and accessible from the west only by a precipitously steep (in places) valley. Cassowaries would not be expected to access this section of trail/camp area for any resources.	**Infrastructure proposed:** • Camp area **Duration of the activities being proposed** Intermittently and short term - During construction phase - strict adherence to daytime construction times only, 7am to 5pm, and timed to avoid highest cassowary activity times. Intermittently and long term - During operational phase Cyclists and hikers must not use any trail before first light and after last light each day and will be restricted to the camp area, times dependent on the season. Times to be set by camp/trail operators with consideration of seasonal visibility early morning/late afternoon. Cassowaries may settle for the evening on road/track verges. Vehicles will be required to service the operation/maintenance of the facilities. All drivers are to be compliant with speed directions with no travel undertaken between 5pm and 7am (overnight) on any track through moderate/high priority management sections.	0.25

Key threatening processes and impacts

Habitat loss and fragmentation of remaining habitat is recognised as the primary threat to cassowary populations and has been most extensive in the coastal lowlands where cassowary densities are the highest and this was noted in research undertaken by Moore in 2007, Latch in 2007, Westcott et al in 2014 ((Environment Pacific Pty Ltd, 2021). Other factors identified in the decline of cassowary populations include road death by vehicle strikes, dog attacks and avian diseases e.g. avian tuberculosis and Aspergillosis (Environment Pacific Pty Ltd, 2021). Degradation of habitat through logging, feral pig activity, weed invasion and altered fire regimes is also considered a key factor in reducing resource availability for cassowaries (Environment Pacific Pty Ltd, 2021).

The primary threatening process to cassowaries within the Wangetti South Section applicable to the proposed works is believed to be anthropogenic interactions that result in behavioural impacts (Environment Pacific Pty Ltd, 2021). Notably, this includes the potential for cassowaries to access resources e.g. rubbish, litter or other potential food sources and/or being hand fed along trails and in camps and eco-accommodation areas (Environment Pacific Pty Ltd, 2021). Available permanent surface water in core rainforest habitat areas is restricted in the project area by comparison with coastal lowlands habitats. Subsequently there is also the potential for cassowaries to access permanent water sources that may be present in camps / eco-accommodation areas, particularly during drier times of the year (Environment Pacific Pty Ltd, 2021). Cassowaries use vocalisation over large distance to locate and communicate with other cassowaries, and noisy camp / eco-accommodation areas in cassowary habitat may stress and cause animals to abandon parts of their ranges, potentially putting them into conflict with the home ranges of neighbouring cassowaries (Environment Pacific Pty Ltd, 2021).

Habitat degradation will be minimal. Most habitat removal will be along the Wangetti South Section, the majority of which is not within mapped essential cassowary habitat. While habitat condition and integrity as a result of logging, cyclones and altered fired regimes do not represent optimal habitat conditions for cassowaries, ecosystems are in a state of advancing restoration, and there is minor potential for degradation to water quality and soil/water processes as a result of the construction/operational phases. These are expected to be addressed through the EMP for the project.

Wangetti South Section is not likely to have a residual impact on the southern cassowary as the main threatening processes for the species (i.e. habitat loss, vehicle, and dog attacks) are not applicable for the project. The CMP in Appendix B in the Preliminary Environmental Management Plan which forms Appendix B in this document sets out a detailed summary of the likely impacts various project elements on cassowary behavioural aspects, the nature of the interactions and summary of proposed management measures.

Habitat avoidance areas

DAWE requested further information regarding areas within Wangetti South Section that could result in the southern cassowary avoiding areas due to potential changes to foraging, breeding and/nesting behaviours resulting from the proposed activities associated with the project.

This section considers indirect impacts of the proposed action associated with Wangetti South Section to the southern cassowary. As noted in the CMP, southern cassowaries are a cryptic species and once a cassowary has established its home range, it moves regularly through that range. Based on the modelling of Westcott et al (2014), survey results in 2019 and 2020, and field habitat assessments in 2020, cassowaries are believed to be in low abundance (possibly as few as 8 to 9 individuals) over an area of approximately 4,000 ha, centred on the upper Spring Creek, Allen Creek catchments in the Wangetti North Trail sections, and in the Big Rooty and Hartley's Creek catchments in the Wangetti Trail mountain bike sections.

There are no records of cassowaries within the majority of Wangetti South trail area, nor does suitable habitat exist over most of this trail. The only exception is the Wangetti coastal plain, however cassowaries have not been recorded in this area since 1907 and are considered locally extinct. The birds tend to be solitary and operate within a home range which changes in size and shape according to season, food availability and whether the cassowary is caring for chicks or not.

Table 2.4 provides a breakdown of the habitat factors within Wangetti South Section associated with the shared use trail, Dark Jungle and waterway crossings. It also provides information about the duration of the proposed activities to occur along the shared use trail and Dark Jungle and provides commentary on whether the proposed activities would potentially impact on the behaviour of cassowaries.

According to Table 2.4, based on the paucity of essential cassowary habitat factors associated with the shared use trail and campsite and the duration of the proposed activities, the project is not considered to have a significant impact on foraging, breeding and/nesting area for the southern cassowary. Furthermore, no fencing will be established as part of the project, and the clearing footprint will be narrow, and clearing will retain identified food resource and large canopy trees wherever possible with the intention that potential disruption to habitat factors will be minimised and/or avoided. Subsequently the area surrounding the shared use trail and the camp site will not alienate cassowaries from food resource access, whilst still allowing foraging cassowaries unrestricted movement away from potential disturbance associated with the shared use trail and campsite.The likelihood and potential for cassowaries to move away from disturbance is dependent on a number of factors that include:

- area of the cassowaries' home range: a large range with a variety of resources presents a less stressful adjustment to disturbance than a smaller, more constrained range. Based on existing information, the population of cassowaries in the project area is believed to be low, potentially 8/9 adult birds, within an overall area exceeding 4,000 ha. The exact population size, and their subsequent home ranges are not known but are anticipated to be in excess of several hundred hectares, thereby enabling birds to avoid disturbance areas without causing stress as they would remain within their own home ranges.
- resource availability: if the area of disturbance (i.e., construction, camp area) includes resources considered essential to the cassowary e.g., permanent water access, significant fruiting trees, then it is unlikely that cassowaries will abandon that resource permanently. For example, cassowaries in the lowland Daintree and Mission Beach area are known to traverse active residential areas (during construction) to access fruiting trees, water, etc. The frequency of visitation will depend on the resource in question, the intensity and duration of the disturbance and seasonal variability in flowering/fruiting. Cassowaries may permanently avoid areas of intense disturbance (e.g. Dark Jungle camp area), if there are no essential habitat factors present in that location. Surveys and data records/reviews of the Wangetti Trail South area have indicated that essential habitat factors are poorly represented and are not represented at key infrastructure locations (e.g., camp).

Given the above, calculating an area of avoidance for a particular location or activity is complex and difficult to assess, and has not been undertaken in management practice in North Queensland owing to the complexity of factors involved including the general lack of data regarding cassowary ranges and movement through their occupation areas, and the different responses that individual cassowaries may have to a particular stimulus/disturbance factor. A review of available literature and research has been undertaken and whilst there are many anecdotal observations, no formal mechanism, research activities, or methodology exists for calculating/estimating the potential area of avoidance.

A review of existing walking tracks that intersects cassowary habitats within North Queensland was undertaken to demonstrate to the DAWE that there are existing walking tracks that have been designed to allow members of the public to explore forested areas inclusive of cassowary habitat while at the same time not restricting the movement of the southern cassowaries.

The following walking trails intersect cassowary habitat and are areas where there have been previous cassowary sightings. A description of the walking trails are outlined below:

- Djiru National Park - Djiru National Park within Tropical North Queensland is partly situated within the Wet Tropics World Heritage Area (Department of Environment and Science, 2021). Djiru National Park is managed by the Queensland Parks and Wildlife Service, in collaboration with the Wet Tropics Management Authority and the Djiru Aboriginal people Area (Department of Environment and Science, 2021). Several short and long walks allow visitors to explore the lowland rainforest in Djiru National Park, while the Musgravea track is a shared-use track for walkers and mountain-bikers. It is the only track in Djiru National Park where bicycles are permitted Area (Department of Environment and Science, 2021).
- Clump Mountain National Park -Clump Mountain National Park contains some of the few remaining examples of undisturbed tropical lowland rainforest in North Queensland (Department of Environment and Science, 2021). This forest type once flourished extensively throughout these coastal lowlands however, due to clearing for farming, little now remains (Department of Environment and Science, 2021). These remnants are important habitat for the endangered southern cassowary, a large flightless bird found only in the tropical rainforests of Queensland and New Guinea (Department of Environment and Science, 2021). Bicton Hill is the main feature of Clump Mountain National Park. A circuit walking track up this moderately steep hill offers visitors spectacular mainland and island views, and a chance to see rare rainforest plants and the elusive cassowary (Department of Environment and Science, 2021).
- Part of Clump Mountain National Park lies within the Wet Tropics World Heritage Area. The park is managed to preserve the area's natural, cultural and scenic values while providing nature-based recreational opportunities for visitors (Department of Environment and Science, 2021).
- Cutten Brothers Track at Mission Beach -The Cutten Brothers Walking Track commemorates some intrepid settlers who made their living from timber in the early 1900s (Cassowary Coast Regional Council, 2021). The track takes you through beautiful remnant coastal rainforest and offers spectacular glimpses of Boat Bay (Cassowary Coast Regional Council, 2021). As you walk through, note the endangered arenga palms, king ferns and the large variety of significant trees (Cassowary Coast Regional Council, 2021). Look out for cassowaries and a wide variety of rainforest birds inhabiting this area. At its northern end the track follows the beach before entering coastal rainforest. At its southern end, it emerges from rainforest at the Clump Point Boat Ramp Rd to meet the Ulysses Link Walking Trail (Cassowary Coast Regional Council, 2021).
- Hartleys Creek Falls within Macalister Range National Park - Macalister Range National Park contains a popular 6.9 km return walking track that features a waterfall at the end and another swimming area called Flat Rock approximately halfway along the track.

Numerous other public and popular walking trails exist within the national park network within the WTWHA where cassowaries are regularly encountered. Other examples include:

- Lake Barrine and Lake Eacham circuit walks on the Atherton Tablelands, Crater Lakes National Park
- Misty Mountains long distance walking trails (including overnight camping), Wooroonooran and Girringun National Parks

- Wallaman Falls walking trail, Girringun National Park
- Dubuji trail and boardwalks, Daintree National Park
- Maardja trail and boardwalk, Daintree National Park
- Jindalba trail and boardwalk, Daintree National Park
- Mossman Gorge walking trail, Daintree National Park

The trails within national parks are managed by DES and QPWS in sometimes in collaboration with the Wet Tropics Management Authority and traditional owners. Following the review existing trails, it was noted that the following mitigation measures are implemented across the sites to reduce adverse impacts to the southern cassowaries and they include:

- Signage about the presence of cassowaries within the area
- Speed restrictions on roads
- Never approach cassowaries
- Never approach chicks—male cassowaries will defend them
- Never feed cassowaries—it is illegal and dangerous and has caused cassowary deaths
- Always discard food scraps in closed bins
- Always slow down when driving in cassowary territory
- Never stop your vehicle to look at cassowaries on the road
- DES manages the trails within national park in accordance with:
  - DES - Procedural guide QPW/2015/1395 v1.01 ABN 46 640 294 485 Infrastructure and Equipment Walking track maintenance – general procedures
  - DES - Operational policy QPW/2013/746 v1.03 ABN 46 640 294 485 Natural Resource Management Pest plant and pathogen spread prevention
  - DES - Operational policy Queensland Parks and Wildlife Service & Partnerships Management of cassowary incidents

The walking trails and waterway crossings have also been designed to allow cassowaries to move easily through the area and they include:

- No fencing
- Natural surface shared use trail
- No handrails on waterway crossings structures over waterway where fall heights allow.

The above mitigation measures and design criteria has been considered and adopted for the Wangetti South Section project. Legislative obligations for protected area management

There is a statutory requirement to develop a management instrument (a management plan or management statement) for all areas dedicated under the *Nature Conservation Act 1992* (NC Act). Management plans and statements must be consistent with the NC Act management principles and they provide strategic management direction and are prepared under the 'Values-Based Management Framework (DES, 2019) - an adaptive management approach that is aimed at enhancing and protecting key values and delivering a level of service that meets custodial and legislative requirements.

Under the *Nature Conservation (Protected Areas Management) Regulation 2017*, recreation and commercial activities on protected areas are managed or controlled to minimise their impact. All activities on protected areas must be consistent with the management principles and with any management plan for the area.

Macalister Range National Park and Mowbray National Park have current management instruments that will be referred to throughout the development of the Wangetti Trail to ensure consistency with the management principles:

- *Macalister Range National Park Management Statement 2013*
- *Mowbray National Park, Mowbray National Park (Recovery) and Mowbray Conservation Park Management Statement 2013.*

Health Checks

QPWS applies a contemporary management process that is based on international best practice, and targets management towards the most important features of each park: their key values. Key values are defined through an assessment process and Health Checks are the tools for efficiently and routinely assessing the condition of these key values.

Health Checks help QPWS monitor the condition of a park's key values and prioritise management efforts, along with delivering on our custodial obligations. Health Checks provide condition assessments of natural values for the majority of estate. Where highly significant values require management intervention, detailed, targeted monitoring or research may be warranted and these activities are outlined in the park's Monitoring and Research Strategy.

QPWS uses the Health Check system to evaluate our performance and ensure that on-ground actions lead to the identified outcomes.

Ongoing maintenance of the Wangetti Trail will be incorporated into the statutory obligations and existing procedures, such as the QPWS Health Checks, to assess the condition of key park values.

It is noted that WTMA currently undertake the following activities that benefit and support cassowary habitat within the WTWHA:

- Weed and pest management programs
- Research strategy that invites collaboration with research providers to build knowledge of the Wet Tropics Bioregion, related to environmental and cultural topics, the social importance of the WHA, and how best to conserve and enhance the WTWHA
- Wet Tropics Tour Guide Program to educate natural and cultural values of the WTWHA, including avoiding adverse impacts on cassowaries.

Risk assessment of mitigation measure to address potential impacts from the project to southern cassowary habitat

To respond to the potential threats and impacts to the southern cassowary habitat as part of the project, mitigation measures have been developed for the design, construction and operational phases of the project. This section qualitatively determines the risk of potential impacts to southern cassowary habitat that could occur as a result of undertaking construction activities for Wangetti South Section. The risk assessment methodology has been based off the risk assessment methodology in DAWE Environmental Management Plan Guidelines 2014.

Ranking impact criteria

Each potential impact to the southern cassowary was ranked according to specific criteria namely likelihood and consequence, using the criteria in Table 2.5 and Table 2.6, respectively, were:

- Likelihood is based on how likely it is that the event/issue will occur after control strategies have been put in place

- Consequence is what the consequence/result will be if the issue does occur.

These ratings are then combined using the risk assessment to generate a risk rating of low, medium, high or severe and have been derived from the AS/NZS ISO 31000:2009 Risk management – Principles and guidelines (Standards Australia 2009).

Table 2.5 Qualitative measure of likelihood (Australian Government Department of the Environment, 2014)

Likelihood	Qualitative measure
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances

Table 2.6 Qualitative measure of consequences (Australian Government Department of the Environment, 2014)

Consequence	Qualitative measure
Minor	Minor incident of environmental damage that can be reversed
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts
High	Substantial instances of environmental damage that could be reversed with intensive efforts
Major	Major loss of environmental amenity and real danger of continuing
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage

Table 2.7 Risk assessment (Australian Government Department of the Environment, 2014)

	Consequence				
	Minor	**Moderate**	**High**	**Major**	**Critical**
Highly likely	Medium	High	High	Severe	Severe
Likely	Low	Medium	High	High	Severe
Possibly	Low	Medium	Medium	High	Severe
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Low	Medium	High

Table 2.8 summarises the predicted initial impacts the proposed construction activities can on have on southern cassowary habitat within the project area. The subsequent residual impacts are based upon implementation of recommended management measures.

Table 2.8 Mitigation measures proposed to manage the risk to cassowaries in Wangetti South Section (Environment Pacific Pty Ltd, 2021)

Impact	Initial risk (without mitigation measures)	Mitigation measure	Low priority section (WS3)	Lowest priority section (WS1, 2, 4 and Dark Jungle)	Residual risk (with mitigation measures)	Design	Construction	Operation
Design and infrastructure of Dark Jungle may result in access to open water sources and food for southern cassowaries, resulting in species entering and relying on camp areas	High	Site clearance survey of camp areas by experienced ecologist to be undertaken prior to any construction with the following requirements: • Location of potentially important cassowary foodplant trees within and immediately adjacent development footprint • Location and orientation of permanent water in relation to development footprint. Assessment of likely cassowary access routes to any of the above resources identified (tracks, pads etc).		X	Low	X	X	
		Survey outcomes to be used in design of the camp layout including construction access routes, location of buildings, water and sewage requirements, waste management requirements.		X		X		
		Provisions to be made to ensure no open water sources are provided in the camps and any grey water discharge is to go to a sump rather than irrigation.		X		X	X	X
		Signage for Dark Jungle at strategic locations advising of the requirements that cassowaries cannot access food and that all water sources and disposal areas are secure from cassowary access.		X		X		X
		Lighting (where required) to be confined to directional and subdued lighting and address Australian Standard AS/NZS 4282:2019. Control of the obtrusive effects of outdoor lighting, which provides information in Appendix B about the impact of artificial light on biota.		X		X		
		An audit of listed/declared weed species to be undertaken at the proposed camp site prior to construction to provide baseline data for future monitoring of weed incursions and/or introduction of new weeds. Species, abundance and distribution of weeds to be recorded.		X		X	X	X
		Waste containers should be in a secured receptacle (e.g. wooden palisade barricaded area that cannot be accessed by cassowaries). Signage in camp and eco-accommodation must clearly identify locations of waste receptacles, and protocols in separating and disposing of waste. Organic waste cannot be composted on-site and must be disposed of (preferably off site) daily in a manner / location that is not detectable or accessible by cassowaries. This includes all kitchen waste from the eco accommodation area.		X		X		X
		Wastewater management at camp area and eco-accommodation must take into account potential cassowary access and potential to impact on local water source quality. Wastewater discharge is not to occur into a situation where the discharge can be accessed by cassowaries and should go to a sump.		X		X		X
		Ensure that there is no cassowary accessible permanent water source within the camp and eco accommodation areas, including: – Signage for camp and eco accommodation users at all water sources/disposal areas regarding water management and security from cassowary access. – Rain water collection points off roofing (e.g. water tanks) to be sealed, with excess runoff to be directed to a sump. – Storm water discharge from eco accommodation and drains about the camp areas must not drain into any perennial water course		X		X		X

Impact	Initial risk (without mitigation measures)	Mitigation measure	Low priority section (WS3)	Lowest priority section (WS1, 2, 4 and Dark Jungle)	Residual risk (with mitigation measures)	Design	Construction	Operation
		– Wastewater discharge at the camp area and eco-accommodation similarly must take into account potential cassowary access and potential to impact on local water source quality. As for storm wastewater should be directed to a sump. – Any watering of rehabilitation areas for establishment purposes is to be undertaken using handheld hoses and portable tanks and not through irrigation systems. – The use of ground water is to be considered only after an assessment of the recharge capacity and the potential for impact on surface environmental flows of nearby watercourses.						
Habitat management within low and lowest priority areas	High	All constructed watercourse crossings will be at bed level, will not obstruct waterflow, and to be comprised primarily of natural material, e.g. laid stone pavements. Bed level crossings must be undertaken in consideration of the requirements of aquatic species with migratory breeding requirements, e.g., opal cling goby.	X	X	Low	X	X	
		An audit of listed/declared weed species to be undertaken at the proposed camp site prior to construction to provide baseline data for future monitoring of weed incursions and/or introduction of new weeds. Species, abundance and distribution of weeds to be recorded.	X	X		X	X	X
		Warning signs and speed limiting signs on approaches to bridges over permanent water, where cassowaries may be likely to be encountered.	X			X	X	X
Vegetation clearing reducing potential habitat for the southern cassowary	Medium	Vegetation clearing to be restricted so that only areas required for safe construction, operation and maintenance are cleared, with vegetation clearing clearly demarcated on drawings and plans and high visible survey tape used. All vegetation waste to be cut into practical sizes and placed at edge of clearings to naturally decompose.		X	Low	X	X	X
		Important food plant trees identified as part of the pre-clearance survey are to be included as components of retained vegetation. E.g. within movement corridors and preferably not left as isolates within clearings.		X		X	X	
		Greenfield vegetation clearing is to be undertaken in accordance with protocols agreed with Traditional owner representatives and with a fauna/flora spotter present.	X	X		X	X	
		Vegetation removed along trails will be the minimum required to ensure clear line of sight for cyclists and hikers approaching permanent or significant ephemeral watercourses (approximately 20 m prior)	X	X		X	X	X
		All clearing is to comply with requirements of relevant permits and approval conditions, with specific reference to erosion and sediment control plans that clearly identify mechanisms to avoid the discharge of sediment during construction off site into local habitat.	X	X			X	
		Any works involving the replanting of vegetation is not to use important cassowary food plants as found locally within or immediately adjacent to Dark Jungle, which may otherwise attract cassowaries into the proximity of humans.	X				X	
		Transit to construction sites will be via approved and designated services tracks only and speed limits of maximum 40 km/hr on formed roads. Construction vehicles will be of the smallest practical size to access the required areas.	X	X			X	X
		Maintenance vegetation clearing, e.g. for Calamus regrowth and fallen vegetation, will be required over the trails. Vegetation not to be mulched but sawn to manageable lengths and put in locations off the trails and allowed to decompose.	X	X				X
Weeds/ Pests/Pathogen infestations	High	An audit of listed/declared weeds must be undertaken prior to construction as a baseline for future monitoring of weed incursions. Undertake a pre-clearing weed survey treatment and management and report areas of existing weed infestation. Pre-clearance on-ground weed, and pest surveys will be undertaken by an appropriately skilled person to confirm	X	X	Low	X	X	

Impact	Initial risk (without mitigation measures)	Mitigation measure	Low priority section (WS3)	Lowest priority section (WS1, 2, 4 and Dark Jungle)	Residual risk (with mitigation measures)	Design	Construction	Operation
		biosecurity matters within the project area and this will assist with determining the appropriate treatments to be used to treat weeds and pests.						
		Biosecurity management, regular inspection of construction areas for fire ants, yellow crazy ants, potential Phytophthora infestation, and other highly invasive species that may be identified as a risk. All machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds and pathogens. Vehicles, plant and equipment to be used for the project would be required to be clean. Vehicles, plant and equipment to be inspected prior to being used to ensure they are clean. Disinfecting vehicles and machinery. This will be undertaken during the construction phase of the project and maintained throughout.	X	X			X	X
		Any weed/pests infestation shall be treated at earliest stage while small and manageable. Treatment methods to be approved by Wet Tropics Management Authority (WTMA), DES, TDPD and Queensland Parks and Wildlife Service (QPWS), as applicable.	X	X			X	X
		Weed material that is cleared within the project area must be disposed of appropriately. Any weed removal as part of the construction phase will be cleared and disposed of at an approved waste disposal facility. Any infestations that subsequently establish during the construction period will be treated, and post-construction weed management of rehabilitated areas will be undertaken.	X	X			X	X
		The contractor will be required to complete a pre-clearing pest survey and report documenting areas of existing electric ant infestation and identifying treatment and management requirements. Pre-clearance on-ground pest surveys will be undertaken by an appropriately skilled person. Before starting construction, discussions with Wet Tropics Management Authority, Douglas Shire Council and Cairns Regional Council to be undertaken during the pre-start trail review to discuss and agree on specific treatments regarding pest species including but not limited to yellow crazy ants, electric ants, pigs and dogs	X	X			X	
Loud, persistent noises resulting in stress to cassowaries and potential abandonment of areas	High	On-site standard construction hours to apply with EP (Noise) Policy 2019, local government statues and permit conditions. Adherence to daytime construction times only, and timed to avoid highest cassowary activity times and all machinery to be silenced to manufacturers specifications. No blasting of rock is permitted.	X	X	Low		X	
		All machinery used in construction and operation should be silenced to manufacturers specifications and maintained to that condition.	X	X			X	X
		Blasting of hard rock areas for construction will not be permitted in any areas.	X	X			X	
		Helicopters can only be used for the transport of materials to construction sites in lowest and low priority habitat areas where: • They are able to operate outside of the ground effect zone when hovering. • Drop zones are allowed in lowest and low priority areas where cassowary occurrence is nil or extremely unlikely. • Preclearance of any drop zones for materials near watercourses or rainforest (essential habitat areas) identifies no evidence of cassowary presence. • Helicopter overfly of WTWHA is in accordance with regulatory provisions of the Wet Tropics Plan	X	X			X	X
		Helicopters can be used in any area where emergency evacuation is required.	X	X			X	X

Impact	Initial risk (without mitigation measures)	Mitigation measure	Low priority section (WS3)	Lowest priority section (WS1, 2, 4 and Dark Jungle)	Residual risk (with mitigation measures)	Design	Construction	Operation
		Helicopters will not be used for the transportation of construction personnel.	X	X			X	
Vehicle movement impacting on Cassowary habitat and movement	Medium	Transit to construction sites will be via approved and designated access routes only, and no in-field unauthorised tracks/roads will be used.	X	X	Low	X	X	
	Medium	Construction vehicles will be of the smallest practical size to access the required areas, this includes the use of quad bikes with trailers, small rubber tracked excavators, etc.	X	X	Low		X	
Construction fencing limiting the movement of the Cassowary	Medium	Consideration will be given to the use of high-vis materials on temporary fencing. Cassowaries are attracted to bright colours and the use of high-vis materials will be limited to occasions where worker safety is an issue. No fencing of any type to be used in vegetation retained for corridor/habitat purposes.	X	X	Low		X	
Interactions between Cassowaries and construction workers and trail users	Medium	Domestic animals at all times are not permitted on site, this includes animals that are restrained inside vehicles. Poultry may be a vector for the introduction of avian diseases	X	X	Low	X	X	X
		The induction program for all construction personnel will include a component on cassowary management measures and will include methodologies for de-escalating confrontational interactions.	X	X			X	
		On any construction work site, should a cassowary approach the works area, then works in that particular location will cease until the cassowary has left of its own accord. All construction work should have a plan for alternate work sites and tasks in this contingency.					X	
		No organic/food waste at any time is to be disposed of on site. All waste is to be collected and removed at the end of each day. Temporary storage of non-organic waste, e.g. cutoffs from construction materials, can be stored under a cover until they can be transported from site.	X	X			X	
		Trail users must not use any trail before first light and after last light each day, times dependent on the season. Times to be set by camp/trail operators with consideration of seasonal visibility early morning/late afternoon. Cassowaries may settle for the evening on road/track verges. Interpretive signage at trail heads will reinforce this message for public trail users.	X					X
Waste management within camp areas	Medium	Waste containers should be in a secured receptacle, e.g. wooden palisade barricaded area, that cannot be accessed by cassowaries.	X		Low			X
		Signage in camp and eco-accommodation must clearly identify locations of waste receptacles, and protocols in separating and disposing of waste.	X					X
		Organic waste cannot be composted on-site and must be disposed of (preferably off site) daily in a manner / location that is not detectable or accessible by cassowaries. This includes all kitchen waste from the eco accommodation area.	X					X
Construction in and around waterways	Medium	Any development adjacent permanent or significant ephemeral watercourses (e.g. crossing works) will have full erosion and sediment control measures implemented and maintained for the duration of the works as per the ESCP to be developed for the project. The ESCP is not to be a generalised document but will address specific infrastructure requirements for any works in moderate, high and highest priority areas.	X	X	Low		X	
	Medium	Construction in watercourses must include consideration of the potential for interference with cassowary movements e.g. within the creek bed, or access to riparian resources. Watercourse crossings should either be at bed level, or at a level that enables cassowaries to traverse the watercourse bed without obstruction, e.g., low enough that they can step onto and over the crossing. Handrails and balustrades on waterway crossings represent a significant obstacle to movement. Bridge/crossing structures should therefore be less than the 1300 to 1400 mm	X	X	Low	X	X	

Impact	Initial risk (without mitigation measures)	Mitigation measure	Low priority section (WS3)	Lowest priority section (WS1, 2, 4 and Dark Jungle)	Residual risk (with mitigation measures)	Design	Construction	Operation
		height for 'low fall' defined structures in Building Code of Australia and relevant standards to avoid the need for handrails wherever possible						

According to the CMP, Wangetti South Section consist of areas of low and lowest priority habitat management. To respond to the potential threats and impacts to the southern cassowary habitat as part of the project, a risk assessment has been undertaken to determine whether the proposed mitigation measures during the design, construction and operational phases would reduce the residual risk for the project and if further measures are required for the southern cassowary. According to Table 2.8, the implementation of the various mitigation measures including the measures in the CMP for Wangetti South Section would result in the residual risk being low. Section 5.2.3 provides a discussion of the effectiveness of the mitigation measures in the CMP. In addition to this, a rehabilitation plan has been developed for the project and discussed in Section 6.

Wangetti South Section would still result in the loss of cassowary habitat and it exceeds the nominated threshold of 1,500 m^2 in the Significant Impact Guidelines for the Endangered Southern Cassowary (*Casuarius casuarius johnsonii*) Wet Tropics Population (Commonwealth of Australia 2010c). Therefore, a detailed discussion regarding residual impacts for the southern cassowary for Wangetti South Section is outlined in Section 7.

2.2.5 Opal Cling Goby

Introduction

The opal cling goby is listed as critically endangered under the EPBC Act and as the species has a very restricted geographic distribution in Australia, which is considered precarious for its survival due to stochastic threats, and the total number of mature individuals is estimated to be 10–30, which is considered extremely low (TSSC, 2010). The opal cling goby is not listed under the Queensland NC Act, however all native fish species are protected under the Queensland *Fisheries Act 1994* (Fisheries Act). Under the Fisheries Act all proposed instream works for the project are required to:

- Maintain fish movement and connectivity throughout waterway and within and between fish habitats
- Maintains the health and productivity of fisheries resources and fish habitat.

This section provides a detailed description of the opal cling goby, its habitat and key threatening processes impacting the species. It also presents the outcomes of the significant impact assessment of the project against the EPBC Act Significant Impact Guidelines 1.1 (DoE 2013) for the opal cling goby. This section draws upon the information collected to date regarding the opal goby species within the project and the following additional information:

- The information from the SPRAT Database and other desktop resources
- Published scientific literature and/or expert advice including from Brendan Ebner.
- Information derived from field ecological surveys undertaken within the Wangetti South Section project area

This section also includes mapping showing potential habitat critical to the survival of the opal cling goby within, and upstream and downstream of, the project area. The maps also the proposed works including the shared use trail, location of waterway structures, Dark Jungle and service tracks.

Description of opal cling goby and behaviour

In Australian habitats, the opal cling goby is a small, slender fish with a maximum total length of 35 mm (Thuesen et al. 2011) (DSEWPC, 2011). The adult opal cling gobies are found in pristine rainforest streams with significant flow and direct access to marine habitats (Thuesen et al 2011). Opal Cling Gobies ‘cling’ to rocky substrates in these fast-flowing rainforest streams while feeding on benthic algae, macroinvertebrates and small macroinvertebrates (Thuesen et al. 2011). The opal cling goby is an amphidromous lowland specialist that moves between freshwater and marine habitats as a critical part of its life cycle (Ebner et al. 2016).

The female has brown horizontal stripes. The non-displaying male is a white, grey or greyblack colour with or without a pink horizontal band along the side (Allen et al., 2002). The displaying male exhibits a green or blue horizontal band (refer to Figure 2-1). In full display the male is jet-black with a bright-blue band (Bray and Gomon, 2020).

Figure 2-1 Male and female Opal Cling Gobies, Stiphodon semoni, from Goodenough Island, Papua New Guinea. Source: Gerald R. Allen. License: All rights reserved (Bray, D and Gomon, F, 2020)

Age at maturity and longevity of this species are not known, however other cling gobies live for between two and five years (Yamisaka and Tachihara, 2006). The generation length of this species is therefore estimated to be between two to three years (DAWE, 2011). Opal cling gobies are believed to spawn in their adult life within rainforest stream habitats (DAWE, 2011). Research on other cling goby species indicates that females lay their eggs in interstitial spaces between submerged stream boulders, where they are fertilised by males and guarded until hatching (DAWE, 2011).

Opal cling goby habitat requirements

Research undertaken by Ebner and Thuesen in 2010 documented in the *conservation planning for cling gobies and short-steep-coastal-streams in the Australian Wet Tropics Report* (2016) noted that Stiphodon species including the opal cling goby (cling goby species) are likely to inhabit low-order streams that empty directly into the Great Barrier Reef Lagoon in high-rainfall areas and these were referred to as short steep coastal stream,

Short-steep-coastal-streams are known to support a unique aquatic fauna dominated by amphidromous species including fishes (especially cling gobies, subfamily Sicydiinae), crustaceans (prawns, shrimps) and molluscs.

Short steep coastal streams (SSCS) are defined having a (Ebner, Donaldson, Sydes, 2016):

- A main channel which is short in length (100's to 10's of kilometres)
- steep (average slope > 5% across the entire stream network) and coastal, in that empties directly to the sea via no or at most a rudimentary estuary
- minimal mangroves present along the creek or lagoon near the mouth
- The overall steep gradient of short-steep-coastal-streams means that riffle-run-pool sequences are maintained along the entire length of the stream, leaving few areas for the deposition of alluvium.

The research undertaken by Ebner and Thuesen hypothesised that large short SSCS (typically pools >10 m wide, depth > 1m) would contain greater numbers of cling goby species than

smaller short steep coastal streams and that wetter catchments containing short steep coastal streams would contain greater numbers of species than those in drier catchments (i.e. according to rainforest as opposed to schlerophyll forest dominated catchments) Ebner, Donaldson, Sydes, 2016).

Based on the research by Ebner and Thuesen in 2010, it appears that the streams that contain high species richness of cling gobies and high counts of each species, are generally the medium to large size streams, experience almost year round flow, in high rainfall, rainforest dominated catchments (Ebner, Donaldson, Sydes, 2016).

Cling goby species thrives along various sections in SSCS and the opal cling goby is found in the lower course of the short steep coastal stream with overlapping distribution and transitioning in an upstream direction (30-40 mm TL) (refer to Figure 2-2).) (Figure 2-2). Opal cling gobies can also be found above the first in-stream barrier, where present. This species is usually found in waterways less than 30 m above sea level (ASL) and often below the first major instream barrier (Ebner, Donaldson, Sydes, 2016).

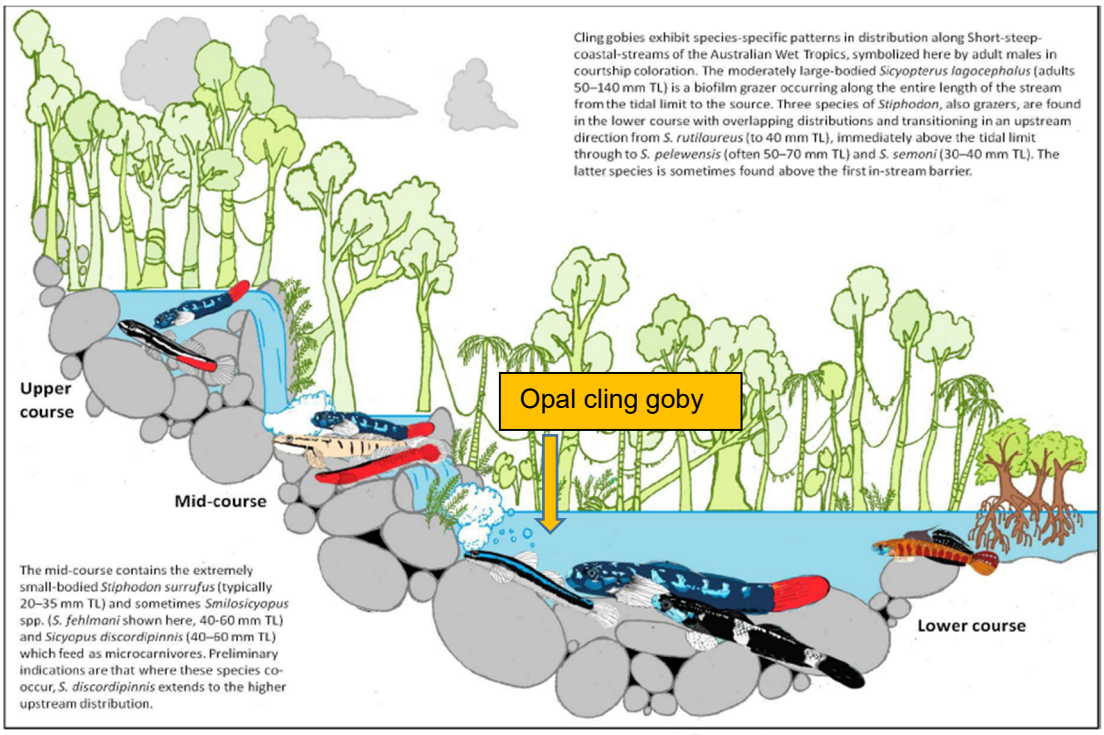


Figure 3.7 Elevational associations of the more commonly encountered sicydiine gobies in the SSCS of the Australian Wet Tropics.

Figure 2-2 Elevational associations for the cling goby species (Ebner, Donaldson, Sydes, 2016)

The opal cling goby is distributed within SSCS within the Wet Tropics World Heritage Area (WTWHA), Cooper Creek north of the Daintree River, Pauls Pocket Creek north of the Mulgrave and Russell Rivers, and Harvey Creek that drains into the Mulgrave River and Russell River estuary (DAWE 2020, Ebner and Thuesen 2010).

Previous research has identified that the opal cling goby occurs within permanent streams within the WTWHA: Turtle Creek and Spring Creek (Ebner et al. 2016).Table 2.9 outlines where cling goby species have been found within the greater Wangetti area based on research documented in by Ebner, Donaldson, Sydes 2016 in the *conservation planning for cling gobies and short-steep-coastal-streams in the Australian Wet Tropics Report* (2016). According to the field surveys conducted in 2016 by TropWATER confirmed the presence of 6–25 individuals within Turtle Creek and 0–5 individuals within Spring Creek (Ebner et al. 2016).

Table 2.9 Cling gobies within the greater Wangetti Area (Ebner, 2016)

Species	Common Name	NC Act	EPBC Act	Location	Elevational association
Stiphodon semoni (opal cling goby)	Opal cling goby	-	CE	Cascade Creek Spring Creek Turtle Creek	Lower course
Stiphodon rutilaureus	Orange cling goby	V	-	Cascade Creek Turtle Creek	Lower course
Stiphodon pelewensis	Emerald cling goby	V	-	Cascade Creek Turtle Creek Hartley's Creek	Lower course to above first instream barrier
Stiphodon surrufus	Birdsong cling goby	V	-	Cascade Creek	Midcourse

Potential habitat within Wangetti South Section

Based on the habitat description for the opal cling goby species presented above, an assessment was undertaken to determine whether there was potential opal cling goby habitat within Wangetti South Section project area. This in turn, has informed whether habitat critical to the survival of the species is present in accordance with the DAWE's *Significant Impact Assessment Guidelines* further informing the impact assessment undertaken in Significance of impact against the EPBC Significant Impact Guidelines.

The information used to determine potential habitat of the opal cling goby was based on:

- The research information from Ebner et al. 2016
- Habitat defined on DAWE's SPRAT profile for the opal cling goby
- Information collected during the ecological field survey completed by GHD, 2019.

Based on a review of the above data sources it is evident that the habitat criteria presented in Table 2.10 is required within a waterway in order to support opal cling goby habitat.

Table 2.10 Opal cling goby habitat requirements

Opal cling goby habitat requirements						
Habitat criteria	>10 m wide	Depth > 1 m	Average slope > 5% across the entire stream network	Waterway discharges directly to the sea via no or at most a rudimentary estuary	Waterways less than 30 m ASL – potential opal cling habitat (DAWE, 2020 and Ebner et al. 2016)	Lower course of the waterway (stream order 1 or 2)

Based on habitat criteria presented in Table 2.10, predicted habitat for the opal cling goby has been applied to the Wangetti South Section Project area has been modelled and presented in Appendix C. Predicted habitat presented in Appendix C has been based on the following:

- At the time of survey were observed to be shallow in nature, and are located on land greater than 5% slope
- All waterways intersected by the project area were field validated to be less than 10 m wide
- Former Department of Natural Resources, Mines and Energy (referred to now as Department of Resources (DR) 10 m contour data to demonstrate all waterways below 30 m ASL
- DR stream order data was used to demonstrate first and second order waterways (i.e. lower course waterways) and those discharging directly to the sea.

As shown on Appendix C the potential habitat for the species indicates the following:

- Five locations within where the project area intersects potential habitat for the opal cling goby, bridge locations are proposed in these locations (refer to Figure 2-3)
- All waterway south of Rifle Range Road lead directly into the sea, while those north of Rifle Range Road meander along the coastline prior to discharging to the sea
- All waterway south of Rifle Range Road are mapped as either first or second order stream while the main arm of the waterway north of Rifle Range Road which discharges to the sea is mapped as a third order waterway. The waterway at the southern end of the alignment which drains to an area south of Palm Cove Jetty does not support potential habitat as the waterway drains through a mangrove estuarine environment.

Figure 2-3 Photos of Opal Cling Goby Potential Habitat within Wangetti South Section

Habitat critical to the survival of the species

Habitat critical to the survival of the opal cling goby has not been specified in listing advice for the species or a specific recovery plan (TSSC, 2011). The *Matters of National Environmental Significance Significant Impact Guidelines 1.1* (DoE, 2013) defines habitat critical to the survival of a species as areas that are necessary:

- For activities such as foraging, breeding, roosting or dispersal
- For the long-term maintenance of the species
- To maintain genetic diversity and long-term evolutionary development
- For the reintroduction of populations or the recovery of the species.

As stated in both the approved conservation advice (DAWE, 2011) and the listing advice (TSSC, 2011) the opal cling goby is only known from one population and is restricted to a limited number of rainforest streams in the Wet Tropics region of northern Queensland. Therefore, streams which meet the habitat criteria of the species would be considered habitat

critical to the survival of the species to support the ecologic functions of the species while maintaining the long-term maintenance of the species.

Key threatening process

This section discusses key threatening process to opal cling gobies within WTWHA and the Wangetti South Section area based on information from the *Approved Conservation Advice for Stiphodon semoni (Opal Cling Goby)* published by DAWE (2011).

Table 2.11 summaries current known and future threats to the opal cling goby habitat and population as identified in the *Approved Conservation Advice for Stiphodon semoni (Opal Cling Goby)* published by DAWE (2011) and provides commentary as to whether the project may increase or result in these threats occurring. Loss of suitable habitat due to human development

Table 2.11 Key threats to the opal cling goby within WTWHA

Threats	Description	Project specific comments
Current known threats	Water extraction and stream regulation including instream barriers Competition with pest species (Cane toad tadpoles) Reduced riparian zone and direct stream clearing Lack of knowledge of the opal cling goby as populations of this species has been recently discovered.	No water extraction or permanent instream barriers (including in-stream crossings) are proposed as part of the proposed works within waterways mapped as habitat critical to the survival of the species. Riparian and stream clearing will be limited to that necessary with constructing the proposed bridges over each waterway identified as habitat critical to the survival of the species. All pest species will be managed in accordance with requirements of the Queensland *Biosecurity Act 2014* and the local council's *Douglas Shire Biosecurity Plan 2017 – 2021.*
Future threats	Alien fish invasions (e.g. climbing perch, Tilapia) Translocation of native fishes Potential overharvest for private aquaria Urbanisation and resort development Overharvest for science included if not conducted in a transparent and coordinated manner under permits Climate change	The project is an adventure-based ecotourism development and will not result in the listed threats for the project area. 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 and national parks.

Potential impacts from the project to opal cling goby habitat and population during the construction phase *and operational phase*

The potential direct and indirect impacts of the construction and operation of the Wangetti South Section on potential opal cling goby habitat are expected to be the same as those described previously for the predicted habitats. These impacts are detailed in the Environmental Assessment Stage 2 Wangetti Trail: MNES Baseline Ecology and Impact Assessment Report (GHD, 2020c) and include:

- Permanent and/or temporary loss of riparian habitat.
- Degradation of aquatic and riparian habitats through increased erosion, run-off and sedimentation.
- Collection of the species for private aquariums and disturbance of behaviour through increased noise and vibration from hikers and mountain bike riders.
- Introduction and/or spread of pests.

Potential impacts from the project to the opal cling goby habitat and population during the construction phase are discussed in the following sections.

- Loss of a small area of riparian vegetation to accommodate the required bridge structures. habitat leading to reduced biodiversity.
- Loss of microhabitats including tree hollows, hollow logs, leaf litter, rocks and substrate suitable for fauna.
- Habitat degradation downstream due to temporary increase in erosion, run-off and sedimentation during the construction phase.

The opal cling goby is known to occur within waterways intersected by the project area (Ebner *et al.* 2016), while a number of other have been mapped as supporting habitat critical to the survival of the species due to the presence of specific habitat criteria. The construction of the proposed shared use trail will traverse the creeks of where the opal cling goby is known to occur as well as several other mapped watercourses and unnamed tributaries. Where the trail crosses known habitat for the cling goby, crossings will be low-level bridges and will not be in water crossings such as rock armour or boulder crossings. Low-level bridges will not have instream impacts and will therefore not impact cling goby habitat.

As the project is not expected to directly impact any watercourses and/or ephemeral creek lines, it is unlikely that the operation works will cause any significant disturbance to aquatic habitats within the project area.

Habitat degradation by increased erosion, run-off and sedimentation

Construction

Construction activities have the potential to generate localised erosion, run-off and sedimentation through clearance of vegetation and instream earthworks. This can reduce the abundance and diversity of downstream receiving aquatic habitats by physically smothering macrophytes, changing nutrient levels, encouraging weed incursions and altering the movement and behaviour of fish species. Sensitive ecological receptors (e.g. aquatic habitats) are particularly susceptible to adverse impacts associated with erosion, run-off, and sedimentation. A number of the streams downstream of the project area have been mapped as supporting habitat critical to the survival of the species. Best practise erosion and sediment controls will be required to be installed prior to the vegetation clearing or any general earthworks.

Adverse weather conditions during construction can exacerbate the potential impact of erosion, runoff and sedimentation. High intensity rainfall has the potential to remove exposed topsoil,

destabilise creek beds and distribute sediment through creek lines. Erosion and sediment control devices will be required to be designed to a designated design event to protect the downstream receiving environment during a range of storm events.

Operational

The project will create a permanent shared use trail that will generally have a surface constructed from the natural soil and rock found along the trail. Although the temporary disturbance footprint for the shared use trail will be rehabilitated, the permanent shared use trail has potential to contribute to sedimentation to the environment. The movement of hikers and mountain bike riders have the potential to cause localised habitat degradation through exposure to run-off and sedimentation, and trail widening to avoid muddy or puddled areas. This can reduce the ecological value of surrounding habitats through physical smothering of vegetation (including aquatic macrophytes), degradation of water quality including changes in nutrient levels, increased weed incursions and declines in species diversity. This risk is considered low given the small number of hikers and mountain bike riders anticipated. However, the long-term degradation of tracks over time could present a local erosion and sedimentation risk.

Introduction and spread of invasive species

Construction

Construction activities have the potential to introduce and/or spread invasive pest and weed species, through the increased movement of people and machinery. This can cause substantial disruption to natural ecosystems by altering the balance of inter-species competition and predation.

Two pest fauna species are known to impact upon the opal cling goby (DAWE, 2011), being the cane toad (*Rhinella marina*) and spotted tilapia (*Tilapia mariae*) as these species have the potential to outcompete the opal cling goby for resources or consume the eggs and/or larvae.

Construction activities can exacerbate the effects feral predators have on local wildlife communities. Inappropriate waste disposal has the capacity to attract higher local concentrations of feral predators, increasing the predation pressures on local wildlife.

Smaller pest fauna species particularly can be introduced via movement of construction vehicles and contaminated fill. As the receiving environment has a high availability of water and food resources, and the movement of vehicles will be limited by terrain, the risks will be relatively low. Nevertheless, measures should be taken to reduce the risk of introducing or spreading pest fauna species.

Operational

Project operation has the potential for introduction and spread of invasive species through the ongoing movement of hikers and mountain bike riders.

Invasive fauna species are known to occur within the project area. Pest species that are likely to be relatively common and ubiquitous within the region include the cane toad (*Rhinella marina*). The proposed shared use trail has the potential to facilitate movement of feral predators, thereby increasing predation pressures on local wildlife. Although the receiving environment is already exposed to pest infestation, mitigation measures will be required to limit any spread of pest animals that could result from construction activities.

Disturbance of surface waterways and waterbodies

Construction

The proposed shared use trail intersects a number of mapped watercourses under the *Water Act 2000*, *Fisheries Act 1994*, and ephemeral creek lines. A number of these watercourses have

significant flow and direct access to marine environments, which provide suitable foraging and breeding habitat for the opal cling goby. These areas are also ecologically important for movement of wildlife, as habitat and drinking sites and are potentially susceptible to construction-related disturbances. It is anticipated that the project will not directly impact any watercourses and/or ephemeral creek lines during the construction of the shared use trail. Single span bridges will be placed across majority of the crossings along the shared use trail, as well as placement of boulders within ephemeral creek lines. Installation of each bridge will be placed away from the embankments to avoid any disturbance to existing waterways.

Operational

Once operational, the project is unlikely to result in the disturbance of surface waterway and waterbodies as users will be utilising the built structures over the waterways.

Degradation of riparian habitats

Construction

While the project will have minimal direct impact on watercourses, earthworks and other construction activities have the potential to cause indirect degradation of aquatic habitats. Construction activities within and/or in the vicinity of watercourses have the potential to cause degradation of aquatic and riparian habitats through:

- Removal of riparian vegetation
- Run-off, sedimentation and erosion
- Point-source pollution (chemical and fuel spills)
- Establishing barriers to the movement of aquatic fauna through the place of boulders within ephemeral creeks

Release of sediments into aquatic habitats can result in altered water chemistry (e.g. increased turbidity, decreased oxygen levels, reduced light penetration), change in channel morphology and alteration of substrate composition (Wood and Armitage 1997; Wheeler *et al.* 2005). These impacts can affect aquatic fauna both directly and indirectly by reducing habitat value and altering trophic dynamics (particularly where substrate and macrophytes are smothered) and feeding behaviours. Use of construction machinery in and around aquatic habitat also has the potential to result in the introduction of contaminants, such as fuels and lubricants. These can result in long-term impacts to aquatic wildlife and their habitats, and lead to a decline in aquatic species diversity as sensitive species are competitively excluded by more tolerant species, particularly exotic pest species that typically tolerate degraded habitats.

Operational

While the project will have minimal direct impact on watercourses, the shared us trail, operation of the public camp has the potential to cause indirect degradation of aquatic habitats. Operational activities within and/or in the vicinity of watercourses have the potential to cause degradation of aquatic and riparian habitats through:

- Run-off, sedimentation and erosion
- Point-source pollution (wastewater and fuel spills)
- Disturbance associated with noise, vibration and/or artificial lighting.

Release of sediments into aquatic habitats can result in altered water chemistry (e.g. increased turbidity, decreased oxygen levels, reduced light penetration), change in channel morphology and alteration of substrate composition (Wood and Armitage 1997; Wheeler *et al.* 2005). These impacts can affect aquatic fauna both directly and indirectly by reducing habitat value and

altering trophic dynamics (particularly where substrate and macrophytes are smothered) and feeding behaviours. Activities associated with camp site near aquatic habitat also has the potential to result in the introduction of contaminants and greywater, noise and vibration impacts and artificial light. These can result in long-term impacts to aquatic wildlife and their habitats, and lead to a decline in aquatic species diversity as sensitive species are competitively excluded by more tolerant species, particularly exotic pest species that typically tolerate degraded habitats.

Collection of wildlife and disturbance of wildlife behaviour through increased noise and vibration from hikers and mountain bike riders

Operational

Collection of wildlife from hikers and mountain bike riders has the potential to occur during the operation of the project. The main threat to the opal cling goby has been identified as collection for the aquarium trade (DAWE 2019), and therefore suitable measures to mitigate this impact will be implemented.

Vibration and sound impacts from hikers and mountain bike riders using the tracks and trails, and campsites are anticipated to be low during operation of the project. Impacts will be limited to localised exposure to human voices in otherwise natural forest and woodland environments. While sensitive wildlife have been shown to experience substantial behavioural alteration to human presence, local species at risk, such as the southern cassowary have been shown to habituate to human activity at high use areas such as National park campgrounds and car parks (Kofron and Chapman 2006). As a result, the potential for disturbance of wildlife behaviour through noise and vibration is considered low. The following impacts will require mitigation during the operational phase:

- Localised habitat degradation through exposure to run-off, sedimentation and trail widening
- Introduction and spread of invasive species
- Barrier effects and reduced movement

Linear clearing for the shared use trail can cause barrier effects by limiting the capacity for movement, particularly among ground-dwelling fauna. No fencing will be established as part of the project, and the clearing footprint will be narrow with a permanent footprint of 1.5 m in width, and clearing will retain large canopy trees wherever possible with the intention that disruption of habitat connectivity will be mitigated.

Risk assessment of mitigation measure to address potential impacts from the project to opal cling goby habitat

To respond to the potential threats and impacts to the opal cling goby habitat as part of the project, mitigation measures have been developed for the design, construction and operational phases of the project. This section qualitatively determines the risk of potential impacts to opal cling goby habitat that could occur as a result of undertaking construction activities for the project. The risk assessment methodology has been based off the risk assessment methodology in the DAWE *Environmental Management Plan Guidelines 2014*.

Ranking impact criteria

Each potential impact to the opal cling goby was ranked according to specific criteria namely likelihood and consequence, using the criteria in Table 2.12 and Table 2.13, respectively, where

- Likelihood is based on how likely it is that the event/issue will occur after control strategies have been put in place
- Consequence is what the consequence/result will be if the issue does occur.

These ratings are then combined using the risk assessment (refer Table 2.14) to generate a risk rating of low, medium, high or severe and have been derived from the AS/NZS ISO 31000:2009 Risk management – Principles and guidelines (Standards Australia 2009).

Table 2.12 Qualitative measure of likelihood (Australian Government Department of the Environment, 2014)

Likelihood	Qualitative measure
Highly likely	Is expected to occur in most circumstances
Likely	Will probably occur during the life of the project
Possible	Might occur during the life of the project
Unlikely	Could occur but considered unlikely or doubtful
Rare	May occur in exceptional circumstances

Table 2.13 Qualitative measure of consequences (Australian Government Department of the Environment, 2014)

Consequence	Qualitative measure
Minor	Minor incident of environmental damage that can be reversed
Moderate	Isolated but substantial instances of environmental damage that could be reversed with intensive efforts
High	Substantial instances of environmental damage that could be reversed with intensive efforts
Major	Major loss of environmental amenity and real danger of continuing
Critical	Severe widespread loss of environmental amenity and irrecoverable environmental damage

Table 2.14 Risk assessment (Australian Government Department of the Environment, 2014)

	Consequence				
	Minor	**Moderate**	**High**	**Major**	**Critical**
Highly likely	Medium	High	High	Severe	Severe
Likely	Low	Medium	High	High	Severe
Possibly	Low	Medium	Medium	High	Severe
Unlikely	Low	Low	Medium	High	High
Rare	Low	Low	Low	Medium	High

Table 2.15 summarises the predicted initial impacts the proposed construction activities can on have on opal cling goby habitat within the project area. The subsequent residual impacts are based upon implementation of recommended management measures.

Table 2.15 Mitigation measures proposed to manage the risk to opal cling gobies in Wangetti South Section

Impact	Initial risk (without mitigation measures)	Mitigation measure	Residual risk (with mitigation measures)	Design	Construction	Operation
Injury and mortality to wildlife during construction phase	Medium	Provisions are made to minimise the risk of fish kills arising from the works e.g. through entrapment of fish upstream or between works. In the event that fish that have been trapped by the works, fish salvage activities in accordance with the Fisheries Queensland Guidelines for Fish Salvage (available at www.daf.qld.gov.au) are implemented immediately	Low		X	X
		Limiting construction equipment operating adjacent to waterways and undertaking hand construction where possible. Where a waterway crossing is required over mapped potential opal cling habitat a single span bridge will be installed. Single span bridges for minor waterway crossings will be used to minimise disturbance with waterways and loss of aquatic habitats.		X	X	
		All clearing is to comply with requirements of relevant permits and approval conditions, with specific reference to erosion and sediment control plans that clearly identify mechanisms to avoid the discharge of sediment during construction off site into local habitat.			X	
		Transit to construction sites will be via approved and designated services tracks only and speed limits of maximum 40 km/hr on formed roads. Construction vehicles will be of the smallest practical size to access the required areas.			X	
					X	X
Illegal collection for the aquarium trade	High	Signs will be erected along the project area to remind people that the collection of wildlife within National parks is prohibited.	Low		X	X
		Within opal cling goby habitat, bridges will be designed to completely span suitable habitat and limit public access to waterways. No in-stream crossings will be included.			X	X
Disturbance to wildlife through increased light, noise and vibration	High	Adherence to daytime construction times only and all machinery to be silenced to manufacturers specifications. No blasting of rock is permitted.	Low		X	

Impact	Initial risk (without mitigation measures)	Mitigation measure	Residual risk (with mitigation measures)	Design	Construction	Operation
		Limiting construction equipment operating adjacent to waterways and undertaking hand construction where possible.			X	
The introduction and/or spread of weeds, pests and diseases	High	Undertake a pre-clearing weed survey and pre-clearing pest survey and treatment and management and report areas of existing weed infestation.	Low	X	X	
		During construction phase, all machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds and pathogens. Vehicles, plant and equipment to be used for the project would be required to be clean with Weed and Seed Hygiene Declaration certificates. Vehicles, plant and equipment to be inspected prior to being used to ensure they are clean. Disinfecting vehicles and machinery. This will be undertaken during the construction phase of the project and maintained throughout. During the operational phase all machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds, pests and pathogens. Operational staff and maintenance staff disinfecting clothing, footwear, equipment and other personal items. Disinfecting vehicles during the operational phase of the project and maintained throughout.			X	X
		Weed identification to be included in the site induction training.			X	X
		Trail construction will minimise disruption of forest canopy wherever possible to avoid additional sunlight that can promote weed growth on forest floor.			X	
		Vehicle access will be restricted to existing roads and tracks.			X	X
Disturbance of surface waterways and waterbodies	Medium	The potential for direct impact on waterways has been largely avoided by installing the bridge structures away from the existing banks of waterways. This avoids undertaking construction works within the waterway.	Low	X	X	

Impact	Initial risk (without mitigation measures)	Mitigation measure	Residual risk (with mitigation measures)	Design	Construction	Operation
Direct loss of aquatic habitat Degradation of riparian habitats		Single span bridges for minor waterway crossings will be used to minimise disturbance with waterways and loss of aquatic habitats. Techniques for installing the bridges has been outlined in the Wangetti Trail Construction Methodology Manual and include spanning the full width of the waterway so that no works occurs within the waterway and existing nature features are left in place within the waterway.				
		Construction of waterway crossings only to occur in the approved areas as documented on a map in a register.			X	
		Pre-works and post works reporting to be undertaken in accordance with the Accepted development requirements for operational work that is constructing or raising waterway barrier works, Department of Agriculture and Fisheries, 2018 and information reported in the contractors environment system.			X	
		For any part of the waterway bed or banks adjacent to the works that has been altered by construction activities, the site is restored and/or rehabilitated so that as a minimum: • Stability and profiles of the bed and banks are re-instated to natural stream profiles and stability within five (5) business days of the completion of the works • The waterway bed is retained with natural substrate or reconstructed with substrate comparable to the natural substrate size and consistency • Site conditions allow the rapid re-establishment of native vegetation and cover or native species are replanted to re-establish the natural plant community		X	X	
		All vegetation that is removed is cut into small pieces and dispersed throughout the surrounding area (where possible) with no large windrows or stockpiles being present within the project area. The temporary (construction) footprint will be left in such a manner that natural regeneration of the local vegetation community will be			X	

Impact	Initial risk (without mitigation measures)	Mitigation measure	Residual risk (with mitigation measures)	Design	Construction	Operation
		encouraged, including soil, and weed management as appropriate to the disturbance and existing environment.				
		Storage of fuels, chemicals, wastes and other potentially environmentally hazardous substances will be bunded or otherwise contained areas away from waterways.			X	X
		No refuelling activities should take place within 50 m of a watercourse.			X	X
		Degradation will be mitigated through minimising the size of the disturbance area, implementing an Erosion Sediment and Control Plan (ESCP), constructing bridges that span the width of the waterway, constructing during dry conditions, and minimising disturbance by noise, vibration and/or artificial lighting.			X	

Significance of impact against the EPBC Significant Impact Guidelines

A significant impact assessment for the opal cling goby has been undertaken to assess the potential for the species to be impacted during the construction and operation of the project and then to discuss the mitigation measures that have been developed to minimise impacts to the opal cling goby habitat. Refer to Table 2-17.

This section assesses the significance of the proposed impacts from the activities during the construction and operational phase of the project on opal cling goby species and their habitat. An assessment has been made against the EPBC Significant Impact Guidelines 1.1 (DoE 2013) for the opal cling goby.

Table 2.16 Significant impact assessment for the opal cling goby

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	Response
Lead to a long-term decrease in the size of a population; or	Unlikely The project is not expected to result in a long-term decrease in the size of the local population of the species, as the proposed bridges will span over opal cling goby potential habitat shown in Appendix C and no loss of instream aquatic habitat will occur. The potential for direct impact on waterways has been largely avoided by installing the bridge structures away from the existing banks of waterways. This avoids undertaking construction works within the waterway. Single span bridges will be used to minimise disturbance with waterways and loss of aquatic habitats. Techniques for installing the bridges has been outlined in the Wangetti Trail Construction Methodology Manual and include spanning the full width of the waterway so that no works occurs within the waterway and existing nature features are left in place within the waterway. Mitigation measures used to minimise the disturbance of waterways during the construction and operation of the project are discussed in Table 2.15 provided in section 5. Specific best practice management actions include: • Implementing erosion and sediment control measures during the construction and operation phases of the project as outlined in the CESCP • Restricting clearing of riparian vegetation to minimum area necessary and taking steps to ensure that bank stability is not affected during construction. • Implementing waste and hazardous materials control measures during the construction phase of the project as outlined in the CEMP. • Implementing measures in the WPDMP. The project has the potential to increase the illegal collection of the opal cling goby for the aquarium trade through increased access and exposure of people to fish habitat.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	Response
	Information about protecting MNES and the illegal taking of threatened species within the project area will be incorporated into site inductions, toolbox talks, signs along the trail, trail briefings and displayed on the Wangetti Trail website. At locations where the trail intersects waterways supporting potential opal cling goby habitat single span bridges will be used and riparian vegetation along waterways will be reinstated to deter trail users from directly accessing the waterways. These locations will be monitored carefully during the construction and operational phases by a method agreed between TDPD and DES. These areas will be listed as 'priority revegetation areas' within the rehabilitation plan. The above listed mitigation measures are considered reduce the risk of illegal fish collection occurring.
Reduce the area of occupancy of the species; or	Unlikely The area of occupancy of the opal cling goby is not predicted to be permanently impacted by the construction of the proposed shared use trail and bridges. No loss of habitat will occur. Flow and fish movement will not be restricted by the bridges. As discussed above, without appropriate management, construction and operation phase activities have the potential to reduce the suitability of habitat for the opal cling goby within and adjacent to the project footprint. Water degradation and clearing of riparian vegetation are the key risks for long-term potential impacts to opal cling goby habitat within and downstream of the project footprint. Potential impacts to the opal cling goby as a result of water quality degradation may include smothering of foraging resources, alteration in habitat characteristics and subsequent impacts to fish physiology and behaviour. Management actions discussed in Table 2.15 will be implemented during the construction and operation phase of the project to manage potential impacts. Applying these management measures, the potential impacts to aquatic habitat suitability for the opal cling goby are expected to be minor. No direct loss of aquatic habitat will occur and, as such, the project is not expected to significantly impact the area of occupancy of the species.
Fragment an existing population into two or more populations; or	Unlikely The proposed bridges have been designed to completely span over opal cling goby potential habitat. Single span bridges will be used to minimise disturbance with waterways and loss of aquatic habitats. Techniques for installing the bridges has been outlined in the Wangetti Trail Construction Methodology Manual and include spanning the full

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	Response
	width of the waterway so that no works occurs within the waterway and existing nature features are left in place within the waterway. Construction and operation of the bridges is therefore not expected to significantly inhibit upstream and downstream movement of the opal cling goby and no fragmentation of the population is expected to occur as a result from the proposed action.
Adversely affect habitat critical to the survival of a species; or	Possible The construction of the shared use trail and the proposed bridges are expected to result in limited and temporary disturbance to the potential habitat for the opal cling goby. Techniques for installing the bridges has been outlined in the Wangetti Trail Construction Methodology Manual and include spanning the full width of the waterway so that no works occurs within the waterway and existing nature features are left in place within the waterway. Techniques for constructing the trail to manage erosion and runoff have been incorporated in the Wangetti Trail Construction Methodology Manual. No loss or fragmentation of habitat will occur as a result of the project. As discussed for the assessment above, without appropriate management, construction and operation phase activities have the potential to adversely affect habitat of the species by reducing the suitability of habitat within and adjacent to the project footprint. Water quality degradation and riparian vegetation clearing are the key risks for long-term potential impacts to opal cling goby within and downstream of the project footprint. Management actions will be implemented during the construction and operation phase of the project to manage these potential impacts. Applying the prescribed management measures, the potential impacts to aquatic habitat suitability for the opal cling goby are expected to be minor. As such, the project is not expected to significantly impact habitat critical to the survival of the species.
Disrupt the breeding cycle of a population; or	Possible The opal cling goby spawn in rainforest streams, with eggs deposited in small, narrow spaces between submerged stream boulders (DAWE 2019). Suitable habitat for the opal cling goby was observed within the project footprint during the surveys, and therefore, spawning of the opal cling goby within the project footprint is considered likely to occur. Water degradation during the construction and operation of the project may disrupt the breeding cycle of the opal cling goby. Management actions as outlined in Section 5.2, such as sediment and erosion control measures will be implemented to protect the

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	Response
	degradation of habitat. A concept erosion sediment and control plan has been developed and outlines appropriate erosion control measures to be implemented. No changes to the natural flow regime of the waterways or restriction of fish movement will occur as a result of the project. The construction of the shared use trail and the proposed bridges are expected to result in limited and temporary disturbance to the potential habitat for the opal cling goby. Techniques for installing the bridges has been outlined in the Wangetti Trail Construction Methodology Manual and include spanning the full width of the waterway so that no works occurs within the waterway and existing nature features are left in place within the waterway. Techniques for constructing the trail to manage erosion and runoff have been incorporated in the Wangetti Trail Construction Methodology Manual. Applying the prescribed management measures, any potential disruption to the breeding cycle of the opal cling goby is expected to be minor and temporary.
Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline; or	Possible Construction and operation of the shared use trail and bridges will have minimal impact on the aquatic environment, as the trail will have a permanent footprint of 1.5 m in width and the proposed bridges will span over the waterways considered to support cling goby habitat. No permanent works are proposed within the waterways and existing nature features are left in place within the waterway. Techniques for constructing the trail to manage erosion and runoff have been incorporated in the Wangetti Trail Construction Methodology Manual. Operation and construction phase activities have the potential to decrease the availability and quality of opal cling goby habitat within and adjacent to the project footprint without appropriate management measures. Water quality degradation and riparian vegetation clearing are the key risks for long-term potential impacts to opal cling goby habitat within and downstream of the project footprint. Management actions will be implemented during the construction and operation phase of the project to manage these potential impacts. The construction of the shared use trail and the proposed bridges are expected to result in limited and temporary disturbance to the potential habitat for the opal cling goby. Techniques for installing the bridges has been outlined in the Wangetti Trail Construction Methodology Manual and include spanning the full width of the waterway so that no works occurs within the waterway and existing nature features are left in place within the waterway. Techniques for constructing the trail to

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	Response
	manage erosion and runoff have been incorporated in the Wangetti Trail Construction Methodology Manual. Applying the prescribed management measures, the potential impacts to aquatic habitat suitability for the opal cling goby are expected to be minor. As such, it is possible that the project may modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that opal cling goby is likely to decline.
Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species' habitat; or	Unlikely Degradation of creek banks from invasive pest and weeds species has the potential to degrade opal cling goby habitat as a result of an alteration of bank characteristics, increase in sediment mobilisation and subsequent decrease in water quality. Implementation of best practice weed management techniques as outlined in the WPDMP coupled with erosion and sediment management controls outlined in the CESCP will reduce the likelihood of this impact. As such, the project is not expected to result in invasive species that are harmful to the opal cling goby becoming established in the species habitat.
Introduce disease that may cause the species to decline; or	Unlikely The construction of the shared use trail and bridges is unlikely to result in the introduction of diseases into the environment given that no biotic materials will be introduced to the project footprint and that construction equipment will be free of weeds and soils which could transfer diseases. A WPDMP has been developed for Wangetti South for the construction and operational phase and outlines controls to be implemented. Construction and operation activities do however have the potential to result in the degradation of water quality. This could lead to degradation of opal cling goby habitat and food resources affecting fish health with the subsequent increase in disease prevalence. Best practice management procedures for the control of erosion and sedimentation, and waste and hazardous materials will be implemented to minimise risks such that decline in opal cling goby as a result of disease introduction is not expected.
Interfere substantially with the recovery of the species.	Unlikely There is no approved recovery plan for the opal cling goby; however, SPRAT (DAWE 2019) includes management strategies for the recovery and maintenance of the species. These include the following management actions: • Known populations to be monitored to identify key threats.

An action is likely to have a significant impact on a critically endangered or endangered species if there is a real chance or possibility that it will:	Response
	• Ensure there is no disturbance in areas where the opal cling goby occurs. • Manage any disruptions to water flows and barriers that may prevent the movement of larvae out to sea and subsequent return of juveniles. • Inhibit over-collection of specimens. These management actions have been considered in the development of the management plans developed for the project are outlined below. • EMP • CEMP • CESCP • WPDMP • Preliminary Traffic Management Plan (TMP) • MNES flora pre-clearance survey methodology.

No significant impact to opal cling goby is anticipated to occur as a result of the proposed works, as described in Table 2.16. A summary of the measures to be implemented during the construction and operational phase to reduce impacts to opal cling goby potential habitat is summarised below:

- Single span bridges area proposed over opal cling goby potential habitat and will be designed to meet the following criteria:
  - the abutments do not extend into the waterway beyond the high bank
  - the bank revetment works do not extend beyond the toe of the bank
  - no scour protection is placed on the bed of the waterway upstream, downstream or under the structure.

  The proposed structures are considered to maintain fish movement and connectivity throughout waterway and within and between fish habitats. No waterway barriers are proposed with SSCS as identified in Appendix C.
- Environmental controls have been developed for the construction and operational phases of the project to reduce impacts on MNES, including the opal cling goby and they include:
  - EMP
  - CEMP
  - CESCP
  - WPDMP
  - TMP
  - MNES flora pre-clearance survey methodology.
- Information about protecting MNES and the illegal taking of threatened species within the project area will be incorporated into site inductions, toolbox talks, signs along the trail, trail briefings and displayed on the Wangetti Trail website.

- Degradation will be mitigated through minimising the size of the disturbance area, implementing a CESCP, constructing bridges that span the width of the waterway, constructing during dry conditions, and minimising disturbance by noise, vibration and/or artificial lighting.

Potential impacts to aquatic habitats for the opal cling goby are expected to be temporary during the construction period of April 2021 to April 2022 for the Wangetti South Section. Through the use of bridges, and the mitigation measures noted above, no significant impact to aquatic habitat or the opal cling goby species is expected to occur within or adjacent to the Wangetti South Section.

3. Impact Assessment – Wet Tropics World Heritage area (WTWHA) and Wet Tropics National Heritage Place (WTNHP)

3.1 Information request

DAWE acknowledges that the referral provides a detailed description of the potential impacts of the proposed action on the World and National Heritage values of the Wet Tropics of Queensland. To support this impact assessment, the preliminary documentation must include:

a. Details of the cultural heritage surveys completed in collaboration with Traditional Owners (or their representative bodies)

b. A description of how the design of the proposed action was informed by the outcomes of the surveys to minimise impacts on the WTNHP.

The stand-alone document must clearly demonstrate, with supporting evidence, how the proposed action adheres to, and is not inconsistent with, the:

- World and National Heritage values of the Wet Tropics of Queensland
- Wet Tropics Management Plan 2020 and Wet Tropics Strategic Plan 2020 -2030
- World and National Heritage management principles as set out in the Environment Protection and Biodiversity Conservation Regulations 2000.

3.2 Response to information request

3.2.1 Cultural heritage surveys completed in collaboration with Traditional Owners (or their representatives)

During the planning and design phase of the project Traditional Owners were consulted to determine 'no go zones' within the project area and requirements for onsite cultural heritage inspections. World Trail was engaged by DTIS to work with cultural heritage representatives to assist in the identification of significant Aboriginal areas, significant Aboriginal objects and or evidence, of archaeological or historic significance. The Wangetti Trail Project Cultural Heritage Survey Report was prepared for the project and outlined details of the cultural heritage surveys.

Details of the cultural heritage surveys undertaken to date for the project area outlined below.

The Cultural Heritage Ground-truthing was conducted in the following areas and dates:

- Ellis Beach and Mount Buchan - Tuesday 24th July 2018
- Hartleys Creek - Wednesday 25th July 2018
- Ellis Beach overtaking lane to Red Cliff Point – Tuesday 31st July to Thursday 2nd August 2018.

Further details of the duration of the surveys and persons involved in the surveys area outlined below.

Cultural Heritage Survey #1

The survey was undertaken from 10.00 am to 3.30 pm (5.5 hours) on Tuesday 31st July 2018.

The following persons attended the survey:

- Cultural Heritage Officers (YGAC) – Roland Singleton and Ashley Richards
- Yirrganydji Rangers (DWAC) – Gavin Singleton, Tarquin Singleton, Shane Singleton, and Lachlan Mitchell
- Volunteers – Kurston Richards and Bernard Singleton Jnr

Key findings for the survey are outlined below:

- There were flat sharp stones observed and may have been potentially used for axe heads. A small flat area within the survey area contained several cycad trees and cocky apple, cycad, canarium were also noted with the survey area and are considered to be bio-cultural values
- There were no findings of rock paintings or scarred trees in the survey. However, further cultural heritage investigations would be required to confirm this.

Cultural Heritage Survey #2

The survey was undertaken from 10.00 am to 3.00 pm (5 hours) on Wednesday 1st August 2018. The survey was attended by the following persons:

- Cultural Heritage Officers (YGAC) – Roland Singleton and Ashley Richards
- Yirrganydji Rangers (DWAC) – Gavin Singleton, Tarquin Singleton, and Lachlan Mitchell
- Volunteers – Kurston Richards, Bernard Singleton Jnr, and George Singleton Snr.

Key findings for the survey are outlined below:

- Some marking of existing river boulders were noted, however there were no cultural heritage items found in the survey area
- A group of tall cycads and flat stones were observed and required further investigation.

Cultural Heritage Survey #3

The survey was undertaken from 9.30 am to 3.30 pm (6 hours) on Thursday 2nd August 2018. It was attended by the following persons:

- Cultural Heritage Officers (YGAC) – Roland Singleton and Ashley Richards
- Yirrganydji Rangers (DWAC) – Gavin Singleton, Tarquin Singleton, Shane Singleton, and Lachlan Mitchell
- Volunteers – Kurston Richards

Key findings for the survey are outlined below:

- Tall cycad trees were observed in the survey area, but no scarring was found. There were small stones sighted along the road and recommendations to follow up in near future for a comprehensive survey of this area.

3.2.2 Description of how the design was informed by the outcomes of the surveys

The Wangetti South Section was altered to avoid culturally sensitive areas based on advice from Traditional Owner Rangers. The location of the shared use trail, camp site and service tracks have been selected as they are considered to avoid the areas of cultural heritage values

based on information collected during discussions with Traditional Owners and collected during cultural heritage surveys.

As discussed in the Wangetti Trail Project Consultation Report 2020, focused engagement was undertaken with the Yirrganydji Aboriginal Corporation (YGAC). The Yirrganydji People are recognised Traditional Owners for the country on which the Wangetti Trail traverses. Engagement with YGAC and their Land and Sea Rangers Corporation was formalised through a MOU that outlined the project vision, objectives, governance framework, business case activities and responsibilities and commercial compensation. This agreement and the working relationship developed with the Yirrganydji People has established a strong relationship of trust and productivity, which has continued throughout the project phases as part of a process to agree and register an Indigenous Land Use Agreement for the Wangetti Trail.

To date, the following activities have been undertaken/are in development with the Yirrganydji people relating to the assessment and delivery of the Wangetti Trail Project:

- Execution of an MOU with the Yirrganydji Gurabana Aboriginal Corporation (YGAC) to participate in the business case development process including definition of overall aspirations for business opportunities for the trail as a precursor to an Indigenous Land Use Agreement (ILUA) and the engagement of Yrriganydji Land and Sea Rangers to provide cultural heritage advice during ground-truthing activities.
- Development of a statutory structure plan for the Wangetti Land Trust Aboriginal Land Act freehold land to be developed as a trail hub for the Wangetti Trail. Establishment of Traditional Owner owned and operated auxiliary trail infrastructure in this location is strongly supported by the Project Team and Douglas Shire Council by way of formal Council resolution.

  Execution of a Cultural Heritage Agreement protocol and engagement of cultural heritage monitors for the construction of the Mowbray River pedestrian bridge
- Drafting of an ILUA for the Wangetti Trail to be agreed and finalised before works commence in early 2021.

Engagement with the Traditional Owner Groups is ongoing and paramount to the successful delivery of the Wangetti Trail. Traditional Owners will be involved throughout all stages of the project – particularly during the procurement process for the eco-accommodation operator.

3.2.3 World and National Heritage values of the Wet Tropics of Queensland

The Wet Tropics of Queensland is a region of spectacular scenery and rugged topography with rivers, gorges, waterfalls and mountains. One of the largest rainforest wilderness areas in Australia is located in the Daintree River valley, and the combination of fringe coral reefs and rainforest coastline in the Cape Tribulation region is rare in the world. The Wet Tropics rainforests contain an almost complete record of the major stages in the evolution of plant life on earth. An assessment has been undertaken against the world heritage values of the Wet Tropics with respect to the proposed Wangetti South Section.

World Heritage Values of the Wet Tropics

Wangetti South Section has been assessed against the World Heritage values of the Wet Tropics of Queensland and this is presented in Table 3.1.

Table 3.1 Assessment against the world heritage values of the Wet Tropics for Wangetti South Section

World heritage values	Response
1. Outstanding universal value The Wet Tropics has been identified as being of outstanding universal value and meets criterion. • vii: exceptional natural beauty • viii: one of the most complete and diverse living records of the major stages of land plants • ix: provides outstanding examples of significant ongoing ecological processes and biological evolution • x: holds a largely intact flora and fauna with hundreds of endemic species restricted to the property	**Wangetti South Section will maintain the outstanding universal value of the Wet Tropics of Queensland.** A report to the Secretariat of the Convention on Biological Diversity and International Union for Conservation of Nature – the Guidelines for tourism partnerships and concessions for protected areas, June 2017 noted: *'The Convention on Biological Diversity in 2012 concluded that the tourism sector is the largest, global, market-based contributor to financing protected area systems in many countries, through entrance and other user fees, partnerships and concessions. However, many Parties to the CBD underutilise tourism as a means to contribute towards the financial sustainability of protected areas'* In addition to the importance of the concept of presenting natural resources, 'opening up' national parks through properly implemented eco-tourism projects (as explicitly allowed for in the Queensland legislation) has the potential to improve environmental outcomes. For example, a properly built, maintained, and operated trail helps minimise erosion and the spread of disease and invasive plants. It also can play an important role in educating the public about the importance of preservation and protection of the environment (PWC, 2018). The Wangetti South Section will aim to preserve the outstanding universal value and ancient and unique plants and animals within the WTWHA by implementing a stringent environmental management plans for both construction and operational phases of the project. A CEMP has been developed for the Project and includes a weed, pest and disease management plan (WPDMP). The WPDMP has been developed in consultation with the WTMA and QPWS officers. The Environmental Management Plan (EMP) prepared for the Project will manage potential impacts on the controlling provisions under the EPBC Act, these are: • Listed threatened species and communities • WTWHA • WTNHP A WPDMP has also been developed with the intent to: • Protect the biodiversity of the surrounding landscape of the adverse impacts from weeds, pests and pathogens

World heritage values	Response
	• Reduce weed infestations and pest infestations by integrated control methods and cost-effective management • Manage weeds in disturbed areas and to protect rehabilitated areas • Manage the weed and pest species that are currently present on the site as well as off-site work areas • Manage pathogens that are currently present on the site as well as off-site work areas • Prevent introduction of new weed infestations to work areas • Increase on-site awareness about the major weed species and manage pest species though strategic management, where possible • Avoid and effectively manage impacts associated with weeds, pests and diseases. A CESCP has been developed with the intent to: • Provide guidance to the construction contractor on the types of erosion and sediment control measures to be considered for the project to mitigate potential impacts to water quality and bed and banks (substrate and vegetation present) of adjoining aquatic habitats that may provide habitat and resources to MNES.
2. Ancient and unique plants and animals The Wet Tropics rainforests are recognised internationally for their ancient ancestry and many unique plants and animals.	**Wangetti South Section will maintain the ancient and unique plants and animals of the Wet Tropics of Queensland.** No threatened ecological communities (TECs) or MNES flora species have been recorded within the Project area during the field surveys which was limited to the shared use trail which included a 40 m wide development envelope (within which the 1.5 m wide trail will be developed) and the locations of the public campsites. 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

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

World heritage values	Response
	• *Zeuxine polygonoides*[2] (Velvet jewel orchid) – Vulnerable. Nine threatened flora species were rated as 'may occur' within the project area. One threatened fauna species, the southern cassowary, was confirmed present during the field survey, and one threatened fish species, the opal cling goby is considered 'likely to occur'. A Cassowary Management Plan has been prepared for the Project. If during construction, high environmental value areas, such as areas containing identified flora species, are identified, qualified environmental specialists will be present to micro-site the trail around high environmental value areas. The trail will avoid large trees where possible and, as is the nature of hiking trails, will wind around trees and large objects to minimise the requirement for clearing and removal of vegetation. Comprehensive management and mitigation strategies have been developed to reduce: the loss of vegetation and habitats; minimise injury and mortality of wildlife; minimise habitat degradation; mitigate barrier effect on fauna movement; restrict the introduction of invasive species; and minimise the disturbance of waterways and waterbodies. The Project will therefore maintain, as much as possible, the ancient ancestry and unique plants and animals that make up the Wet tropics.
3. Scenic beauty The Wet Tropics is also recognised on the World Heritage list for its exceptional natural beauty, with superlative scenic features highlighted by extensive sweeping forest vistas, wild rivers, waterfalls, rugged gorges and coastal scenery.	**The Wangetti South Section will maintain the scenic beauty of the Wet Tropics of Queensland** The Wangetti South Section has been designed such that it is responsive to the natural environmental values, enhancing conservation and protection of a cherished part of Tropical North Queensland. World Trail were appointed to design the alignment and completed a walkthrough, working closely with Traditional Owners, specialist consultants and engineers. The Project will result in minimal impacts to forest vistas, wild rivers, waterfalls, rugged gorges and coastal scenery through the construction of the trail and camp sites and will allow for managed access for tourists to view the scenic beauty of the Wet Tropics.

[2] Also known as *Rhomboda polygonoides*

World heritage values	Response
	The Wangetti South Section and its ancillary facilities will be low-impact and, to the greatest extent possible, ecologically sustainable and preserve and protect community resources. The Wangetti Trail has been designed to minimise built structures like bridges, boardwalks and viewing platforms. Where built structures are required, the design and finish will prioritise the use of local timbers and other materials that will age gracefully with time. Above all, the materials must be durable enough to withstand the harsh tropical climate and natural environment. Any built structures must be designed and engineered to be fit-for-purpose, to have minimal impact to the surrounding environment, to have minimal maintenance requirements and will need to take a minimalistic approach to materials given the remote nature of the trail, resulting in a minimal impact on the scenic beauty of the Wet tropics.
4. Visitor enjoyment The diversity of plants and animals found in this unique environment is a treasure trove of curiosities that attracts visitors from around the world. First class recreational facilities for bushwalking, water sports and camping are all within easy reach.	**Wangetti South Section will enable visitor enjoyment of the unique environment of the Wet Tropics of Queensland** The shared use trail is anticipated to support an expected 28,000 annual visitors. The Wangetti South Section experience will be uniquely Australian, emphasising the culture, history and way of life of the Traditional Owners, the Yirrganydji people. It will encourage a sense of exploration and a spirit of adventure. It will foster an appreciation of the natural environment and the diversity of flora and fauna within it. The Project will provide economic, cultural and educational benefits to the community, as summarised below.
5. Community benefits The World Heritage Areas central to the community's identity and sense of place and offers a wide range of benefits. About 300,000 people live in or within 50 km of the WTWHA. The benefits of the area range from the environmental to the economic, cultural, spiritual, educational, and medicinal.	**The project will provide benefits to the community through economic, cultural and educational benefits** *Economic* The Project has the potential to diversify the tourism product offering in North Queensland, involve Traditional Owners and increase jobs by utilising Queensland's natural assets. The construction phase of the Project will provide an opportunity for the creation of local jobs and employment through the sourcing of material and equipment or through manual labour, while the operational phase of the Project will increase visitors to the area, supporting the local economies of Cairns, Wangetti and Port Douglas. The Wangetti South Section will provide access to a World Heritage listed assets –the WTWHA, which will create value for money experiences for tourists and provide opportunities for tourism operators to extend their offerings and capture markets that are seeking access to unique nature-based experiences (PWC, 2018).

World heritage values	Response
	Cultural and spiritual The Wangetti South Section supports a healthy wellbeing and lifestyle by encouraging the physical, mental, and spiritual activity of participants. Contact with nature can enhance spiritual health, which underpins all other aspects of health (PWC, 2018). *Educational* The Wangetti South Section will create several educational opportunities, including the community, schools and universities to increase their knowledge and understanding around wildlife and conservation in WTWHA, with the opportunity to develop education programs to help teach and upskill students (PWC, 2018).
6. Rainforest Aboriginal country Rainforest Aboriginal people have occupied, used and enjoyed their lands in the WTWHA since time immemorial.	**The Wangetti South Section will uphold the values of the Wet Tropics with respect to the rainforest Aboriginal people** Construction works will be undertaken in accordance with the provisions of Cultural Heritage Management Plan or under another form of agreement with the Traditional Owners. During the development of the shared use trail, cultural heritage representatives were engaged to provide advice regarding the significant Aboriginal areas, significant Aboriginal objects and or evidence, of archaeological or historic significance along the trail. As part of the Project, TDPD has been engaging with Traditional Owners regarding the proposed works and to avoid impacts on cultural heritage values. In areas of high cultural heritage values, qualified archaeologists and/or Traditional Owners will be present during construction. Traditional Owners will be engaged regarding bushfire management techniques that can be adopted for the Project.

National Heritage Values of the Wet Tropics

In May 2007, the Wet Tropic of Queensland was added to the National Heritage List alongside other World Heritage Areas. Australia's national heritage comprises exceptional natural and cultural places which help give Australia its national identity. Such places are a living and accessible record of the nation's evolving landscapes and experiences. The National Heritage criteria that the Wet Tropics of Queensland was listed for in 2007 corresponds to its World Heritage criteria (Section 3.1). In 2012 the Area was also listed for an additional criterion to recognise its cultural values. An assessment has been undertaken against the national heritage values of the Wet Tropics with respect to the proposed Wangetti South Section in Table 3.2 below.

Table 3.2 Assessment against the national heritage values of the Wet Tropics

National heritage value	Response
Criterion (a) The place's importance in the course, or pattern, of Australia's natural or cultural history	**The project will uphold the natural and cultural values of the Wet Tropics** Addressed in Table 3.1 Items 1, 2, 3 & 6.
Criterion (b) The place's possession of uncommon, rare or endangered aspects of Australia's natural or cultural history.	**The project will maintain the uncommon, rare or endangered aspects of the natural and cultural values of the Wet Tropics** Addressed in Table 3.1 Items 1 & 2.
Criterion (c) The place's potential to yield information that will contribute to an understanding of Australia's natural or cultural history	**The project will maintain the potential for the Wet Tropics to contribute to understanding Australia's natural and cultural history** Addressed in Table 3.1 Item 4 & 5.
Criterion (d) The place's importance in demonstrating the principal characteristics of (i) a class of Australia's natural or cultural places; or (ii) a class of Australia's natural or cultural environments.	**The project will maintain the Wet Tropics importance in demonstrating Australia's natural and cultural places** Addressed in Table 3.1 Items 4, 5 & 6.
Criterion (e) The place's importance in exhibiting particular aesthetic characteristics valued by a community or cultural group.	Addressed in Table 3.1 Items 5 & 6.

3.2.4 Wet Tropics Management Plan 1998 and Wet Tropics Strategic Plan 2020-2030

Wet Tropics Management Plan 1998

The project has been approved (Wet Tropics Permit No: WTMA20001a) and a permit issued under Part 4, Division 1, Section 45 of the Wet Tropics Management Plan 1998 (superseded 3rd July 2017) (*Wet Tropics World Heritage Protection Management Act 1993)* to allow for the proposed works to occur within the Wet Tropics Management Zone. While the project was assessed in accordance with the Wet Tropics Management Plan 1998 plan, the project is considered to comply with the intent of the Wet Tropics Management Plan 2020.

An assessment has been undertaken against the provisions of the Wet Tropics Management Plan 1998 (superseded 3rd July 2017) and is presented in Table 3.3.

Table 3.3 Assessment against the provisions of the Wet Tropics Management Plan 1998

Wet Tropics Management Plan 1998	Response
Zone B – Zone B is comprised of land that is mostly of high integrity but not necessarily remote from disturbance. It is intended that, in Zone B, land be undergoing recovery or rehabilitation towards its natural state or becoming remote from disturbance by activities associated with modern technological society; and a visitor may expect opportunities for solitude in a natural area requiring a degree of self reliance; and management presence be limited mainly to activities required for the recovery or rehabilitation of the area.	The majority of the project is located within Zone B under the Wet Tropics Management Plan 1998. The proposed trail is considered to meet the intent of Zone B by providing opportunities to connect with nature and to be surrounded by nature along the trail. The trail will allow for winding around natural obstacles and integrating within the natural environment. Vegetation disruption, including canopy cover, is minimised. The Wangetti South Section has been designed to minimise built structures like bridges, boardwalks and viewing platforms. These built structures pose a number of challenges: • They are normally constructed from imported materials and can be intrusive in the natural environment • They can burn during bushfires or prescribed burns • They can be difficult to construct in remote areas, due to the challenges of importing the materials • They increase the maintenance burden.
The management purpose of Zone B is, to the greatest possible extent— c. To protect and enhance the integrity of land in the zone d. If the land is disturbed— (i) To restore land in the zone to its natural state, as opportunities arise (ii) To include the land in zone A once it is sufficiently recovered or rehabilitated.	

Wet Tropics Management Plan 1998	Response
	Where built structures are required, the design and finish will prioritise the use of local timbers and other materials that will age gracefully with time. Above all, the materials must be durable enough to withstand the harsh tropical climate and natural environment. Any built structures must be designed and engineered to be fit-for-purpose, to have minimal impact to the surrounding environment, to have minimal maintenance requirements and will need to take a minimalistic approach to materials given the remote nature of the trail, resulting in a minimal impact on the scenic beauty of the Wet tropics.
Zone C – Zone C is comprised of land on which, or adjacent to which, there is disturbance associated with community services infrastructure. It is intended that, in Zone C— e. Land be mostly natural, but with some disturbance associated with community services infrastructure (community services infrastructure means infrastructure for community services such as, for example, transport services, electricity supply, water supply and telecommunications services), other community facilities and visitor facilities f. A visitor may expect various low-key opportunities for nature appreciation and social interaction in a natural setting, but with some disturbance by activities associated with modern technological society g. Management presence may be obvious.	Where the trail is located within Zone C land, it is considered to meet the intent of Zone C areas, being, land be mostly natural, but with some disturbance associated with community services infrastructure. The Wangetti South Section has been designed to minimise built structures like bridges, boardwalks and viewing platforms. These built structures pose a number of challenges: • They are normally constructed from imported materials and can be intrusive in the natural environment • They can burn during bushfires or prescribed burns • They can be difficult to construct in remote areas, due to the challenges of importing the materials • They increase the maintenance burden. Where built structures are required, the design and finish will prioritise the use of local timbers and other materials that will age gracefully with time. Above all, the materials must be durable enough to withstand the harsh tropical climate and natural environment. Any built structures must be designed and engineered to be fit-for-purpose, to have minimal impact to the surrounding environment, to have minimal maintenance requirements and will need to take a minimalistic approach to materials given the remote nature of the trail, resulting in a minimal impact on the scenic beauty of the Wet Tropics.
The management purpose of Zone C is— h. To accommodate community services infrastructure, other community facilities and visitor facilities; but (b) to the greatest possible extent— (i) To ensure any adverse impact of activities carried out in the zone on the area's integrity is minimal and acceptable under this plan (ii) To otherwise protect and enhance the integrity of land in the zone.	

Wet Tropics Strategic Plan 2020 – 2030

The Wet Tropics Strategic Plan 2020 – 2030 provides a 10-year policy framework to guide decision-making under the *Wet Tropics World Heritage Protection and Management Act 1993*. The primary purpose of the Wet Tropics Strategic Plan 2020 – 2030 is to enable the identification, protection, and conservation of the Wet Tropics for future generations. It states the desired outcomes that will be delivered and outlines the actions that will achieve this. An assessment has been undertaken against the provisions of the Wet Tropics Strategic Plan 2020 – 2030 with respect to Wangetti South Section and is outlined in Table 3.4.

Table 3.4 Assessment against the provisions of the Wet Tropics Strategic Plan 2020 – 2030

Wet Tropics Strategic Plan 2020 – 2030	Response
11. **Climate change and other threats** Respond to the impacts of climate change and priority cross-tenure threats to the area	To respond to climate change and other threats within the Wangetti South Section, mitigation measures have been developed to be implemented during the construction and operational phases of the project and they are outlined in the following management plans that have been developed for the project: • Environmental Management Plan (EMP) • CEMP • CESCP • Weeds, Pest and Diseases Management Plan (WPDMP) • TMP A summary of the controls measures that been developed in response to climate change include: • Fire management plan is to be developed for the construction phase of the project, in conjunction with WTMA. The nominated construction contractor of the trail and public campsites will be required to develop a bushfire management plan as part of their contract. • No burning of any substances, including wooden debris or products, will be undertaken as part of this project. • Toolbox talks with the construction crew will occur prior construction to educate them about bushfire management, bushfire hazards and evacuation routes. • Working during the fire season, ensure that each team has at least one team member who has been trained in basic bushfire awareness.

Wet Tropics Strategic Plan 2020 – 2030	Response
	• During the fire season, chainsaw work to be scheduled to take place early in the morning, when fire danger risk is lowest. • All signage installed with the project area must have a unique 'location identification number' on it, to be quoted in case of emergency. Emergency responders would be provided with GPS coordinates corresponding to each 'location identification number' and instructions about the most direct and reliable routes of access to that point. Where built structures are required, the design and finish will prioritise the use of local timbers and other materials that will age gracefully with time. Above all, the materials must be durable enough to withstand the harsh tropical climate and natural environment. Any built structures must be designed and engineered to be fit-for-purpose, to have minimal impact to the surrounding environment, to have minimal maintenance requirements.
12. **Support Rainforest Aboriginal Peoples** Promote and incorporate the rights, interests and aspirations of Rainforest Aboriginal Peoples	During the development of the trail, cultural heritage representatives were engaged to provide advice regarding the significant Aboriginal areas, significant Aboriginal objects and or evidence, of archaeological or historic significance along the trail. As part of the Project, TDPD has been engaging with Traditional Owners regarding the proposed works and to avoid impacts on cultural heritage values.
13. **Involve the community** Optimise community participation and connection with the area through innovative interpretation, with a focus on education, volunteering and social inclusion	The Wangetti South Section experience will be uniquely Australian, emphasising the culture, history and way of life of the Traditional Owners, the Yirrganydji people. It will encourage a sense of exploration and a spirit of adventure. It will foster an appreciation of the natural environment and the diversity of flora and fauna within it. The Project will provide economic, cultural and educational benefits to the community, as summarised below. *Economic* Wangetti South Section has the potential to diversify the tourism product offering in North Queensland, involve Traditional Owners and increase jobs by utilising Queensland's natural assets. The construction phase of the Project will provide an opportunity for the creation of local jobs and employment through the sourcing of material and equipment or through manual labour, while the operational phase of the Project will increase visitors to the area, supporting the local economies of Cairns, Wangetti and Port Douglas.
14. **World-class tourism and recreation** Enhance the World Heritage presentation and support	

Wet Tropics Strategic Plan 2020 – 2030	Response
opportunities for natural and cultural tourism and recreation	The Wangetti South Section will provide access to a World Heritage listed assets –the WTWHA, which will create value for money experiences for tourists and provide opportunities for tourism operators to extend their offerings and capture markets that are seeking access to unique nature-based experiences (PWC, 2018). *Cultural and spiritual* The Wangetti South Section supports a healthy wellbeing and lifestyle by encouraging the physical, mental, and spiritual activity of participants. Contact with nature can enhance spiritual health, which underpins all other aspects of health (PWC, 2018). *Educational* The Wangetti South Section will create several educational opportunities, including the community, schools and universities to increase their knowledge and understanding around wildlife and conservation in WTWHA, with the opportunity to develop education programs to help teach and upskill students (PWC, 2018).
15. **Minimise impacts** Manage activities that may have been an impact on the area appropriately through permit and zoning system.	Wangetti South Section has received a WTMA permit and the proposed works were considered to be consistent with the intent of the zones. WTMA was consulted during the design phase of the project and provided advice regarding the: location of the proposed works, extent of footprints, environmental controls and types of material proposed. Wangetti South Section was adjusted accordingly based on the advice from WTMA.

3.2.5 World and National Heritage management principles as set out in the Environment Protection and Biodiversity Conservation Regulations 2000

World heritage management principles

The EPBC Act enhances the management and protection of Australia's heritage places, including World Heritage properties. It provides for the listing of natural, historic or Indigenous places that are of outstanding national heritage value to the Australian nation as set out in the Environment Protection and Biodiversity Conservation Regulations 2000. Schedule 5 of the Environment Protection and Biodiversity Conservation Regulations 2000 details the World and National Heritage management principles. Table 3.5 and Table 3-7 demonstrate how the proposed action adheres to management principles defined for Australian World Heritage and National Heritage, respectively.

Table 3.5 Assessment against the principles of the World Heritage management principles

Principle	Response
General	
1.01 The primary purpose of management of natural heritage and cultural heritage of a declared World Heritage property must be, in accordance with Australia's obligations under the World Heritage Convention, to identify, protect, conserve, present, transmit to future generations and, if appropriate, rehabilitate the World Heritage values of the property.	The Wangetti South Section has been designed to minimise impact and identify and present outstanding natural values of the surrounding environment, including the WTWHA. The Wangetti South Section will provide the public with an immersive, nature experience centred on the unique features of the area and allow for greater sharing of environmental knowledge and connection. The Project has adopted the principles of the mitigation hierarchy, whereby impacts are addressed through the preferential order of avoidance, minimisation and compensation (offset). Throughout the project design, avoidance measures have been considered wherever possible, including minimisation of the total disturbance footprint of the Project and locating proposed infrastructure in previously disturbed areas. Where this avoidance is not possible, the proposed clearing footprint will be minimised to the greatest extent possible through selection of clearing techniques. Regular maintenance of the Wangetti South Section is also proposed during operation to clearly define trail areas and promote use of designated areas. This will create clear designation of public use areas and help to maximise protection and conservation of the surrounding WTWHA. As part of a baseline impact assessment for the Wangetti South Section, an assessment against the MNES – Significant Impact Guidelines 1.1 EPBC Act for World Heritage Properties – Wet Tropics World

Principle	Response
	Heritage Area has been undertaken. The assessment indicated that no significant residual impact is anticipated (following implementation of proposed mitigation measures).
1.02 The management should provide for public consultation on decisions and actions that may have a significant impact on the property.	As part of the Wangetti South Section, consultation with relevant stakeholders has been continuously undertaken, including with regulatory authorities across multiple levels of government, tourism operators, Traditional Owners and public consultation with the wider community. A process was developed to identity individuals and organisations that need to be consulted for the program and project to succeed. The matrix is reviewed on a fortnightly basis, at a minimum, and updated as required. The analysis on key stakeholders includes (PWC, 2018): • Their connection to the project • Level of interest, influence and impact • Engagement methods and frequency of engagement • Key issues, interests, concerns and needs. Specifically for public consultation, a broad communication approach has been implemented using traditional and modern methods such as media statements, a website, a dedicated email address, monthly eNewsletter, 1800 number, social media profiles, editorial articles, letterbox drop and face-to-face community consultation. To advise the community that the community consultation was underway, advertisements appeared in local newspapers, digital ads were created for online news outlets and Facebook advertising was utilised. Through the implementation of this adaptive and wide-reaching consultation process, the Wangetti South Section is considered to provide for a suitable level of public consultation for each key milestone and project phase (PWC, 2018).
1.03 The management should make special provision, if appropriate, for the involvement in managing the property of people who: • Have a particular interest in the property	The State of Queensland acting through the former Department of State Development, Tourism and Innovation (referred to now as the Department of Tourism, Innovation and Sport (DTIS) –TDPD is the proponent responsible for management of the Wangetti South Section. In addition to the employment of QPWS rangers for management of the Wangetti South Section, Traditional Owners who have native title claim or claim interest will have opportunity for involvement.

Principle	Response
• May be affected by the management of the property.	There is significant potential to draw on the knowledge, resources and skills of Indigenous people to create sustainable and long-term employment opportunities. Through the Adventure and Nature Based Tourism Opportunities (ANBTO) program, the State has been conducting meaningful engagement with Traditional Owners who have a native title claim or assert a native title interest in relation to the Wangetti South Section. A key objective of the ANBTO program is to secure long-term job and business opportunities for Traditional Owners (PWC, 2018).
1.04 The management should provide for continuing community and technical input in managing the property.	As described in the response to principle 1.02 above, a process has been developed that identifies individuals and organisations that need to be consulted for the program and project to succeed.
Management planning	
2.01 At least 1 management plan should be prepared for each declared Ramsar wetland.	Not applicable as the project does not intersect any declared Ramsar wetlands.
2.02 A management plan for a declared Ramsar wetland	Not applicable as the project does not intersect any declared Ramsar wetlands.
Environmental impact assessment and approval	
This principle applies to the assessment of an action that is likely to have a significant impact on the ecological character of a Ramsar wetland	Not applicable as the project does not intersect any declared Ramsar wetlands.

National heritage management principles

Table 3.6 Assessment against the principles of the National Heritage management principles

Principle	Response
1. The objective in managing National Heritage places is to identify, protect, conserve, present and transmit, to all generations, their National Heritage values.	The Wet Tropics are listed on both the World Heritage List as the WTWHA, and the National Heritage List as Wet Tropics of Queensland. Refer to response for principle 1.01 in Table 3.5 above.
2. The management of National Heritage places should use the best available knowledge, skills and standards for those places, and include ongoing technical and community input to decisions and actions that may have a significant impact on their National Heritage values.	The Wangetti South Section has adopted the use of information collected from both desktop assessment and field surveys undertaken specifically for the Project. These methods of investigation and assessment have been undertaken by suitably qualified personnel including ecologists and environmental consultants. All environmental impacts have been assessed in accordance with relevant Departmental policies and guidelines, relevant conservation advices and recovery plans. Throughout construction and operation, the Wangetti South Section will abide by environmental impact best practice guidelines to minimise impact, wherever possible. The Wangetti South Section has also been designed in accordance with relevant state and local government guidelines for trail planning, design and management. This ensures that any built are designed and engineered to be fit-for-purpose to the best available standard, to have minimal impact to the surrounding environment, to have minimal maintenance requirements and will need to take a minimalistic approach to materials given the remote nature of the trail. Additionally, during the development of the Wangetti South Section, cultural heritage representatives were engaged to provide advice regarding the significant Aboriginal areas, significant Aboriginal objects and or evidence, of archaeological or historic significance along the trail. This provided key insights and helped to strengthen and conserve important cultural heritage values. The approach and incorporation of the abovementioned sources and parties, paired with the adaptive and wide-reaching consultation process (as described in the response to principle 1.02 in Table 3.5), works to ensure the best available knowledge, skills and standards are being continually adopted for the Wangetti South Section.

Principle	Response
3. The management of National Heritage places should respect all heritage values of the place and seek to integrate, where appropriate, any Commonwealth, State, Territory and local government responsibilities for those places.	During the development of the Wangetti South Section, cultural heritage representatives were engaged to provide advice regarding the significant Aboriginal areas, significant Aboriginal objects and or evidence, of archaeological or historic significance along the trail (DITID, 2020). As part of the Project TDPD has been engaging with Traditional Owners regarding the proposed works and to avoid impacts on cultural heritage values. Additionally, through the ANBTO program, the State has been conducting meaningful engagement with Traditional Owners who have a native title claim or assert a native title interest in relation to the Wangetti South Section. This engagement is aimed towards securing long-term job and business opportunities for Traditional Owners (PWC, 2018). This will allow for the continued management and input of Traditional Owners and, more generally allow heritage values to be appropriately conserved and represented.
4. The management of National Heritage places should ensure that their use and presentation is consistent with the conservation of their National Heritage values.	The conservation of the National Heritage listed Wet Tropics of Queensland (also listed on the World Heritage List as the WTWHA) is paramount to the development of the Wangetti South Section. The Project has been designed to present the outstanding natural values of the surrounding environment, including the Wet Tropics, and foster an appreciation of the natural environment and the diversity of flora and fauna within it. For additional information relevant to conservation refer to response for principle 1.01 in Table 3.5 above.
5. The management of National Heritage places should make timely and appropriate provision for community involvement, especially by people who: • Have a particular interest in, or association with, the place • May be affected by the management of the place.	Refer to response for principles 1.02 and 1.03 in Table 3.5 above.
6. Indigenous people are the primary source of information on the value of their heritage and the active participation of indigenous people in	Refer to response for principle 3 above.

Principle	Response
identification, assessment and management is integral to the effective protection of indigenous heritage values.	
7. The management of National Heritage places should provide for regular monitoring, review and reporting on the conservation of National Heritage values.	Environmental reporting will be undertaken in accordance with the legal obligations and compliance requirements set out for the Project. The proponent aims to provide timely, relevant and appropriately presented information to government authorities, the local community and the general public on the environmental performance of the project. Reporting commitments under the environmental approval conditions and other legislation will be complied with monitoring results as required by authorities and progress reports as required in approval conditions. Any significant environmental incidents or serious breaches of the approval conditions will be reported to the relevant authorities in a timely manner and in accordance with legislative requirements.

4. Cumulative impacts

4.1 Information request

DAWE considers the proposed action is a component of a larger action with the Wangetti Trail North Project (EPBC 2020/8723), however both Wangetti Trail North and Wangetti South Section are stand-alone projects and the viability of Wangetti South Section is not dependent on Wangetti Trail North. DAWE notes that the nature and extent of potential impacts on relevant MNES are similar for both Wangetti Trail North and Wangetti South Section proposals.

The preliminary documentation must include a cumulative impact assessment on relevant listed threatened species and communities, in particular the southern cassowary, opal cling goby, and the World and National Heritage values of the Wet Tropics of Queensland in the context of the impacts of the proposed action and the Wangetti Trail North Project.

The cumulative impact assessment must be undertaken with consideration of relevant Departmental policies and guidelines, the SPRAT database, and relevant conservation advices, recovery plans and threat abatement plans specific to each MNES.

4.2 Response to information request

A cumulative impact assessment has been undertaken on MNES values assessed as both the Wangetti North Section and Wangetti South Section as having a significant impact on:

- Southern cassowary
- Opal cling goby
- World and National Heritage values of the Wet Tropics of Queensland.

Impacts on the above values were assessed for both the construction and operational phases of both Wangetti North Section and Wangetti South Section Projects.

This cumulative impact assessment has considered temporary impacts being those experienced during the construction phase of the collective projects and permanent impacts being those experienced during the operational phases of the collective projects to the abovementioned MNES values.

4.2.1 Cumulative impact assessment southern cassowary

Anticipated permanent and temporary impacts for the construction and operational phase of the project to habitat for conservation significant species associated with the projects was provided in the MNES Baseline and Impact Assessment Report (GHD, 2020c). Additional information has been provided in Table 4.1 in regard to the proposed clearing extents of habitat for conservation significant species as a percentage of the total WTWHA. While additional information has been provided in Table 4.1 in regards to the proposed clearing extents of habitat for the critically endangered opal cling goby as the loss of habitat is linear and restricted to certain waterways within the Wangetti South Section Project only.

Introduction

A cumulative impact assessment has been undertaken to assess the potential impacts from the construction phase and operational phase of Wangetti North Section and Wangetti South Section would have on the southern cassowary habitat.

Methodology

The methodology adopted for the cumulative impact assessment is outlined below.

The cumulative impact assessment focused only on the permanent disturbance of the proposed works for Wangetti South Section and Wangetti North Section as outlined below:

Wangetti North Section

- Shared Use Trail = 1.5 m wide trail
- Campsite 2 = 3.6 ha
- Campsite 3 = 3.3 ha
- Campsite 4 = 3.61 ha
- Campsite 5 = 2.9 ha
- For each of the proposed waterway crossing structures = 0.0042 ha
- Hartley suspension bridge = 0.08 ha

Wangetti South Section

- Shared Use Trail = 1.5 m wide trail
- Dark Jungle = 0.25 ha
- For each of the proposed waterway crossing structures = 0.0042 ha

Section of the Shared Use Trail (0.5 km) that connects to the Captain Cook Highway, north of Red Cliff Point follows an existing access track and has not been included in the disturbance component.

Using the information above, the permanent disturbance of the proposed works within the potential southern cassowary habitat for Wangetti South Section and Wangetti North Section was calculated and then added together to determine the total permanent disturbance for the proposed works within potential south cassowary habitat. The results of the calculations are presented in Table 4.1.

The percentage of loss of potential southern cassowary habitat area within 5 km radius of the proposed works was also determined for Wangetti South Section and Wangetti North Section. The results of the calculations are presented in Table 4.1.

Then the percentage of loss of potential southern cassowary habitat within the entire of WTWHA was determined for Wangetti South Section and Wangetti North Section. The results of the calculations are presented in Table 4.1.

The results of the calculation were then examined, and a detailed discussion is outlined in following section and considered information contained in the CMP, SPRAT Database, and relevant conservation advices, recovery plans and threat abatement plans.

Results

The calculations of the cumulative impacts to southern cassowary habitat from Wangetti North Section and Wangetti South Section is presented in Table 4.1.

Table 4.1 Cumulative impacts to southern cassowary habitat from Wangetti North Section and Wangetti South Section

Permanent Disturbance Component	Priority habitat management area (from the Cassowary Management Plan)	Areas HA	Total Area to be Cleared (both North and South)(ha)	WT Section	% of loss of local species habitat within 5 km radius	% of loss of local species habitat within 5 km radius - Both Project Areas	% of local species habitat within WTWHA	% of local species habitat within WTWHA Both Project Areas
Shared Use Trail	Lowest Priority	0.03	25.52	North	0.13%	0.11%	0.0025%	0.003%
	Low Priority	5.37						
	Moderate Priority	1.03						
	High Priority	0.86						
Campsite 2	Low Priority	3.59						
Campsite 3	Low Priority	3.35						
Campsite 4	Highest Priority	3.61						
Campsite 5	Low Priority	2.94						
Waterway Crossings	Low Priority	0.04						
	Moderate Priority	0.05						
	High Priority	0.01						
Waterway Crossings - Mountain Bike Trail	N/A	0.02						
Shared Use Trail Waterway Crossings	Lowest Priority	4.31		South	0.04%		0.0006%	
	Low Priority	0.06						
Campsite 1 - Dark Jungle	Low Priority	0.25						

The permanent disturbance footprint within potential southern cassowary habitat within Wangetti North Section is 20.89 ha, which comprises of 3.61 ha highest priority, 1.07 ha moderate priority, 0.03 lowest priority and 15.28 low priority cassowary habitat. This does exceed the 0.15 ha threshold for southern cassowary habitat in the Significant Impact Guidelines for the Endangered Southern Cassowary (*Casuarius casuarius johnsonii*) Wet Tropics Population (Commonwealth of Australia 2010), It was determined that the permanent disturbance footprint within potential southern cassowary habitat within Wangetti North would equate to 0.0025% loss of local species habitat within WTWHA. It was noted in the CMP that habitat degradation as a result of Wangetti North Section will be minimal, with trails in the highest, high and moderate mapped priority habitat management areas primarily using existing tracks, roads and infrastructure (e.g., Southedge Road, Black Mountain Road, Twin Bridges Road).

The permanent disturbance footprints within potential southern cassowary habitat within Wangetti South Section is 4.62 ha, which comprises of lowest priority and low priority cassowary habitat. This does exceed the 0.15 ha threshold for southern cassowary habitat in the Significant Impact Guidelines for the Endangered Southern Cassowary (*Casuarius casuarius johnsonii*) Wet Tropics Population (Commonwealth of Australia 2010), It was noted in the CMP that there are no records of cassowaries within the majority of Wangetti South Section. Wangetti South Section has been assessed as not resulting in a significant impact the cassowary and to local populations of the southern cassowary.

As detailed within the MNES Baseline and Impact Assessment Report (GHD, 2020c), the proposed works for both project areas have the potential to impact on the southern cassowary on the basis that habitat clearing of more than 1,500 m^2 (equates to 0.15 ha) is proposed albeit sub-optimal habitat. An offset strategy is proposed to deal with the low residual risk due to the permanent clearing of cassowary habitat for the trail and campgrounds.

It is important to take into consideration the minor construction scale and low-impact nature of trails once operational, in particular:

- Existing service tracks will be used for the project and no new roads or fences are proposed within the project areas.
- The clearing footprints have been minimised to the greatest extent possible, with the footprints encompassing 0.11% of the potential southern cassowary habitat in the local landscape. Furthermore, the impacted habitat is primarily comprised of sub-optimal habitat types, with impact to higher value littoral vine forest habitat largely avoided.
- The clearing footprints will be narrow with a permanent footprint of 1.5 m in width, and clearing will retain large canopy trees wherever possible with the intention that disruption of habitat connectivity will be mitigated. Accordingly, it is anticipated that movement of the southern cassowary across the local landscape will not be adversely affected.
- Works proposed within the higher value habitat for the southern cassowary will only include establishment of the shared use trail, bridges and camp sites that is not anticipated to function as a barrier to faunal movement or habitat connectivity.
- Environmental management strategies will be implemented to mitigate against habitat degradation and edge effects, as outlined within the CMP (Environment Pacific Pty Ltd, 2021).
- No modification or destruction of abiotic factors is anticipated to occur.

A CMP has been developed for Wangetti North Section and Wangetti South Section and further analysed potential cassowary habitat within both project areas (refer to Appendix A in the Preliminary Environmental Management Plan which forms Appendix B in this document). Wangetti North Section and according to the CMP, Wangetti South Section were broken down into various habitat management areas based on the presence of core habitat factors located

either directly along the trails and camp areas, and/or within an estimate home range of 500 m to 1000 m radius. The home range area adopted is larger than estimated for cassowary habitat in the coastal lowlands in accordance with the research literature which suggests cassowary ranges in the uplands are larger than optimal coastal habitats owing to the less favourable environmental conditions, i.e. lesser complex habitat, lesser permanent water availability and higher topographical constraints (Environment Pacific Pty Ltd, 2021).

The criteria, their relative importance, and notes used for identifying priority management areas are presented in the CMP in Appendix B in the Preliminary Environmental Management Plan which forms Appendix B in this document.

A description of the priority habitat management areas is described in Section 2.2.4.

The Wangetti South Section intersects the following habitat management areas, as described in Section 2.2.4 and shown on the CMP in Appendix B.

- Low Priority Habitat Management Areas
- Lowest Priority Habitat Management Areas

Therefore, the permanent disturbance footprint to potential southern cassowary habitat within Wangetti South Section (4.62 ha) is not considered to be habitat critical to the survival of the southern cassowary.

Whereas Wangetti North Section intersects the following habitat management areas:

- Highest Priority Habitat Management Areas
- High Priority Habitat Management Areas
- Moderate Priority Habitat Management Areas
- Low Priority Habitat Management Areas
- Lowest Priority Habitat Management Areas.

Wangetti North Section is considered to impact on a total of 3.61 ha which is associated with campsite 4 and is considered to be habitat critical to the survival of the southern cassowary.

While both Wangetti North Section and Wangetti South Section have been assessed as not resulting in a cumulative impact on the southern cassowary, as a result of the works exceeding the clearing threshold of 1,500 m^2, the project will provide offsetting. Section 7 provides a detailed discussion about environmental offsets for Wangetti South Section.

4.2.2 Cumulative impact assessment opal cling goby

Introduction

A cumulative impact assessment has been undertaken to assess the potential impacts from the construction phase (temporary impacts) and operational phase (permanent impacts) of Wangetti North Section and Wangetti South Section would have on the opal cling goby. It is important to note, that habitat critical to the survival of the species was only assessed as being intersected by the Wangetti South Section alignment at 5 waterways based on their specific habitat requirements noted on the SPRAT database, recovery plans and listing advice. Temporary (indirect) impacts may also occur to other sections of waterways downstream of either project.

Methodology

The methodology adopted for the cumulative impact assessment is outlined below.

The cumulative impact assessment focused only on the permanent disturbance of the proposed works for Wangetti South Section as outlined below:

Wangetti South Section

- The distance of upstream waterway from the southern extent of the project area in km's

The total length (km) of the waterway structures within opal cling goby potential habitat was calculated for the five waterways intersected by the Wangetti South Section to calculate the total length of waterways temporarily impacted during the construction phase. The results of the calculations are presented in Table 4.2. Once operational, no quantitative impacts to opal cling goby habitat are anticipated as no direct impacts will occur. Indirect impacts will be managed through mitigation measures.

The results of the calculation were then examined, and a detailed discussion is outlined in following section and considered information contained in the SPRAT Database, and relevant conservation advices, recovery plans and threat abatement plans.

Results

The calculations of the cumulative impacts to opal cling goby potential habitat from Wangetti North Section and Wangetti South Section is presented in Table 4.2.

Table 4.2 Cumulative impacts to opal cling goby from Wangetti North Section and Wangetti South Section

Section	Permanent Disturbance Component	Length (km)	Total Length of areas intersecting potential opal cling goby habitat (both Wangetti North Section and Wangetti South Section) (km)
Wangetti North Section	Shared Use Trail	0	0.02
	Campsite 2	0	
	Campsite 3	0	
	Campsite 4	0	
	Campsite 5	0	
	Waterway Crossings	0	
Wangetti South Section	Shared Use Trail	0	
	Dark Jungle	0	
	Waterway Crossings	0.2	

According to Table 4.2 and to Appendix C, there is only potential opal cling goby habitat within Wangetti South Section due the habitat criteria determined in Section 2.2. As a result, 0.2 km of the potential opal cling goby habitat is considered to be impacted by the proposed bridges within Wangetti South Section.

As detailed in Section 2.2 in Table 2-1 14 significant impact assessment for the opal cling goby, the project is not considered to result in a significant impact to the opal cling goby. This is based on the following:

- The project is not expected to result in a long-term decrease in the size of the local population of the species, as each of the five waterways intersected will incorporate single span bridge structure which will span over opal cling goby potential habitat shown in Appendix C and result in no loss of instream aquatic habitat.

  The potential for direct impact on waterways has been largely avoided by installing the single span bridge structures which include footings outside the main channel width. This avoids undertaking construction works within the waterway. Single span bridges will be used to minimise disturbance with waterways and loss of aquatic habitats. Techniques for installing the bridges has been outlined in the Wangetti Trail Construction Methodology Manual and include spanning the full width of the waterway so that no works occurs within the waterway and existing nature features are left in place within the waterway.

- Single span bridges area proposed over opal cling goby potential habitat and will be designed to meet the following criteria:
  - the abutments do not extend into the waterway beyond the high bank
  - the bank revetment works do not extend beyond the toe of the bank
  - no scour protection is placed on the bed of the waterway upstream, downstream or under the structure.

  The proposed structures are considered by the Queensland Department of Agriculture and Fisheries as able to maintain fish movement and connectivity throughout waterway and within and between fish habitats.

- Construction of the bridge and all other waterway crossings are to occur during dry periods to minimise the potential for indirect impacts.

- Minimising disturbance by noise, vibration and/or artificial lighting near waterways.

- Environmental controls have been developed for the construction and operational phases of the project to reduce impacts on MNES, including the opal cling goby and they include:
  - EMP
  - CEMP
  - CESCP
  - WPDMP
  - TMP
  - MNES flora pre-clearance survey methodology.

- Information about protecting MNES and the illegal taking of threatened species within the project area will be incorporated into the construction site inductions, toolbox talks, signs along the trail, trail briefings and displayed on the Wangetti Trail website.

- Degradation will be mitigated through minimising the size of the disturbance area, implementing a CESCP, constructing bridges that span the width of the waterway, constructing during dry conditions, and minimising disturbance by noise, vibration and/or artificial lighting.

Potential impacts to aquatic habitats for the opal cling goby are expected to be temporary during the construction period of April 2021 to April 2022 for the Wangetti South Section. Through the use of bridges, and the mitigation measures noted above, no significant impact to aquatic habitat or the opal cling goby species is expected to occur within or adjacent to the Wangetti South Section.

The construction plan and mitigation measures that will be implemented across both the Wangetti North Section and Wangetti South Section mean that cumulative impacts are not expected to be significant on the opal cling goby.

The report assessed the following actions that could have a significant impact on a critically endangered or endangered species:

- Lead to a long-term decrease in the size of a population – ***Unlikely***

  Five locations within Wangetti South Section where the project area intersects potential habitat for the opal cling goby, bridge locations are proposed in these locations (refer to Figure 2-4). Single span bridges are proposed in these and will span over opal cling goby potential habitat shown in Appendix C and no loss of instream aquatic habitat will occur.

  Single span bridges will be used to minimise disturbance with waterways and loss of aquatic habitats. Techniques for installing the bridges has been outlined in the Wangetti Trail Construction Methodology Manual and include spanning the full width of the waterway so that no works occurs within the waterway and existing nature features are left in place within the waterway.

  Key mitigation measures to be implemented include:

  – Implementing erosion and sediment control measures during the construction and operation phases of the project as outlined in the CESCP
  – Restricting clearing of riparian vegetation to minimum area necessary.
  – Implementing waste and hazardous materials control measures during the construction phase of the project as outlined in the CEMP.
  – Implementing measures in the WPDMP.

  Information about protecting MNES and the illegal taking of threatened species within the project area will be incorporated into site inductions, toolbox talks, signs along the trail, trail briefings and displayed on the Wangetti Trail website.

  At locations where the trail intersects waterways supporting potential opal cling goby habitat single span bridges will be used and riparian vegetation along waterways will be reinstated to deter trail users from directly accessing the waterways. These locations will be monitored carefully during the construction and operational phases by a method agreed between TDPD and DES. These areas will be listed as ‘priority revegetation areas’ within the rehabilitation plan. The above listed mitigation measures are considered reduce the risk of illegal fish collection occurring.

- Reduce the area of occupancy of the species – ***Unlikely***

  Five locations within Wangetti South Section only where the project area intersects potential habitat for the opal cling goby, bridge locations are proposed in these locations (refer to Figure 2-4). Single span bridges are proposed in these and will span over opal cling goby potential habitat shown in Appendix C and no loss of instream aquatic habitat will occur. No construction activities will occur directly within the five locations of potential cling goby habitat and during the operational phase trail users will cross the waterways via the bridge. Natural features within the waterway will remain in place. Proposed works will be set back from the banks of the waterway so that riparian vegetation remains intact.

Key mitigation measures to be implemented include:

- Implementing erosion and sediment control measures during the construction and operation phases of the project as outlined in the Concept Erosion and Sediment Control Plan
- Restricting clearing of riparian vegetation to minimum area necessary.
- Implementing waste and hazardous materials control measures during the construction phase of the project as outlined in the CEMP.
- Implementing measures in the WPDMP.

Information about protecting MNES and the illegal taking of threatened species within the project area will be incorporated into site inductions, toolbox talks, signs along the trail, trail briefings and displayed on the Wangetti Trail website.

At locations where the trail intersects waterways supporting potential opal cling goby habitat single span bridges will be used and riparian vegetation along waterways will be reinstated to deter trail users from directly accessing the waterways. These locations will be monitored carefully during the construction and operational phases by a method agreed between TDPD and DES. These areas will be listed as 'priority revegetation areas' within the rehabilitation plan. The above listed mitigation measures are considered reduce the risk of illegal fish collection occurring.

- Fragment an existing population into two or more populations – ***Unlikely***

  Five locations within Wangetti South Section where the project area intersects potential habitat for the opal cling goby, bridge locations are proposed in these locations (refer to Figure 2 4). Single span bridges are proposed in these and will span over opal cling goby potential habitat shown in Appendix C and no loss of instream aquatic habitat will occur.

  Single span bridges will be used to minimise disturbance with waterways and loss of aquatic habitats. Techniques for installing the bridges has been outlined in the Wangetti Trail Construction Methodology Manual and include spanning the full width of the waterway so that no works occurs within the waterway and existing nature features are left in place within the waterway.

  Key mitigation measures to be implemented include:

  - Implementing erosion and sediment control measures during the construction and operation phases of the project as outlined in the CESCP.
  - Restricting clearing of riparian vegetation to minimum area necessary.
  - Implementing waste and hazardous materials control measures during the construction phase of the project as outlined in the CEMP.
  - Implementing measures in the WPDMP.

- Adversely affect habitat critical to the survival of a species – ***Possible due to the restricted geographical range of this species and the reduction in the suitability of habitat (e.g. water quality degradation and riparian vegetation clearing).***

  Five locations have been identified within Wangetti South Section where the project area intersects potential habitat for the opal cling goby, bridge locations are proposed in these locations (refer to Figure 2 4). Single span bridges are proposed in these and will span over opal cling goby potential habitat shown in Appendix C and no loss of instream aquatic habitat will occur. No construction activities will occur directly within the five locations of potential cling goby habitat and during the operational phase trail users will cross the waterways via the bridge. Natural features within the waterway will remain in place.

Proposed works will be set back from the banks of the waterway so that riparian vegetation remains intact.

The bridge structure will be limited to a maximum width of 1.5 m and will not impede on the flow of the waterway.

Key mitigation measures to be implemented include:

- Implementing erosion and sediment control measures during the construction and operation phases of the project as outlined in the CESCP.
- Restricting clearing of riparian vegetation to minimum area necessary.
- Implementing waste and hazardous materials control measures during the construction phase of the project as outlined in the CEMP.
- Implementing measures in the WPDMP.

Information about protecting MNES and the illegal taking of threatened species within the project area will be incorporated into site inductions, toolbox talks, signs along the trail, trail briefings and displayed on the Wangetti Trail website.

At locations where the trail intersects waterways supporting potential opal cling goby habitat single span bridges will be used and riparian vegetation along waterways will be reinstated to deter trail users from directly accessing the waterways. These locations will be monitored carefully during the construction and operational phases by a method agreed between TDPD and DES. These areas will be listed as 'priority revegetation areas' within the rehabilitation plan. The above listed mitigation measures are considered reduce the risk of illegal fish collection occurring.

The implementation of the mitigation measures are considered to reduce adverse impacts from the project to habitat critical to the survival of the opal cling goby and protect existing habitat.

- Disrupt the breeding cycle of a population – ***Possible due to degradation of water quality adversely affecting breeding habitat. Actions to minimise this potential impact include implementation of an ESCP, maintaining the natural flow regime by installing bridges and boulders at waterway crossings.***

  As discussed in Section 2.2, opal cling gobies are believed to spawn in their adult life within rainforest stream habitats (DAWE, 2011). Research on other cling goby species indicates that females lay their eggs in interstitial spaces between submerged stream boulders, where they are fertilised by males and guarded until hatching (DAWE, 2011). Five locations have been identified within Wangetti South Section where the project area intersects potential habitat for the opal cling goby, bridge locations are proposed in these locations (refer to Figure 2 4).

  Single span bridges are proposed in these and will span over opal cling goby potential habitat shown in Appendix C and no loss of instream aquatic habitat will occur. No construction activities will occur directly within the five locations of potential cling goby habitat and during the operational phase trail users will cross the waterways via the bridge. Natural features within the waterway will remain in place. Proposed works will be set back from the banks of the waterway so that riparian vegetation remains intact.

- Modify, destroy, remove, isolate or decrease the availability or quality of habitat to the extent that the species is likely to decline – ***Possible due to construction and operation activities reducing the availability and quality of habitat. Actions to minimise this potential impact include minimising the disturbance area and implementation of an ESCP.***

Five locations have been identified within Wangetti South Section where the project area intersects potential habitat for the opal cling goby, bridge locations are proposed in these locations (refer to Figure 2 4). Single span bridges are proposed in these and will span over opal cling goby potential habitat shown in Appendix C and no loss of instream aquatic habitat will occur. No construction activities will occur directly within the five locations of potential cling goby habitat and during the operational phase trail users will cross the waterways via the bridge. Natural features within the waterway will remain in place. Proposed works will be set back from the banks of the waterway so that riparian vegetation remains intact.

The bridge structure will be limited to a maximum width of 1.5 m and will not impede on the flow of the waterway.

Key mitigation measures to be implemented include:

- Implementing erosion and sediment control measures during the construction and operation phases of the project as outlined in the CESCP.
- Restricting clearing of riparian vegetation to minimum area necessary.
- Implementing waste and hazardous materials control measures during the construction phase of the project as outlined in the CEMP.
- Implementing measures in the WPDMP.

Information about protecting MNES and the illegal taking of threatened species within the project area will be incorporated into site inductions, toolbox talks, signs along the trail, trail briefings and displayed on the Wangetti Trail website.

At locations where the trail intersects waterways supporting potential opal cling goby habitat single span bridges will be used and riparian vegetation along waterways will be reinstated to deter trail users from directly accessing the waterways. These locations will be monitored carefully during the construction and operational phases by a method agreed between TDPD and DES. These areas will be listed as ‘priority revegetation areas’ within the rehabilitation plan. The above listed mitigation measures are considered reduce the risk of illegal fish collection occurring.

The implementation of the mitigation measures are considered to reduce adverse impacts from the project to habitat critical to the survival of the opal cling goby and protect existing habitat.

- Result in invasive species that are harmful to a critically endangered or endangered species becoming established in the endangered or critically endangered species’ habitat – ***Unlikely***

The construction of the proposed works will not result in the introduction of diseases into the environment given that strict biosecurity environmental controls will be implemented during the construction and operational phase and they are discussed in detail in the WPDMP which has been developed for Wangetti South. Key measures include:

- All machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds and pathogens. Vehicles, plant and equipment to be used for the project would be required to be clean with Weed and Seed Hygiene Declaration certificates. Vehicles, plant and equipment to be inspected prior to being used to ensure they are clean. Disinfecting vehicles and machinery.
- All plant/machinery washdown checklists to be recorded. Records demonstrating that personnel associated with the construction and operational phases have undertaken weed, pest and pathogen induction training.
- Regular visual weed and pest inspections within the works area.

- Prior to construction commencing a pre-clearing pest survey to be undertaken and report documenting areas of existing electric ant infestation and identifying treatment and management requirements.
- Feeding of wildlife is prohibited and food scraps to be disposed of into bins with closed/secured lids and removed from site daily to minimise vermin infestations. Waste to be removed from the project area.
- Recreational users of the trail will be educated on the sensitive nature of the local landscape and the importance of avoiding introduction and spread of pests through the use of appropriate signage.
- Regular inspection of the trail and nodes, as per the following existing QPWS procedures during operation:
  - Walking track maintenance – general procedures Procedural Guide (QPW/2015/1395 v1.01) (DES, 2015a)
  - Pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013)

- Introduce disease that may cause the species to decline – ***Unlikely***

  The construction of the proposed works will not result in the introduction of diseases into the environment given that strict biosecurity environmental controls will be implemented during the construction and operational phase and they are discussed in detail in the WPDMP which has been developed for Wangetti South. Key measures include:

  - All machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds and pathogens. Vehicles, plant and equipment to be used for the project would be required to be clean with Weed and Seed Hygiene Declaration certificates. Vehicles, plant and equipment to be inspected prior to being used to ensure they are clean. Disinfecting vehicles and machinery.
  - All plant/machinery washdown checklists to be recorded. Records demonstrating that personnel associated with the construction and operational phases have undertaken weed, pest and pathogen induction training.
  - Regular visual weed and pest inspections within the works area.
  - Prior to construction commencing a pre-clearing pest survey to be undertaken and report documenting areas of existing electric ant infestation and identifying treatment and management requirements.
  - Feeding of wildlife is prohibited and food scraps to be disposed of into bins with closed/secured lids and removed from site daily to minimise vermin infestations. Waste to be removed from the project area.
  - Recreational users of the trail will be educated on the sensitive nature of the local landscape and the importance of avoiding introduction and spread of pests through the use of appropriate signage.
  - Inspection of the trail and nodes, as per the following existing QPWS procedures during operation:
    - Walking track maintenance – general procedures Procedural Guide (QPW/2015/1395 v1.01) (DES, 2015a)
    - Pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013)

- Interfere substantially with the recovery of the species – ***Unlikely***

  There is no approved recovery plan for the opal cling goby; however, SPRAT (DAWE 2019) includes management strategies for the recovery and maintenance of the species. These include the following management actions:

  – Known populations to be monitored to identify key threats.
  – Ensure there is no disturbance in areas where the opal cling goby occurs.
  – Manage any disruptions to water flows and barriers that may prevent the movement of larvae out to sea and subsequent return of juveniles.
  – Inhibit over-collection of specimens.

  These management actions have been considered in the development of the management plans developed for the project are outlined below.

  – EMP
  – CEMP
  – CESCP
  – WPDMP
  – TMP
  – MNES flora pre-clearance survey methodology.

Overall, it is considered that there will be no significant cumulative impact to the opal cling goby during the construction or operation of the Wangetti North Section and Wangetti South Section.

4.2.3 Cumulative impact assessment World and National Heritage values of the Wet Tropics of Queensland

Introduction

A cumulative impact assessment has been undertaken to assess the potential impacts from the construction phase and operational phase of Wangetti North Section and Wangetti South Section would have on the World and National Heritage values of the Wet Tropics of Queensland.

Methodology

The methodology adopted for the cumulative impact assessment is outlined below. The cumulative impact assessment focused only on the permanent disturbance of the proposed works for Wangetti South Section and Wangetti North Section as outlined below:

Wangetti North Section

- Shared Use Trail = 1.5 m wide trail
- Campsite 2 = 3.6 ha
- Campsite 3 = 3.3 ha
- Campsite 4 = 3.61 ha
- Campsite 5 = 2.9 ha
- For each of the proposed waterway crossing structures = 0.0042 ha
- Hartley suspension bridge = 0.08 ha

Wangetti South Section

- Shared Use Trail = 1.5 m wide trail

- Dark Jungle = 0.25 ha
- For each of the proposed waterway crossing structures = 0.0042 ha

Using the information above, the permanent disturbance for the proposed works within the WTWHA for Wangetti South Section and Wangetti North Section was calculated and then added together to calculate the total permanent disturbance for the proposed works within the WTWHA. The results of the calculations are presented in Table 4.3.

The percentage of loss of WTWHA area within 5 km radius of the proposed works was then determined for Wangetti South Section and Wangetti North Section. The results of the calculations are presented in Table 4.3. The percentage of loss of WTWHA within the entire of WTWHA was also determined for Wangetti South Section and Wangetti North Section. The results of the calculations are presented in Table 4.3.

The results of the calculation were then examined, and a detailed discussion is outlined in following section and considered information contained in the SPRAT Database, and relevant conservation advices, recovery plans and threat abatement plans.

Results

The proposed permanent works associated with Wangetti North Section and Wangetti South section within the WTWHA is 21.67 ha, which equates to 0.002% within the entire WTWHA boundary. Wangetti South Section will only impact 4.44 ha of the WTWHA, which equates to 0.0005% within the entire WTWHA boundary. The proposed permanent works associated with Wangetti North Section and Wangetti South Section are not considered to result in a significant impact to WTWHA.

Table 4.3 Cumulative impacts to WTWHA from Wangetti North Section and Wangetti South Section

Section	Permanent Disturbance Component	Permanent disturbance footprints within WTWHA (ha)	Total Area to be Cleared (both Wangetti North and Wangetti South) in WTWHA (ha)	% of loss of WTWHA within 5 km radius of the proposed works	% of loss of WTWHA within 5 km radius - both Wangetti North and Wangetti South	% of WTWHA within the entire WTWHA	% of WTWHA within the entire WTWHA both Wangetti North and Wangetti South
Wangetti North Section	Shared Use Trail	6.37	21.67	0.12%	0.11%	0.0019%	0.002%
	Campsite 2	3.59					
	Campsite 3	3.35					
	Campsite 4	3.61					
	Campsite 5	0					
	Waterway Crossings	0.14					
Wangetti South Section	Shared Use Trail	4.26		0.05%		0.0005%	
	Dark Jungle	0.25					
	Waterway Crossings	0.11					

Individually, the Wangetti North Section and Wangetti South Sections have been assessed to have no significant impact on the WTWHA. There will also be no significant cumulative impact to the WTWHA during the construction or operation of the Wangetti North Section and Wangetti South Section for the following reasons:

- Both Wangetti North Section and Wangetti South Section are intended to be a new adventure/nature based tourism product of National Significance. The shared use trail for both Wangetti North Section and Wangetti South Section have been designed to be linear and will be constructed to have a minimal impact on the Wet Tropics natural environment and natural assessment. It does this by being sympathetic to the terrain and topography and create a sense of purpose and movement through the landscape. It will use existing access tracks in order to prevent unnecessary trail construction.
- Both Wangetti North Section and Wangetti South Section are consistent with the intent and objectives of the World and National Heritage values of the Wet Tropics of Queensland, the Wet Tropics Management Plan 2020 and Wet Tropics Strategic Plan 2020 -2030 and the World and National Heritage management principles as set out in the *Environment Protection and Biodiversity Conservation Regulations 2000*. Wangetti North Section and Wangetti South Section showcases culturally valuable areas including WTWHA, Macalister Range National Park and Mowbray National Park.
- Existing service tracks will be used for the project and no new roads or fences are proposed within the project area.
- The shared use trail and campsites utilises existing cleared or modified areas within the WTWHA.
- Sensitive design principles will be employed during detailed design to minimise impacts to visual and landscape amenity. The proposed infrastructure will blend into the landscape and it will be designed and positioned to consider the landscape character of the area. The alignment will be sited in accordance with the natural landform to avoid earthworks. The surface of shared use trail will be predominantly natural soil, the tread of the trail will be constructed from the natural soil and rock found along the trail. Materials used during the construction phase will be required to respond to the local environment and be locally sourced where possible.
- The clearing footprint for both Wangetti North Section and Wangetti South Section have been minimised to the greatest extent possible, with the footprint encompassing 0.002% of the WTWHA in the entire WTWHA boundary.
- The clearing footprint will be narrow with a permanent footprint of 1.5 m in width, and clearing will retain large canopy trees wherever possible. The trail is able to wind around existing trees, vegetation and rocks that may support MNES species.
- Environmental management strategies will be implemented to mitigate impacts to the values within the WTWHA and they are captured in:
  - EMP
  - CEMP
  - CESCP
  - WPDMP
  - TMP
  - MNES flora pre-clearance survey methodology.

  These plans consider advice from WTMA, DES, QPWS Procedural Guides and other relevant conservation advices.

- Wangetti North Section and Wangetti South Section will abide by environmental impact best practice guidelines by using low impact construction methods. Hand construction may need to be undertaken in areas of high environmental values, requiring minimal excavation. The Wangetti Trail construction methodology manual has been prepared and is a document which aims to guide construction activities associated with the project to minimise impacts to the environment and ensure compliance with all permits, approvals and legislative requirements. The document provides high-level information to be considered by the nominated construction contractors during the detailed design and construction phase.
- The Wangetti North Section and Wangetti South Section have been altered to avoid culturally sensitive areas based on advice from Traditional Owner Rangers. The location of the shared use trail, camp sites and service tracks have been selected as they are considered to avoid the areas of cultural heritage values based on information collected during discussions with Traditional Owners and during cultural heritage surveys. A cultural heritage management plan has been developed for both Wangetti North Section and Wangetti South Section in consultation with the traditional owners.
- Wangetti North Section and Wangetti South Section are considered to facilitate access for traditional owners to areas within the WTWHA of cultural heritage significance and the project provides an opportunity for traditional owners to be involved in the construction and operational phases of the project.
- Wastewater generated from the campsites will be captured by onsite recycling of water/wastewater, swales and bio-retention basins.
- Construction activities will only occur during daytime hours.
- The project has been approved (Wet Tropics Permit No: WTMA20001a) and a permit issued under Part 4, Division 1, Section 45 of the Wet Tropics Management Plan 1998 (superseded 3rd July 2017) (*Wet Tropics World Heritage Protection Management Act 1993)* to allow for the proposed works to occur within the Wet Tropics Management Zone.

Overall, it is considered that there will be no significant cumulative impact to the WTWHA during the construction or operation of the Wangetti North Section and Wangetti South Section.

5. Avoidance, mitigation and management measures

5.1 Information request

DAWE notes the referral includes a detailed description of the proposed avoidance, mitigation and management measures to be implemented by the proponent during the construction, operational and maintenance stages of the proposed action. The referral also states that the following plans and procedures will be implemented prior to the commencement of the proposed action:

- Construction Environmental Management Plan
- Erosion and Sediment Control Plan
- Weed, Pest and Disease Management Plan
- Traffic Management Plan

To enable a robust assessment of the effectiveness of these plans to avoid, mitigate and manage potential impacts on relevant MNES, please include the plans specified above (in approved or draft format) as attachments to the preliminary documentation.

Further, the stand-alone document must include a detailed summary of the measures proposed to be undertaken by the proponent to avoid, mitigate and manage relevant impacts of the proposed action on listed threatened species and communities, and the World and National Heritage values of the Wet Tropics of Queensland. The proposed measures must be based on best available practices, appropriate standards, evidence of success for other similar actions and supported by published scientific evidence.

With consideration of the construction, operation and maintenance stages of the proposed action, the preliminary documentation must include:

- Details of specific environmental outcomes to be achieved for relevant MNES
- Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action, including those required through other Commonwealth, State and local government approvals, including but not limited to:
  - Details and locations, including with appropriate maps, of where low-level bridges will be implemented at water crossings to avoid impacts on the Opal Cling Goby, and its known and potential habitat, as a result of the revised impact assessment in Section 2 above
  - Details about how the proposed measures are consistent with Wet Tropics World Heritage Management Plan 2020 and Wet Tropics Strategic Plan 2020 – 2030
  - Details of the procedure for dealing with strikes, injury and deaths of native fauna and the loss of flora species
  - Key International Erosion Control Association (IECA) best practice erosion and sediment control procedures that will be incorporated into the ESCP to mitigate and manage impacts on water quality
  - Pre-clearance survey methodology, and its predicted effectiveness, for a commitment to avoid listed threatened flora species (including those identified in Section 2 above) and Southern Cassowary nests during the construction stage
  - With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor:

    - Weeds and pests, including the spread of weeds within and adjacent to the project area
    - Light and noise impacts
    - The removal of food waste and litter within the full extent of the project area
  - The use of committed language (e.g. 'will' and 'must') when describing the proposed measures
  - An assessment of the expected or predicted effectiveness of the proposed measures
  - Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans
  - Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures
  - Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure
  - Information on the timing, frequency and duration of the measures to be implemented.

Appropriate measures may be detailed on the SPRAT Database for relevant listed threatened species and communities. All proposed measures should consider the 'S.M.A.R.T' principle:

- S – Specific (what and how)
- M – Measurable (baseline information, number/value, auditable)
- A – Achievable (timeframe, money, personnel)
- R – Relevant (conservation advices, recovery plans, threat abatement plans)
- T – Time-bound (specific timeframe to complete)

5.2 Response to the information request

The proponent has developed several preliminary management plans to be adopted by the nominated contractor to prevent, reduce or control adverse environmental effects on MNES and the surrounding environment during the construction phase and operation phase of the project. The nominated contractor will finalise these plans.

The management plans that have been developed for the project are outlined below.

- EMP
- CEMP
- CMP
- CESCP
- WPDMP
- TMP
- MNES flora pre-clearance survey methodology

The following sections below provide an overview of each plan, detail how the plans have been structured and how the plans have addressed the information requested by DAWE. The EMP has been attached as Appendix B, which appends the CEMP, CESCP, WPDMP, TMP and MNES flora pre-clearance survey methodology.

5.2.1 Preliminary Environmental Management Plan

Overview

The EMP details the performance objectives, actions and procedures to be carried out to minimise potential environmental impacts during construction phase and operational phase of the Wangetti South Section.

The EMP is the key reference document which identifies actions and commitments to be followed during the Project. The EMP serves as a benchmark for measuring the effectiveness of environmental protection and management. This will be achieved by specifying monitoring and reporting requirements, with nominated responsibilities and timing to ensure necessary performance objectives are met.

The contractors assigned to the Project will use the information in this document to develop environmental management system and documentation for the construction and operational phase of the Project.

The EMP is a stand-alone, dynamic, document which will be reviewed and updated as required to reflect changes in processes, controls and procedures.

Structure of the EMP

The structure of the EMP has been developed to align with provisions in the Department of the Environmental – Environmental Management Plan (DEMP) Guidelines 2014, Table 5.1 below demonstrates that this EMP has considered the sections of the DEMP Guidelines. It has also considered the provisions in the QPWS policies and procedures for undertaking works within protected areas and advice from WTMA. It also discusses how the EMP has addressed the information requested by DAWE in Section 5.1.

Table 5.1 Structure of the EMP

Section	Comments	How this addresses DAWE's RFI
Section 1: Introduction	This section outlines the purpose for the EMP and the scope of works associated with the EMP.	The EMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures

Section	Comments	How this addresses DAWE's RFI
		• Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented. • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action are captured in the Environmental Management Subplans which form the appendices of the EMP.
Section 2: Site description	This section provides a description of the Wangetti South Section. It also outlines the key environmental factors relevant to construction, the proposal activities that would affect the factors and the site-specific environmental values, uses and sensitive components that will be affected.	The EMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor. • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans.
Section 3: Legislative requirements	This section provides an overview of the Commonwealth and State legislation applicable to Wangetti South Section and details about how the proposed measures in the environmental management sub plans are consistent with Wet Tropics World Heritage Management Plan 2020 and Wet Tropics Strategic Plan 2020 – 2030.	The EMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor. • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans.
Section 4: Role and responsibilities	This section outlines parties associated with the Wangetti South Section and the responsibilities during the construction and operational phases.	The EMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Any statutory or policy basis for the proposed measures, including

Section	Comments	How this addresses DAWE's RFI
		reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure.
Section 5: Project phases	This section provides an overview of the planning and design phase of the project, the construction phase and the operational phase.	No comment
Section 6: Training	This section outlines how training will be addressed during the construction phase and operational phase.	The EMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.
Section 7: Monitoring and environmental inspections	Section outlines the types of monitoring activities that will occur during the construction phase and operational phase.	The EMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.
Section 8: Documentation, document control and records	This section outlines how documentation will be managed during the construction and operational phases of the Project.	The EMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures

Section	Comments	How this addresses DAWE's RFI
		• Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.
Section 9: Audit	This section outlines how audits will be undertaken during the construction phase and operational phase.	The EMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.
Section 10: Review	This section outlines when reviews will be undertaken during the construction phase and operational phase.	The EMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.
Section 11: Emergency, incidents, and complaints	This section outlines how emergency incidents will be addressed during the construction phase and operational phase.	The EMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure

Section	Comments	How this addresses DAWE's RFI
		• Information on the timing, frequency and duration of the measures to be implemented.
Section 12: Environmental management sub plans	The environmental management sub plans provide details of specific environmental outcomes to be achieved for relevant MNES during the relevant phases of the Project. They also provide details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action.	The EMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action are captured in the Environmental Management Subplans which form the appendices of the EMP. • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.

Summary of the measures proposed within the EMP to avoid, mitigate and manage relevant impacts for MNES

Details of the proposed avoidance and mitigation measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action are captured in the Environmental Management Subplans which form the appendices of the EMP. Refer to Sections 5.2.2 to 5.2.7.

Table 5.2 Avoidance and mitigation measures for MNES fauna species from the EMP

Factor – MNES fauna species	
Applicable MNES	
• Threatened migratory bird species • Casuarius casuarius (Southern cassowary) • *Litoria dayi* (Australian lace lid) • *Litoria nannotis* (Waterfall frog)	• *Litoria nyakalensis* (Mountain Mistfrog) • *Litoria rheocola* (Common mistfrog) • *Stiphodon semoni* (Opal cling goby)
Mitigation measures/controls	**Effectiveness**
Site inductions and toolbox talks with the construction crew will occur prior construction to educate them about fauna species in the project area.	This will assist in training all onsite personnel in regard to their environmental obligations where MNES are found onsite MNES fauna species applicable to the Wangetti South Section will be flagged during inductions and toolbox talks and mitigation measures to reduce impacts to MNES fauna species during the construction phase will be outlined with the construction crew. This measure is also consistent with the mitigation measures in the Recovery plan for the southern cassowary *Casuarius casuarius johnsonii* in that it educates construction crew not to feed native wildlife which assists in reducing human—cassowary interactions.
Sequential clearing of vegetation to allow resident fauna the opportunity to disperse away from the immediate construction area	This will assist in detecting fauna including MNES fauna species that are present within the clearing area directly prior to vegetation clearing and allow these species to move away from the impacted area, where possible.
During the PSTR, the fauna specialist will undertake pre-clearance survey, to search habitat features previously marked for fauna and/or breeding activity.	This will assist in detecting fauna that are present within the clearing area directly prior to vegetation clearing and allow these species to move away from the impacted area, where possible. Provides flexibility to the trail builders to avoid sensitive habitats or individual species and habitat factors within a 40 m wide construction allowance corridor.
Suitability qualified fauna spotter/ecologist to be available during the construction phase to provide advice. An experienced fauna spotter-catcher to conduct an inspection of the trail alignment and public campsites ahead of vegetation disturbance and track construction clearing. The spotter will be present through all stages of clearing. Standard fauna spotter-catcher vegetation clearing protocols will be followed, including inspection of potential habitat features prior to disturbance.	This will assist in detecting fauna that are present within the clearing area and allow these individuals to move away from the impacted area, where possible. The measure will protect MNES fauna species during the construction phase.
Clearing of trees that provide habitat to fauna species is carried out in a way that ensures animals in the area being cleared (the clearing site) have enough time to move out of the clearing site without human intervention; the clearing must be carried out in stages.	This will assist in detecting fauna that are present within the clearing area and allow these individuals to move away from the impacted area, where possible. The fauna catcher may relocate individuals to the nearest safe place within suitable habitat if appropriate and safe to do so.
Southern cassowaries to be managed during the construction phase in accordance with the provision	This will assist in appropriate measures being incorporating into the contractor's

Factor – MNES fauna species	
in the Southern Cassowary Management Plan in the EMP in Appendix B. On any construction work site, should a cassowary approach the works area then works in that particular location will cease until the cassowary has left of its own accord. All construction work should have a plan for alternate work sites and tasks in this contingency. Domestic animals, under no circumstances, are to be taken into any part of the project area, trails, or camp grounds, nor to accompany service/maintenance vehicles during operation (even if they say in the vehicle). All machinery used in construction and operation should be silenced to manufacturers specifications and maintained to that condition. Vehicles will be required to service the construction and operation/maintenance of the facilities. Motorised vehicles may range from quad biked (or similar) to 4WD vehicles and light trucks. All drivers are to be aware of speed limits for the varying sections of rod/track. Lighting and electrical supply to the campsite and emergency lighting should be reliant on alternatives to fuel generators. Lighting (where required) to be confined to directional and subdued lighting and address Australian Standard AS/NZS 4282:2019. *Control of the obtrusive effects of outdoor lighting*, which provides information in Appendix B about the impact of artificial light on biota. Works adjacent permanent or significant ephemeral watercourses (e.g. bridge works) will have full erosion and sediment control measures implemented and maintained for the duration of the works as per the ESCP to be developed for the project Helicopters cannot be used for transport/construction in any moderate, high and highest priority areas. The only exception for helicopter access to these areas will be for emergency situations. Permanent barrier fencing, of any sort, is not be employed in any situation. Any secured areas e.g. around waste disposal locations, should use wooden palisade fencing. Temporary fencing for construction purposes (e.g. around open pits, newly laid concrete areas) will not be made of wire, nor obstruct movement across the general site area.	environmental management framework. This has been based on research and will avoid hostile interactions with the southern cassowary and humans within the project area. This will assist in reducing injuries to the southern cassowaries. This mitigation measure will contribute to the localised knowledge of the species that may lead to the determination of the presence of the species, capture variations in habitat condition and threats throughout the construction period, informing performance evaluation of management measures and assisting in mitigating impacts to southern cassowary and their breeding places/habitat.
A response procedure to be developed and implemented with regards to wildlife injury or mortality during construction.	This is an effective measure to provide urgent care to injured animals within the project area.
Opal cling goby to be managed during the construction phase in accordance with the following: • No instreams structures within opal cling goby potential habitat • minimising the size of the disturbance area, implementing an Erosion Sediment and Control Plan • minimising disturbance by noise, vibration and/or artificial lighting near waterways.	This will assist in preventing water quality and aquatic habitat degradation through minimising release of sediment and other contaminants to waterways as a result of the works. This will also reduce adverse impacts to the opal cling gobies that may be present with the waterways. This mitigation measure will contribute to the localised knowledge of the species that may lead to the determination of the presence of

Factor – MNES fauna species	
All machinery used in construction and operation should be silenced to manufacturers specifications and maintained to that condition. Lighting and electrical supply to the eco-accommodation and emergency lighting should be reliant on alternatives to fuel generators. Works adjacent permanent or significant ephemeral watercourses (e.g. bridge works) will have full erosion and sediment control measures implemented and maintained for the duration of the works as per the ESCP to be developed for the project An aquatic fauna specialist is required to undertake pre-clearance surveys of waterways prior to activities occurring to identify whether any breeding places or individuals are present within the disturbance area. This will avoid harm to individual MNES present within water features.	the species, capture variations in habitat condition and threats throughout the construction period, informing performance evaluation of management measures and assisting in mitigating impacts to opal cling goby and their breeding places/habitat.
Requirement for contractor to design, install and maintain all erosion and sediment controls.	This will assist in minimising indirect impacts on waterways by reducing sediment loss as well as associated water quality impacts. Furthermore, this mitigation measure will reduce impacts on the waterways through inclusion of management measures for vegetation clearing and general environmental management.
Records of pest animals observed on site to be recorded and addressed in accordance with the provision in the weed, pests and diseases management plan.	This mitigation measure will assist in identifying and controlling pest species within the project area and determining appropriate treatments. It is noted in the Recovery plan for the southern cassowary *Casuarius casuarius johnsonii* that the two key pest species that affect the cassowary are dogs and pigs and attacks on cassowaries are known to cause injury and death and their presence potentially affects cassowary feeding, movements and behaviour. By recording pest animals within Wangetti South Section this information can then be shared with the State Government departments and WTMA to assist in the implementation of existing eradication programs dealing with pest species.
Incorporation of bridge structures over waterways mapped as opal cling goby potential habitat to allow for the movement of fish upstream and downstream of the Project area. The incorporation of bridges over these waterways will assist in avoiding direct impacts on breeding/nesting habitat for opal cling goby, while avoiding direct loss of potential habitat for opal cling goby by spanning the low flow channel of each waterway. Checking that bridge structure allow light to penetrate to existing ground surface.	This is considered to be an effective management measure according to the QLD Department of Agriculture and Fisheries (DAF) to maintain habitat connectivity and minimise impacts on existing populations and fauna individuals moving across linear infrastructure. Bridges are considered by DAF to maintain fish passage and not constitute a waterway barrier when designed in a particular way. This measure avoids direct impacts to waterways which have the potential to support habitat for MNES amphibian species and the opal cling goby.
Speed limits are to be restricted on access roads to avoid the incidence of vehicle strike with fauna to be nominated in the Traffic Management Plan.	This is considered to be effective in avoiding fauna injury and mortality due to individuals remaining within the clearing area.

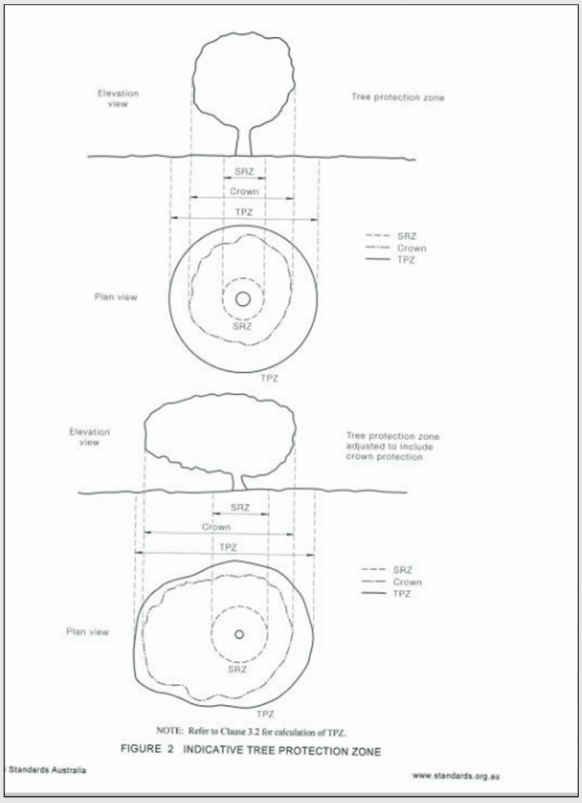
Factor – MNES fauna species	
	This measure is consistent with the mitigation measures in the Recovery plan for the southern cassowary *Casuarius casuarius johnsonii.* Erected signs and reduced speed limits have proven to be effective in minimising cassowary mortality and injury along roads.
No fires are to be permitted within the project area.	This is considered to be effective in avoiding potential bushfires starting which can cause death/injuries to fauna species. Severe fires can destroy critical habitat for MNES species. Therefore, to reduce the risk of bushfires occurring within Wangetti South no fires area to be permitted.
Requirements for upstream and downstream water quality conditions to be monitored through visual and in situ recordings during the construction phase.	MNES amphibian species and the opal cling goby are susceptible to changes to the water quality parameters in existing waterways. Therefore, the planning of appropriate and regular water quality monitoring by the contractor during construciton will allow for early detection and corrective actions to be set in place if any impact to water quality is identified. This measure is considered to maintain habitat critical to the survival of MNES amphibian species and the opal cling goby.
Signage around awareness of fauna species and sensitive areas.	This will assist in minimising impacts to MNES fauna species and its habitat. This measure is consistent with the mitigation measures in the Recovery plan for the southern cassowary *Casuarius casuarius johnsonii* as education is key in promoting positive behaviours when dealing with native animals including not feeding them.
Site inductions during operational phase with maintenance staff regarding: • undertaking works and the movement of vehicles within road reserves, existing access tracks. • Wildlife present within the project area that could pose a hazard to vehicles and mobile plant • Incident response procedures will be developed to detail actions to be taken in the event of wildlife injury or mortality during clearing a Incident response procedures will be developed to detail actions to be taken in the event of injury or mortality to hikers or cyclist.	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans. This measure is consistent with the mitigation measures in the Recovery plan for the southern cassowary *Casuarius casuarius johnsonii* as education is key in promoting positive behaviours when dealing with native animals
Operational and maintenance traffic to use nominated roads and nominated service tracks when accessing the exiting the project area. Designated vehicle routes within the project area to have a firm and even surface, be wide and high enough for the largest vehicle using them and be well maintained and free from obstructions. Service tracks to be clearly sign-posted to indicate speed limits and traffic calming measures (if required)	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans.

Factor – MNES fauna species	
Speed limits for to be adopted for the operational phase to be developed in consultation with TDPD, DES, WTMA and DTMR.	
Where trail builders are required to camp overnight along the trail due to the remoteness of the area they will be required to carry all rubbish out; bury human waste at least 100 m from streams and at least 15 cm deep, or carry it out. During construction phase the contractor to consider having a trailer mounted portable toilet or something similar to be able to service the construction crew. The setup of temporary amenities to be located in disturbed areas and outside of areas of high ecological significance.	These measures are considered effective in not attracting pests to the project area.
All machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds, pests and pathogens. Operational staff and maintenance staff disinfecting clothing, footwear, equipment and other personal items. Disinfecting vehicles during the operational phase of the project and maintained throughout.	This will assist in minimising impacts to MNES fauna species and its habitat through the management of pest species.
Provisions are made to minimise the risk of fish kills arising from the works e.g. through entrapment of fish upstream or between works. In the event that fish that have been trapped by the works, fish salvage activities in accordance with the Fisheries Queensland Guidelines for Fish Salvage (available at www.daf.qld.gov.au) are implemented immediately	This is an effective measure avoid direct impacts on the opal cling goby.
Limiting construction equipment operating adjacent to waterways and undertaking hand construction where possible. Where a waterway crossing is required over mapped potential opal cling goby habitat, a single span bridge will be installed. Single span bridges for minor waterway crossings will be used to minimise disturbance with waterways and loss of aquatic habitats. Techniques for installing the bridges are outlined in the Wangetti Trail Construction Methodology Manual and include spanning the full width of the waterway so that no works occurs within the waterway and existing nature features are left in place within the waterway. For any part of the waterway bed or banks adjacent to the works that has been altered by construction activities, the site is restored and/or rehabilitated so that as a minimum: • Stability and profiles of the bed and banks are re-instated to natural stream profiles and stability within five (5) business days of the completion of the works • The waterway bed is retained with natural substrate or reconstructed with substrate comparable to the natural substrate size and consistency • Site conditions allow the rapid re-establishment of native vegetation and cover or native species are replanted to re-establish the natural plant community	This is considered effective in reducing adverse impacted to waterways and adjoining riparian areas that could support MNES species. It has also adopted standards outlined in the Fisheries Queensland, Department of Agriculture and Fisheries -Accepted development requirements for operational work that is constructing or raising waterway barrier works 2018.

Factor – MNES fauna species	
Information about protecting MNES and the illegal taking of threatened species within the project area will be incorporated into site inductions, toolbox talks, signs along the trail, trail briefings and displayed on the Wangetti Trail website. Due the relatively remote location of opal cling goby habitat, the risk of illegal fish collection is not expected to be significant.	This measure is considered effective in educating people within the project area about protected MNES species and be vigilant for illegal behaviour.
Performance indicator	
No injury or death to native fauna species. Compliance with condition of contract A plan of clearing will be prepared by the Construction Contractor. No collision with fauna species All site personnel have undertaken the environmental induction prior to commencing work. Existing pest species are identified and controlled onsite.	
Monitoring/audits	
Weekly inspections conducted by the contractor during the construction phase to assess the implementation of the above mitigation measures with records kept in a weekly environmental checklist.	
Any non-conformances are to be documented and reported to TDPD and rectified immediately	

Table 5.3 Avoidance and mitigation measures for MNES flora species from the EMP

Factor – MNES flora species	
Applicable MNES	
• *Canarium acutifolium* • *Dendrobium mirbelianum* (Dark-stemmed antler orchid) • *Diplazium cordifolium* • *Diplazium pallidum* • *Myrmecodia beccarii* (Ant plant) • *Phaius pictus* • *Phalaenopsis amabilis subsp. rosenstromii* (Native moth orchid) • *Polyscias bellendenkerensis* • *Toechima pterocarpum* (Orange tamarind) • *Vappodes lithocola* (Dwarf butterfly orchid) (Also known as *Dendrobium lithocola*, and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*) • *Vappodes phalaenopsis* (Cooktown orchid) (Also known as *Dendrobium phalaenopsis* and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*) • *Zeuxine polygonoides* (Velvet jewel orchid) (also known as *Rhomboda polygonoides*)	
Mitigation measures/controls	**Effectiveness**
During vegetation clearing preference is given to trimming vegetation rather than clearing to retain overhead canopy.	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem. This measure is considered to effective to avoid significant changes to the existing canopy within the Project area as this can lead to the following: • Increased sunlight to the ground surface which can directly impact the type of flora species that grow.

Factor – MNES flora species	
	• Increased sunlight to the ground surface can result in an increase of invasive flora species. • Changes to the ecosystem and to the leaf litter zone and how plants decay.
During the MNES flora pre-clearance survey, the botanist/ecologist will comprehensively traverse the project footprint on foot in search of MNES plants. 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 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. Where an MNES flora species is encountered, the tree protection zone of the individual tree (or the host tree / adjacent tree, as relevant to the particular flora species) is to be determined and an exclusion zone established. In accordance with Australian Standard Protection of Trees on Development Sites (AS 4970-2009), the formula to use is: Tree Protection Zone radius = DBH (trunk diameter measured at 1.4m above ground) x 12 For trees with a diameter at breast height larger than 1.5 m, a maximum tree protection zone radius of 18 m is to be established. As per AS 4970-2009, encroachment of up to 10 percent of the tree protection zone is allowable when the suitably qualified and experienced the botanist/ecologist assesses that this will not adversely affect plant health.  	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. This flora pre-clearance survey 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. The flora pre-clearance survey 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 preclearance survey will facilitate clear

Factor – MNES flora species	
Upon completion of works in the vicinity of an exclusion zone, all marking will be removed. Vegetation clearing must only take place in those areas where pre-clearance surveys have been completed. During the PSTR, the scope of the environmental issue is visually identified and marked as an exclusion zone (using different coloured flagging tape or bunting). The exact alignment of the trail is flagged, ensuring an adequate buffer from the exclusion zone. 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, which will enable before/after comparison. Refer to the Wangetti South Section Matters of National Environmental Significance flora pre-clearance survey methodology in Appendix B.	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. This measure will avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area.
Site induction and toolbox talks with the construction crew will occur prior construction to educate them about flora species in the project area.	This will assist in training all onsite personnel to inform them of their environmental obligations where MNES are found onsite. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries.
Plant operators are to exercise due care when operating to ensure any parts of trees are not damaged from blades or booms. Manual construction methods are encouraged in preference to mechanical methods	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries.
Clearing for trail, public campsite and associated structure construction is to avoid, where practical, trees greater than 10 cm diameter at breast height (dbh).	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem. This measure is considered to effective to avoid significant changes to the existing canopy within the Project area as this can lead to the following: • Increased sunlight to the ground surface which can directly impact the type of flora species that grow. • Increased sunlight to the ground surface can result in an increase of invasive flora species. Changes to the ecosystem and to the leaf litter zone and how plants decay.
Suitability qualified botanist/ecologist to be available during the construction phase to provide advice.	This will assist in detecting flora species that are present within the clearing area. This measure will assist in avoiding impacts to individuals remaining in the vicinity of the Project area.
Where unavoidable, restrict vegetation clearing to the smallest practical work area with retention of vegetation associated with riparian areas.	This measure will avoid unnecessary impacts to known habitats to be retained adjacent to the Project and avoid impacts to waterways. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries. This measure will also assist in minimising indirect impacts on waterways by reducing

Factor – MNES flora species	
	sediment loss as well as associated water quality impacts. Furthermore, this mitigation measure will reduce impacts on the waterways through inclusion of management measures for vegetation clearing and general environmental management.
Clearing for public campsite facilities and associated structures is to be restricted to the footprint of individual features such as camping platforms, amenities blocks, rainwater tanks and tracks or raised walkways. Clearing is only to occur where it is unavoidable.	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries.
Information about protecting MNES and the illegal taking of threatened species within the project area will be incorporated into site inductions, toolbox talks, signs along the trail, trail briefings and displayed on the Wangetti Trail website.	This measure is considered effective in educating people within the project area about protected MNES species and be vigilant for illegal behaviour. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries.
No unapproved clearing to occur beyond the required limits for construction	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries.
Identified sensitive areas are demarcated and managed appropriately with minimal impacts	This measure will avoid unnecessary impacts to known habitats to be retained adjacent to the Project. Recording and reporting of any incidences of noncompliance allows for identification of potential adaptive management strategies. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries.
No burning of vegetation is to occur on site	This is considered to be effective in avoiding potential bushfires starting which can damage MNES.
All vegetation that is cleared should not be stockpiled and should be dispersed of within the 40 m corridor to resemble the natural surrounds and to allow natural decomposition processes to take place.	This is considered acceptable for works within WTWHA avoid additional areas to disturbed and is supported by DES and WTMA. Furthermore, it will reduce the potential for weeds and/or pathogens from spreading within the WTWHA.
All machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds and pathogens. Vehicles, plant and equipment to be used for the project would be required to be clean with Weed and Seed Hygiene Declaration certificates. Vehicles, plant and equipment to be inspected prior to being used to ensure they are clean. Disinfecting vehicles and machinery. This will be undertaken during the construction phase of the project and maintained throughout.	This is considered to be an effective weed management control and is supported by DES and WTMA. Weeds and pathogens are major threats to the survival and habitat of native flora species within the Project area, and this measure is considered to be effective in reducing the spread of the weeds and pathogens during the construction phase. This measure also aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).

Factor – MNES flora species	
Undertake a pre-clearing weed survey treatment and management and report areas of existing weed infestation.	Identification of weed species and locations of infestations will facilitate appropriate management strategies. Weeds and pathogens are major threats to the survival and habitat of native flora species within the Project area, and this measure is considered to be effective in reducing the spread of the weeds and pathogens during the construction phase. This measure also aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
Performance indicator	
No vegetation clearing outside of the approved clearing footprint.	
No fires within Wangetti South Section	
All site personnel have undertaken the environmental induction prior to commencing work.	
Compliance with condition of contract	
Existing weeds and pathogens are identified and controlled onsite.	
Monitoring/audits	
Weekly inspections conducted by the contractor to assess the implementation of the above mitigation measures with records kept in a weekly environmental checklist.	
Any non-conformances are to be documented and reported to TDPD and rectified immediately	

Table 5.4 Avoidance and mitigation measures for WTWHA from the EMP

Factor – WTWHA	
Applicable MNES	
WTWHA	
Mitigation measures/controls	**Effectiveness**
Fire extinguishers to be kept in all vehicles, as well as the project site office and/or work areas.	This is considered to be effective in avoiding potential bushfires starting which can damage MNES. This measure is supported by WTMA, DES and the traditional owners. Severe fires can destroy critical habitat for MNES species. Therefore, to reduce the risk of bushfires occurring within Wangetti South no fires area to be permitted.
Fuel shall be stored in appropriate storage containers.	
Fire management plan is to be developed for the construction phase of the project, in conjunction with WTMA. The nominated construction contractor of the trail and public campsites will be required to develop a bushfire management plan as part of their contract.	
All chemical storage and handling will be in accordance with material SDS, with appropriate firefighting equipment (e.g. specific fire extinguisher types) identified in the SDS to be maintained on-site.	
No burning of any substances, including wooden debris or products, will be undertaken as part of this project.	
Toolbox talks with the construction crew will occur prior construction to educate them about bushfire management, bushfire hazards and evacuation routes.	

Factor – WTWHA	
Working during the fire season, ensure that each team has at least one team member who has been trained in basic bushfire awareness	
All works are to be undertaken in accordance with the *Queensland Heritage Act 1992*, cultural heritage management plan, ACH Act and the Duty of Care Guidelines unless otherwise agreed in a CHMP.	This is considered an effective measure to avoid impacts to cultural heritage features within the WTWHA and is supported by WTMA, DES and the traditional owners.
All site personnel shall attend environmental training as part of the site induction process prior to entering the work site. As part of this training, a cultural heritage induction should be delivered to all site personnel before entering the site, with the notification procedure in the event of an unexpected find to be clearly indicated during the induction	This will assist in training all onsite personnel in regard to their environmental obligations where MNES are found onsite and cultural heritage obligations.
In the event of a find following procedures in the cultural heritage management plan which includes the following actions are to be undertaken: 1. FIND: A potential Cultural Heritage item or object is found. 2. STOP: STOP WORK IMMEDIATELY and install an exclusion zone around the area. 3. NOTIFY: Notify a responsible person (e.g. Site Supervisor, Project Manager). 4. MANAGE: Report the discovery to the project manager for advice on management. Cease operations and follow cultural heritage reporting procedure. Report to TDPD and Project Manager. Protocols to follow as outlined in the Cultural Heritage Agreement. Let areas naturally regenerate and implement weed control to manage any outbreaks. Areas to be monitored to check health and condition of regenerating areas. Construction Manager should be notified immediately who will then notify the Archaeologist appointed to the project. Archaeologist is to provide management recommendations to the Construction Manager and will liaise (if necessary) with the Department of Environment and Science to ensure compliance with the Queensland Heritage Act 1992 and the ACH Act.	This is considered an effective measure to avoid impacts to cultural heritage features within the WTWHA and is supported by WTMA, DES and the traditional owners.
Within the WTWHA minimise clearing to designed and demarcated areas; weed and pest management to avoid disturbance and degradation of flora and fauna environmental values.	This is considered an effective measure to avoid impacts to environmental features and MNES within the WTWHA and is supported by WTMA and DES. This measure is considered to effective to avoid significant changes to the existing canopy within the Project area as this can lead to the following: • Increased sunlight to the ground surface which can directly impact the type of flora species that grow. • Increased sunlight to the ground surface can result in an increase of invasive flora species. • Changes to the ecosystem and to the leaf litter zone and how plants decay.

Factor – WTWHA	
Prior to conducting construction works within the WTWHA the contractor conducting the works has been informed of the requirements of the Wet Tropics Permit No: WTMA20001a The works supervisor has obtained a briefing describing the natural values of the subject site from the relevant QPWS Ranger or a Wet Tropics Management Authority officer. The works supervisor must also be given direction by the relevant QPWS Ranger or a Wet Tropics Management Authority officer as to the nature and extent of the clearing or earthworks to be undertaken.	This will assist in educating the contractor on their environmental obligations where MNES are found onsite and cultural heritage obligations.
An Erosion Sediment and Control Plan will be developed by the construction contractor prior to any works commencing onsite	This measure will mitigate any potential impacts to water quality and bed and banks (substrate and vegetation present) of adjoining aquatic habitats that may provide habitat and resources to MNES.
Consider weather conditions and prevailing winds when conducting construction activities that may result in air emissions. Reduce clearing during periods of high wind. Wetting the road/work area during dry periods to reduce dust being generated. Construction vehicles to be cleaned of soils before driving on sealed roads to reduce dust being generated.	This measure is considered effective in reducing dust within the project area which can cover native plants used by MNES fauna species and potentially reduces the plant's ability to photosynthesize. Furthermore, this measure is considered effective in reducing sediment entering waterways within the project area which could reduce the water quality of the waterways and affect the opal cling goby and amphibian species.
Equipment and shoe wash down areas will be in place prior entering the site to avoid the spread of weeds and pathogens. Construction crews required to disinfect clothing, footwear, equipment and other personal items.	This is considered to be an effective weed management control and is supported by DES and WTMA. This is considered to be an effective weed management control and is supported by DES and WTMA. Weeds and pathogens are major threats to the survival and habitat of native flora species within the Project area, and this measure is considered to be effective in reducing the spread of the weeds and pathogens during the construction phase. This measure also aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
All machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds and pathogens. Vehicles, plant and equipment to be used for the project would be required to be clean with Weed and Seed Hygiene Declaration certificates. Vehicles, plant and equipment to be inspected prior to being used to ensure they are clean. Disinfecting vehicles and machinery. This will be undertaken during the construction phase of the project and maintained throughout.	This is considered to be an effective weed management control and is supported by DES and WTMA. This is considered to be an effective weed management control and is supported by DES and WTMA. Weeds and pathogens are major threats to the survival and habitat of native flora species within the Project area, and this measure is considered to be effective in reducing the spread of the weeds and pathogens during the construction phase. This measure also aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
Cyclists and hikers to be educated on the environmental values associated the project area, procedures to following if an accident occurs on the trail, accessing and exiting the trail and the appropriate use of the trail. This information can be presented on the Wangetti Trail website, at the trail head and presented by the operational staff.	This will assist in educating users of the trail the values of the WTWHA and their environmental obligations on site.

Factor – WTWHA	
Trail construction will minimise disruption of forest canopy wherever possible to avoid additional sunlight that can promote weed growth on forest floor.	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem. This measure is considered to effective to avoid significant changes to the existing canopy within the Project area as this can lead to the following: • Increased sunlight to the ground surface which can directly impact the type of flora species that grow. • Increased sunlight to the ground surface can result in an increase of invasive flora species. • Changes to the ecosystem and to the leaf litter zone and how plants decay.
Ad hoc/opportunistic inspections of the trail and nodes, as per existing QPWS procedures during operation, including: • Walking track maintenance – general procedures Procedural Guide (QPW/2015/1395 v1.01) (DES, 2015a) • Pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013) • Management of Cassowary incidents Operational Policy (v1) (DES, 2020) • Managing Indigenous Cultural Heritage Operational Policy (QPW/2015/1461 v1.01) (DES, 2015b)	This measure is considered to effective to in reducing impacts on MNES for the following reasons: • Inspection of the condition of the trail and erosion and sediment devices to make sure that they are not result in adverse impacts to adjoining areas and the waterways. • Checking the presence of weed and pest specicies and take corrective actions to avoid adverse impacts on MNES. • Checking that no damage is made to areas outside of the trail footprint and camp area including illegal fires and new tracks. • Checking that there is no evidence of damage to MNES flora species and/or injury to MNES fauna species.
Performance indicator	
No injury or death to humans or native fauna species, loss of vegetation and/or damage to property or buildings.	
No damage to known or unknown to cultural heritage sites.	
No vegetation clearing outside of the approved clearing footprint.	
No fires within Wangetti South Section	
No illegal activities occurring within the project to MNES	
All site personnel have undertaken the environmental induction prior to commencing work.	
Compliance with condition of contract	
Existing weeds and pathogens are identified and controlled onsite.	
Monitoring	
Weekly inspections during the construction (carried out by the contractor) to assess the implementation of the above mitigation measures with records kept in a weekly environmental checklist.	
At the start of each working week (or some other agreed schedule) provide reports to TDPD depending on work locations) stating the trails being worked on, their location and the number of personnel working on each. Report to provide contact details for key personnel in construction crew.	
At the start of each working week, check the weather forecast and note any potential high-risk days (i.e. high-risk days are those with high temperatures and high winds. They generally only occur during the hot summer months or during periods of drought)	

Factor – WTWHA
On the day before any anticipated high-risk days, check to see if a Total Fire Ban (TFB) has been called for the area. Local fire bans will be checked to see if they are in place, with any project works that pose a high fire risk not performed during this time. If a TFB day has been called, contact TDPD immediately to discuss whether it is safe/appropriate to work.
During the fire season, the following weather monitoring protocols apply: • At arrival to site in the morning, check weather observations and record in Fire Weather Log Book • Before returning to work after lunch, check weather observations and record in Fire Weather Log Book
Any non-conformances are to be documented and reported to TDPD and rectified immediately

5.2.2 Preliminary Construction Environmental Management Plan

Overview

The CEMP guides construction activities associated with the Wangetti South Section to prevent or minimise the environmental impacts and disturbance on site and to the surrounding environment during the construction phase. This CEMP has been prepared to satisfy the environmental obligations during the construction phase and complements the overarching Wangetti South Section Environmental Management Plan.

The CEMP adopts a risk-based approach to identify and prioritise actions, which addresses the key environmental values, uses and sensitive components. The CEMP adopts provisions based on industry standard practices for minimisation and rehabilitation of environmental impacts during construction. The provisions reflect the potential for indirect and direct impacts posed by construction activities, such as unauthorised clearing, dust emissions during high winds and collisions with wildlife.

Structure of the CEMP

The structure of the CEMP has been developed to align with provisions in the DEMP Guidelines. Table 5.5 below demonstrates that this CEMP has considered the sections of the DEMP Guidelines. It has also considered the provisions in the QPWS policies and procedures for undertaking works within protected areas and advice from WTMA. It also discusses how the CEMP has addressed the information requested by DAWE in Section 5.1.

Table 5.5 Structure of the CEMP

Section	Comments	How this addresses DAWE's RFI
Section 1: Introduction	Compiles with Section 3.4, 3.5 and 3.6 in Department of Environment Environmental Management Plan Guidelines 2014.	The CEMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a

Section	Comments	How this addresses DAWE's RFI
		discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.
Section 2: Potential environmental impacts and risks	Compiles with Section 3.8, 3.10, 3.12 and 4.0 in Department of Environment Environmental Management Plan Guidelines 2014. This section outlines the key environmental factors relevant to construction, the proposal activities that would affect the factors and the site-specific environmental values, uses and sensitive components that will be affected.	The CEMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans
Section 3: CEMP Provisions	Compiles with Section 3.12 and 3.13 in Department of Environment Environmental Management Plan Guidelines 2014. In the section the following has been addressed: • Details of the procedure for dealing with strikes, injury and deaths of native fauna and the loss of flora species • Details the controls to manage the cling goby and includes maps showing where low-level bridges will be implemented at water crossings to avoid impacts on the opal cling goby, and its known and potential habitat	The CEMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure.

Section	Comments	How this addresses DAWE's RFI
	• The mitigation measures that have been developed have considered the QPWS operational policies • Details of the control measures, who is responsible for their implementation, when they will be implemented, how they will be measured for effective and corrective actions in the case of an incident occurring.	
Section 4: Rehabilitation of works areas	Compiles with Section 3.13 in Department of Environment Environmental Management Plan Guidelines 2014.	No comment
Section 5: Monitoring	Compiles with Section 3.9 and 3.14 in Department of Environment Environmental Management Plan Guidelines 2014. It also outlines the types of monitoring activities that will occur during the construction phase.	The CEMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.
Section 6: Audit	Compiles with Section 3.14 in Department of Environment Environmental Management Plan Guidelines 2014. This section outlines how audits will be undertaken during the construction phase.	The CEMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local

Section	Comments	How this addresses DAWE's RFI
		government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.
Section 7: Review	Compiles with Section 3.14 in Department of Environment Environmental Management Plan Guidelines 2014. This section outlines when reviews will be undertaken during the construction phase.	The CEMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.
Section 8: Emergency incident planning and response	Compiles with Section 3.11 in Department of Environment Environmental Management Plan Guidelines 2014. This section outlines how emergency incidents will be addressed during the construction phase.	The CEMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Information on the timing, frequency and duration of the measures to be implemented.

Summary of the measures proposed within the CEMP to avoid, mitigate and manage relevant impacts

A number of avoidance and mitigation measures have been established for the Project and specific measures for each of the relevant MNES that are likely and may be impacted by the Project are provided below (refer to Table 5.6, Table 5.7 and Table 5-8). Table 5.6, Table 5.7 and Table 5-8 below present the environmental factors and MNES potentially impacted by construction and operational activities, the proposed environmental controls in response to the impact and the effectiveness of such controls. Further to this, it nominates performance

indicators used for measuring the controls and how the mitigation measures will be monitored. The management objective of the proposed measures is to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.

This section supports the provisions and mitigations detailed in the preliminary management plans developed for the Project, to ensure construction and operational activities are appropriately managed and impacts to significant environmental values associated with the Project area are reduced.

In addition, Table 5.6, Table 5.7 and below addresses the additional information requested by DAWE, including:

- Details and locations, including with appropriate maps, of where low-level bridges will be implemented at water crossings to avoid impacts on the Opal Cling Goby, and its known and potential habitat, as a result of the revised impact assessment in Section 2 above
- Details about how the proposed measures are consistent with Wet Tropics World Heritage Management Plan 2020 and Wet Tropics Strategic Plan 2020 – 2030
- Details of the procedure for dealing with strikes, injury and deaths of native fauna and the loss of flora species
- Key International Erosion Control Association (IECA) best practice erosion and sediment control procedures that will be incorporated into the ESCP to mitigate and manage impacts on water quality
- Pre-clearance survey methodology, and its predicted effectiveness, for a commitment to avoid listed threatened flora species (including those identified in Section 2 above) and Southern Cassowary nests during the construction stage
- With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies
- The use of committed language (e.g., 'will' and 'must') when describing the proposed measures
- An assessment of the expected or predicted effectiveness of the proposed measures
- Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans
- Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures
- Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure
- Information on the timing, frequency and duration of the measures to be implemented.

Table 5.6 Avoidance and mitigation measures for MNES fauna species

Factor – MNES fauna species
Applicable MNES
• Threatened migratory bird species • Casuarius casuarius (Southern cassowary) • *Litoria dayi* (Australian lace lid) • *Litoria nannotis* (Waterfall frog) • *Litoria nyakalensis* (Mountain Mistfrog) • *Litoria rheocola* (Common mistfrog) • *Stiphodon semoni* (Opal cling goby)

Factor – MNES fauna species	
Mitigation measures/controls	**Effectiveness**
Site inductions and toolbox talks with the construction crew will occur prior construction to educate them about fauna species in the project area.	This is consistent within provisions in the Walking track maintenance – general procedures Procedural Guide (QPW/2015/1395 v1.01) (DES, 2015a). This will assist in training all onsite personnel in regard to their environmental obligations where MNES are found onsite MNES fauna species applicable to the Wangetti South Section will be flagged during inductions and toolbox talks and mitigation measures to reduce impacts to MNES fauna species during the construction phase will be outlined with the construction crew. This measure is also consistent with the mitigation measures in the Recovery plan for the southern cassowary *Casuarius casuarius johnsonii* in that it educates construction crew not to feed native wildlife which assists in reducing human—cassowary interactions
Sequential clearing of vegetation to allow resident fauna the opportunity to disperse away from the immediate construction area	This will assist in detecting fauna that are present within the clearing area directly prior to vegetation clearing and allow these species to move away from the impacted area, where possible.
During the PSTR, the fauna specialist will undertake pre-clearance survey, to search habitat features previously marked for fauna and/or breeding activity.	This will assist in detecting fauna that are present within the clearing area directly prior to vegetation clearing and allow these species to move away from the impacted area, where possible. Provides flexibility to the trail builders to avoid sensitive habitats or individual species and habitat factors within a 40 m wide construction allowance corridor. This is supported by DES and WTMA.
Suitability qualified fauna spotter/ecologist will be available during the construction phase to provide advice. An experienced fauna spotter-catcher will conduct an inspection of the trail alignment and public campsites ahead of vegetation disturbance and track construction clearing. The spotter will be present through all stages of clearing. Standard fauna spotter-catcher vegetation clearing protocols are to be followed, including inspection of potential habitat features prior to disturbance.	This will assist in detecting fauna that are present within the clearing area and allow these individuals to move away from the impacted area, where possible.
Clearing of trees that provide habitat to fauna species is carried out in a way that ensures animals in the area being cleared (the clearing site) have enough time to move out of the clearing site without human intervention; the clearing must be carried out in stages.	This will assist in detecting fauna that are present within the clearing area and allow these individuals to move away from the impacted area, where possible. The fauna catcher may relocate individuals to the nearest safe place within suitable habitat if appropriate and safe to do so.
Southern cassowaries to be managed during the construction phase in accordance with the provision in the Southern Cassowary Management Plan in the EMP. On any construction work site, should a cassowary approach the works area then works in that particular location will cease until the cassowary has left of its	This will assist in appropriate measures being incorporating into the contractor's environmental management framework. This has been based on research and will avoid hostile interactions with the southern cassowary and humans within the project area. This will assist in reducing injuries to the southern cassowaries.

Factor – MNES fauna species	
own accord. All construction work should have a plan for alternate work sites and tasks in this contingency. Domestic animals, under no circumstances, are to be taken into any part of the project area, trails, or camp grounds, nor to accompany service/maintenance vehicles during operation (even if they say in the vehicle). All machinery used in construction and operation should be silenced to manufacturers specifications and maintained to that condition. Vehicles will be required to service the construction and operation/maintenance of the facilities. Motorised vehicles may range from quad biked (or similar) to 4WD vehicles and light trucks. All drivers are to be aware of speed limits for the varying sections of rod/track. Lighting and electrical supply to the campsite and emergency lighting should be reliant on alternatives to fuel generators. Lighting (where required) to be confined to directional and subdued lighting and address Australian Standard AS/NZS 4282:2019. *Control of the obtrusive effects of outdoor lighting*, which provides information in Appendix B about the impact of artificial light on biota. Any development adjacent permanent or significant ephemeral watercourses (e.g. crossing works) will have full erosion and sediment control measures implemented and maintained for the duration of the works as per the ESCP to be developed for the project. The ESCP is not to be a generalised document, but will address specific infrastructure requirements for any works in moderate, high and highest priority areas. Helicopters can only be used for the transport of materials to construction sites in all but Highest priority and High priorities areas where: • They are able to operate outside of the ground effect zone when hovering. • o Drop zones are in low or lowest priority areas where likely cassowary occurrence is nil or extremely unlikely. • Preclearance of any drop zones for materials near watercourses or rainforest (essential habitat areas) identifies no evidence of cassowary presence. • Helicopter overfly of WTWHA is in accordance with regulatory provisions of the Wet Tropics Plan Temporary fencing for construction purposes at camps (e.g. around open pits, newly laid concrete areas) will not be made of wire, nor obstruct fauna movement across the general site area. No fencing of any type to be used in vegetation retained for corridor/habitat purposes.	This mitigation measure will contribute to the localised knowledge of the species that may lead to the determination of the presence of the species, capture variations in habitat condition and threats throughout the construction period, informing performance evaluation of management measures and assisting in mitigating impacts to southern cassowary and their breeding places/habitat.
A response procedure to be developed and implemented with regards to wildlife injury or mortality during construction	This is an effective measure to provide urgent care to injured animals within the project area. This is consistent with management of

Factor – MNES fauna species	
	Cassowary incidents Operational Policy (v1) (DES, 2020).
Opal cling goby to be managed during the construction phase in accordance with the following: • No instreams structures within opal cling goby potential habitat • minimising the size of the disturbance area, implementing an Erosion Sediment and Control Plan • minimising disturbance by noise, vibration and/or artificial lighting near waterways. All machinery used in construction and operation should be silenced to manufacturers specifications and maintained to that condition. Lighting and electrical supply to the eco-accommodation and emergency lighting should be reliant on alternatives to fuel generators. Works adjacent permanent or significant ephemeral watercourses (e.g. bridge works) will have full erosion and sediment control measures implemented and maintained for the duration of the works as per the ESCP to be developed for the project An aquatic fauna specialist is required to undertake pre-clearance surveys of waterways prior to activities occurring to identify whether any breeding places or individuals are present within the disturbance area. This will avoid harm to individual MNES present within water features. Details and locations of where low-level bridges will be implemented at water crossings to avoid impacts on the opal cling goby, and its known and potential habitat as shown in Appendix C.	This will assist in preventing water quality and aquatic habitat degradation through minimising release of sediment and other contaminants to waterways as a result of the works. This will also reduce adverse impacts to the opal cling gobies that may be present with the waterways. This mitigation measure will contribute to the localised knowledge of the species that may lead to the determination of the presence of the species, capture variations in habitat condition and threats throughout the construction period, informing performance evaluation of management measures and assisting in mitigating impacts to opal cling goby and their breeding places/habitat.
Requirement for contractor to design, install and maintain all erosion and sediment controls.	This will assist in minimising indirect impacts on waterways by reducing sediment loss as well as associated water quality impacts. Furthermore, this mitigation measure will reduce impacts on the waterways through inclusion of management measures for vegetation clearing and general environmental management.
Records of pest animals observed on site to be recorded and addressed in accordance with the provision in the weed, pest and disease management plan.	This mitigation measure will assist in identifying and controlling pest species within the project area and determining appropriate treatments. It is noted in the Recovery plan for the southern cassowary *Casuarius casuarius johnsonii* that the two key pest species that affect the cassowary are dogs and pigs and attacks on cassowaries are known to cause injury and death and their presence potentially affects cassowary feeding, movements and behaviour. By recording pest animals within Wangetti South Section this information can then be shared with the State Government departments and WTMA to assist in the implementation of existing eradication programs dealing with pest species.

Factor – MNES fauna species	
Incorporation of bridge structures over waterways mapped as opal cling goby potential habitat to allow for the movement of fish upstream and downstream of the Project area. The incorporation of bridges over these waterways will assist in avoiding direct impacts on breeding/nesting habitat for opal cling goby, while avoiding direct loss of potential habitat for opal cling goby by spanning the low flow channel of each waterway. Checking that bridge structure allow light to penetrate to existing ground surface.	This is considered to be an effective management measure according to the QLD Department of Agriculture and Fisheries (DAF) to maintain habitat connectivity and minimise impacts on existing populations and fauna individuals moving across linear infrastructure. Bridges are considered by DAF to maintain fish passage and not constitute a waterway barrier when designed in a particular way.
Speed limits are to be restricted on access roads to avoid the incidence of vehicle strike with fauna to be nominated in the Traffic Management Plan.	This is considered to be effective in avoiding fauna injury and mortality due to individuals remaining within the clearing area. This measure is also consistent with the mitigation measures in the Recovery plan for the southern cassowary *Casuarius casuarius johnsonii.* Erected signs and reduced speed limits have proven to be effective in minimising cassowary mortality and injury along roads.
No fires are to be permitted within the project area.	This is considered to be effective in avoiding potential bushfires starting which can cause death/injuries to fauna species. This measure is supported by WTMA, DES and the traditional owners. Severe fires can destroy critical habitat for MNES species. Therefore, to reduce the risk of bushfires occurring within Wangetti South no fires area to be permitted.
Requirements for upstream and downstream water quality conditions to be monitored through visual and in situ recordings during the construction phase.	MNES amphibian species and the opal cling goby are susceptible to changes to the water quality parameters in existing waterways. Therefore, the planning of appropriate and regular water quality monitoring (carried out by the contractor) will allow for early detection and corrective actions to be set in place if any impact to water quality is identified. This measure is considered to maintain habitat critical to the survival of MNES amphibian species and the opal cling goby.
Signage around awareness of fauna species and sensitive areas.	This will assist in minimising impacts to MNES fauna species and its habitat. This measure is consistent with the mitigation measures in the Recovery plan for the southern cassowary *Casuarius casuarius johnsonii* as education is key in promoting positive behaviours when dealing with native animals including not feeding them. This will assist in minimising impacts to MNES fauna species and its habitat.
Site inductions during operational phase with maintenance staff regarding: • undertaking works and the movement of vehicles within road reserves, existing access tracks. • Wildlife present within the project area that could pose a hazard to vehicles and mobile plant • Incident response procedures will be developed to detail actions to be taken in the event of wildlife injury or mortality during clearing a	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans. This will assist in training all onsite personnel in regard to their environmental obligations where MNES are found onsite.

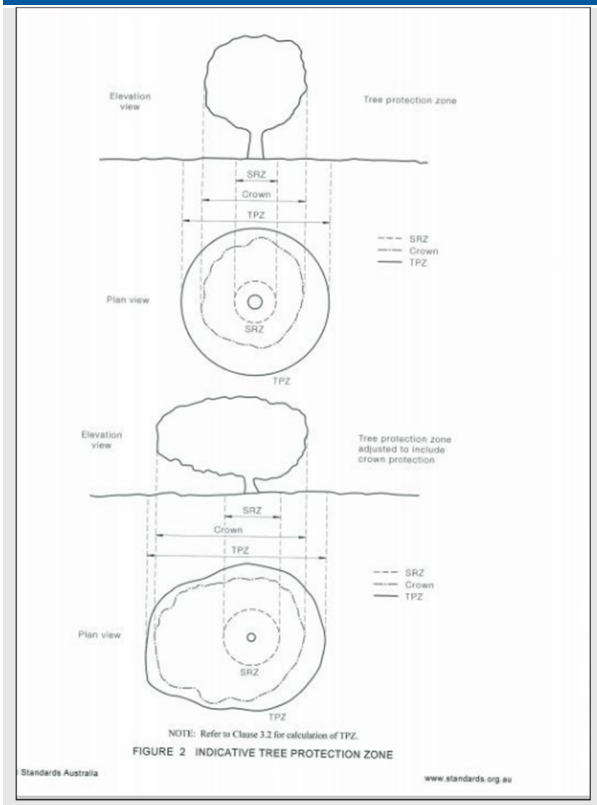
Factor – MNES fauna species	
Incident response procedures will be developed to detail actions to be taken in the event of injury or mortality to hikers or cyclist.	
Operational and maintenance traffic to use nominated roads and nominated service tracks when accessing the exiting the project area. Designated vehicle routes within the project area to have a firm and even surface, be wide and high enough for the largest vehicle using them and be well maintained and free from obstructions. Service tracks to be clearly sign-posted to indicate speed limits and traffic calming measures (if required) Speed limits for to be adopted for the operational phase to be developed in consultation with TDPD, DES, WTMA and DTMR.	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans. This measure is also consistent with the mitigation measures in the Recovery plan for the southern cassowary *Casuarius casuarius johnsonii.* Erected signs and reduced speed limits have proven to be effective in minimising cassowary mortality and injury along roads.
Where trail builders are required to camp overnight along the trail due to the remoteness of the area, they will be required to carry all rubbish out; bury human waste at least 100 m from streams and at least 15 cm deep, or carry it out. During construction phase the contractor to consider having a trailer mounted portable toilet or something similar to be able to service the construction crew. The setup of temporary amenities to be located in disturbed areas and outside of areas of high ecological significance.	These measures are considered effective in not attracting pests to the project area which can damage attack/ kill MNES species and/or damage their habitat.
All machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds, pests and pathogens. Operational staff and maintenance staff disinfecting clothing, footwear, equipment and other personal items. Disinfecting vehicles during the operational phase of the project and maintained throughout.	This will assist in minimising impacts to MNES fauna species and its habitat through the management of pest species. This is considered to be an effective weed, pest and pathogen management control and is supported by DES and WTMA. Pest, weeds and pathogens are major threats to the survival and habitat of native flora and fauna species within the Project area, and this measure is considered to be effective in reducing the spread of the weeds and pathogens during the construction phase. This measure also aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
Provisions are made to minimise the risk of fish kills arising from the works e.g. through entrapment of fish upstream or between works. In the event that fish that have been trapped by the works, fish salvage activities in accordance with the Fisheries Queensland Guidelines for Fish Salvage (available at www.daf.qld.gov.au) are implemented immediately	This is an effective measure to provide urgent care to injured animals within the project area.
Limiting construction equipment operating adjacent to waterways and undertaking hand construction where possible. Where a waterway crossing is required over mapped potential opal cling goby habitat, a single span bridge will be installed. Single span bridges for minor waterway crossings will be used to minimise disturbance with waterways and loss of aquatic habitats. Techniques for installing the bridges are outlined in the Wangetti Trail Construction Methodology Manual	This is considered effective in reducing adverse impacted to waterways and adjoining riparian areas that could support MNES species. It has also adopted standards outlined in the Fisheries Queensland, Department of Agriculture and Fisheries -Accepted development requirements for operational work that is constructing or raising waterway barrier works 2018.

Factor – MNES fauna species	
and include spanning the full width of the waterway so that no works occurs within the waterway and existing nature features are left in place within the waterway. For any part of the waterway bed or banks adjacent to the works that has been altered by construction activities, the site is restored and/or rehabilitated so that as a minimum: • Stability and profiles of the bed and banks are re-instated to natural stream profiles and stability within five (5) business days of the completion of the works • The waterway bed is retained with natural substrate or reconstructed with substrate comparable to the natural substrate size and consistency • Site conditions allow the rapid re-establishment of native vegetation and cover or native species are replanted to re-establish the natural plant community	This will assist in preventing water quality and aquatic habitat degradation through minimising release of sediment and other contaminants to waterways as a result of the works. This will also reduce adverse impacts to the opal cling gobies that may be present with the waterways.
Information about protecting MNES and the illegal taking of threatened species within the project area will be incorporated into site inductions, toolbox talks, signs along the trail, trail briefings and displayed on the Wangetti Trail website. Due the relatively remote location of opal cling goby habitat, the risk of illegal fish collection is not expected to be significant.	This measure is considered effective in educating people within the project area about protected MNES species and be vigilant for illegal behaviour.
Performance indicator	
No injury or death to native fauna species. Compliance with condition of contract A plan of clearing will be prepared by the Construction Contractor. No collision with fauna species All site personnel have undertaken the environmental induction prior to commencing work. Existing pest species are identified and controlled onsite.	
Monitoring/audits	
Weekly inspections to assess the implementation of the above mitigation measures will be carried out by the contractor during the construction phase with records kept in a weekly environmental checklist.	
Any non-conformances are to be documented and reported to TDPD and rectified immediately	

Table 5.7 Avoidance and mitigation measures for MNES flora species

Factor – MNES flora species
Applicable MNES
• *Canarium acutifolium* • *Dendrobium mirbelianum* (Dark-stemmed antler orchid) • *Diplazium cordifolium* • *Diplazium pallidum* • *Myrmecodia beccarii* (Ant plant) • *Phaius pictus* • *Phalaenopsis amabilis subsp. rosenstromii* (Native moth orchid) • *Polyscias bellendenkerensis*

Factor – MNES flora species	
• *Toechima pterocarpum* (Orange tamarind) • *Vappodes lithocola* (Dwarf butterfly orchid) (Also known as *Dendrobium lithocola*, and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*) • *Vappodes phalaenopsis* (Cooktown orchid) (Also known as *Dendrobium phalaenopsis* and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*) • *Zeuxine polygonoides* (Velvet jewel orchid) (also known as *Rhomboda polygonoides*)	
Mitigation measures/controls	**Effectiveness**
During vegetation clearing preference is given to trimming vegetation rather than clearing to retain overhead canopy.	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem.
During the MNES flora pre-clearance survey, the botanist/ecologist will comprehensively traverse the project footprint on foot in search of MNES plants. 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 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. Where an MNES flora species is encountered, the tree protection zone of the individual tree (or the host tree / adjacent tree, as relevant to the particular flora species) is to be determined and an exclusion zone established. In accordance with Australian Standard Protection of Trees on Development Sites (AS 4970-2009), the formula to use is: Tree Protection Zone radius = DBH (trunk diameter measured at 1.4m above ground) x 12 For trees with a diameter at breast height larger than 1.5 m, a maximum tree protection zone radius of 18 m is to be established. As per AS 4970-2009, encroachment of up to 10 percent of the tree protection zone is allowable when the suitably qualified and experienced the botanist/ecologist assesses that this will not adversely affect plant health.	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. This flora pre-clearance survey 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. The flora pre-clearance survey 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

Factor – MNES flora species	
 Upon completion of works in the vicinity of an exclusion zone, all marking will be removed. Vegetation clearing must only take place in those areas where pre-clearance surveys have been completed. During the PSTR, the scope of the environmental issue is visually identified and marked as an exclusion zone (using different coloured flagging tape or bunting). The exact alignment of the trail is flagged, ensuring an adequate buffer from the exclusion zone. 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, which will enable before/after comparison. Refer to the Wangetti South Section Matters of National Environmental Significance flora pre-clearance survey methodology.	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 preclearance 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. • This measure will avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area.
Site induction and toolbox talks with the construction crew will occur prior construction to educate them about flora species in the project area.	This will assist in training all onsite personnel to inform them of their environmental obligations where MNES are found onsite. This measure is supported by DES and WTMA
Plant operators are to exercise due care when operating to ensure any parts of trees are not damaged from blades or booms. Manual construction methods are encouraged in preference to mechanical methods	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem. It will avoid unnecessary impacts to MNES flora species.
Clearing for trail, public campsite and associated structure construction is to avoid, where practical, trees greater than 10 cm diameter at breast height (dbh).	This measure will reduce impacts on MNES flora species and assist in reducing impacts to the ecosystem. This measure is considered to effective to avoid significant changes to the existing canopy within the Project area as this can lead to the following:

Factor – MNES flora species	
	• Increased sunlight to the ground surface which can directly impact the type of flora species that grow. • Increased sunlight to the ground surface can result in an increase of invasive flora species. • Changes to the ecosystem and to the leaf litter zone and how plants decay.
Suitability qualified botanist/ecologist to be available during the construction phase to provide advice.	This will assist in detecting flora species that are present within the clearing area. This measure will assist in avoiding impacts to individuals remaining in the vicinity of the Project area.
Where unavoidable, restrict vegetation clearing to the smallest practical work area with retention of vegetation associated with riparian areas.	This measure will avoid unnecessary impacts to known habitats to be retained adjacent to the Project and avoid impacts to waterways. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries. This measure will also assist in minimising indirect impacts on waterways by reducing sediment loss as well as associated water quality impacts. Furthermore, this mitigation measure will reduce impacts on the waterways through inclusion of management measures for vegetation clearing and general environmental management.
Clearing for public campsite facilities and associated structures is to be restricted to the footprint of individual features such as camping platforms, amenities blocks, rainwater tanks and tracks or raised walkways. Clearing is only to occur where it is unavoidable.	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries.
Information about protecting MNES and the illegal taking of threatened species within the project area will be incorporated into site inductions, toolbox talks, signs along the trail, trail briefings and displayed on the Wangetti Trail website.	This measure is considered effective in educating people within the project area about protected MNES species and be vigilant for illegal behaviour. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries.
No unapproved clearing to occur beyond the required limits for construction	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries.
Identified sensitive areas are demarcated and managed appropriately with minimal impacts	This measure will avoid unnecessary impacts to known habitats to be retained adjacent to the Project. Recording and reporting of any incidences of noncompliance allows for identification of potential adaptive management strategies. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries.

Factor – MNES flora species	
No burning of vegetation is to occur on site	This is considered to be effective in avoiding potential bushfires starting which can damage/destroy MNES flora species.
All vegetation that is cleared should not be stockpiled and should be dispersed of within the 40 m corridor to resemble the natural surrounds and to allow natural decomposition processes to take place.	This is considered acceptable for works within WTWHA avoid additional areas to disturbed and is supported by DES and WTMA.
All machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds and pathogens. Vehicles, plant and equipment to be used for the project would be required to be clean with Weed and Seed Hygiene Declaration certificates. Vehicles, plant and equipment to be inspected prior to being used to ensure they are clean. Disinfecting vehicles and machinery. This will be undertaken during the construction phase of the project and maintained throughout.	This is considered to be an effective weed management control and is supported by DES and WTMA. Weeds and pathogens are major threats to the survival and habitat of native flora species within the Project area, and this measure is considered to be effective in reducing the spread of the weeds and pathogens during the construction phase. This measure also aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
Undertake a pre-clearing weed survey treatment and management and report areas of existing weed infestation.	Identification of weed species and locations of infestations will facilitate appropriate management strategies. Weeds and pathogens are major threats to the survival and habitat of native flora species within the Project area, and this measure is considered to be effective in reducing the spread of the weeds and pathogens during the construction phase. This measure also aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
Performance indicator	
No vegetation clearing outside of the approved clearing footprint.	
No fires within Wangetti South Section	
All site personnel have undertaken the environmental induction prior to commencing work.	
Compliance with condition of contract	
Existing weeds and pathogens are identified and controlled onsite.	
Monitoring/audits	
Weekly inspections to assess the implementation of the above mitigation measures will be carried out by the contractor during the construction phase, with records kept in a weekly environmental checklist.	
Any non-conformances are to be documented and reported to TDPD and rectified immediately	

Table 5.8 Avoidance and mitigation measures for WTWHA

Factor – WTWHA	
Applicable MNES	
WTWHA	
Mitigation measures/controls	**Effectiveness**
Fire extinguishers to be kept in all vehicles, as well as the project site office and/or work areas.	This is considered to be effective in avoiding potential bushfires starting which can damage

Factor – WTWHA	
Fuel shall be stored in appropriate storage containers.	MNES species. This measure is supported by WTMA, DES and the traditional owners. Severe fires can destroy critical habitat for MNES species. Therefore, to reduce the risk of bushfires occurring within Wangetti South no fires area to be permitted.
Fire management plan is to be developed for the construction phase of the project, in conjunction with WTMA. The nominated construction contractor of the trail and public campsites will be required to develop a bushfire management plan as part of their contract.	
All chemical storage and handling will be in accordance with material SDS, with appropriate firefighting equipment (e.g. specific fire extinguisher types) identified in the SDS to be maintained on-site.	
No burning of any substances, including wooden debris or products, will be undertaken as part of this project.	
Toolbox talks with the construction crew will occur prior construction to educate them about bushfire management, bushfire hazards and evacuation routes.	
Working during the fire season, ensure that each team has at least one team member who has been trained in basic bushfire awareness	
All works are to be undertaken in accordance with the *Queensland Heritage Act 1992*, cultural heritage management plan, ACH Act and the Duty of Care Guidelines unless otherwise agreed in a CHMP.	This is considered an effective measure to avoid impacts to cultural heritage features within the WTWHA and is supported by WTMA, DES and the traditional owners.
All site personnel shall attend environmental training as part of the site induction process prior to entering the work site. As part of this training, a cultural heritage induction should be delivered to all site personnel before entering the site, with the notification procedure in the event of an unexpected find to be clearly indicated during the induction	This will assist in training all onsite personnel in regard to their environmental obligations where MNES are found onsite and cultural heritage obligations.
In the event of a find following procedures in the cultural heritage management plan which includes the following actions are to be undertaken: 1. FIND: A potential Cultural Heritage item or object is found. 2. STOP: STOP WORK IMMEDIATELY and install an exclusion zone around the area. 3. NOTIFY: Notify a responsible person (e.g. Site Supervisor, Project Manager). 4. MANAGE: Report the discovery to the project manager for advice on management. Cease operations and follow cultural heritage reporting procedure. Report to TDPD and Project Manager. Protocols to follow as outlined in the Cultural Heritage Agreement. Let areas naturally regenerate and implement weed control to manage any outbreaks. Areas to be monitored to check health and condition of regenerating areas. Construction Manager should be notified immediately who will then notify the Archaeologist appointed to the project Archaeologist is to provide management recommendations to the Construction Manager and will liaise (if necessary) with the Department of	This is considered an effective measure to avoid impacts to cultural heritage features within the WTWHA and is supported by WTMA, DES and the traditional owners.

Factor – WTWHA	
Environment and Science to ensure compliance with the Queensland Heritage Act 1992 and the ACH Act.	
Within the WTWHA minimise clearing to designed and demarcated areas; weed and pest management to avoid disturbance and degradation of flora and fauna environmental values.	This is considered an effective measure to avoid impacts to environmental features and MNES within the WTWHA and is supported by WTMA and DES.
Prior to conducting construction works within the WTWHA the contractor conducting the works has been informed of the requirements of the Wet Tropics Permit No: WTMA20001a The works supervisor has obtained a briefing describing the natural values of the subject site from the relevant QPWS Ranger or a Wet Tropics Management Authority officer. The works supervisor must also be given direction by the relevant QPWS Ranger or a Wet Tropics Management Authority officer as to the nature and extent of the clearing or earthworks to be undertaken.	This will assist in educating the contractor on their environmental obligations where MNES are found onsite and cultural heritage obligations.
An Erosion Sediment and Control Plan will be developed by the construction contractor prior to any works commencing onsite and will be based on the CESCP.	This measure will mitigate any potential impacts to water quality and bed and banks (substrate and vegetation present) of adjoining aquatic habitats that may provide habitat and resources to MNES.
Consider weather conditions and prevailing winds when conducting construction activities that may result in air emissions. Reduce clearing during periods of high wind. Wetting the road/work area during dry periods to reduce dust being generated. Construction vehicles to be cleaned of soils before driving on sealed roads to reduce dust being generated.	This measure is considered effective in reducing dust within the project area which can cover native plants used by MNES fauna species and potentially reduces the plant's ability to photosynthesize. Furthermore, this measure is considered effective in reducing sediment entering waterways within the project area which could reduce the water quality of the waterways and affect the opal cling goby and amphibian species.
Equipment and shoe wash down areas will be in place prior entering the site to avoid the spread of weeds and pathogens. Construction crews required to disinfect clothing, footwear, equipment and other personal items.	This is considered to be an effective weed management control and is supported by DES and WTMA. This is considered to be an effective weed management control and is supported by DES and WTMA. Weeds and pathogens are major threats to the survival and habitat of native flora species within the Project area, and this measure is considered to be effective in reducing the spread of the weeds and pathogens during the construction phase. This measure also aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
All machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds and pathogens. Vehicles, plant and equipment to be used for the project would be required to be clean with Weed and Seed Hygiene Declaration certificates. Vehicles, plant and equipment to be inspected prior to being used to ensure they are clean. Disinfecting vehicles and machinery. This will be undertaken during the construction phase of the project and maintained throughout.	This is considered to be an effective weed management control and is supported by DES and WTMA. This is considered to be an effective weed management control and is supported by DES and WTMA. Weeds and pathogens are major threats to the survival and habitat of native flora species within the Project area, and this measure is considered to be effective in reducing the spread of the weeds and pathogens during the construction phase. This measure also aligns with the provisions in the pest plant and pathogen

Factor – WTWHA	
	spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
Cyclists and hikers to be educated on the environmental values associated the project area, procedures to following if an accident occurs on the trail, accessing and exiting the trail and the appropriate use of the trail. This information can be presented on the Wangetti Trail website, at the trail head and presented by the operational staff.	This will assist in educating users of the trail the values of the WTWHA and their environmental obligations on site.
Trail construction will minimise disruption of forest canopy wherever possible to avoid additional sunlight that can promote weed growth on forest floor.	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem. This measure is considered to effective to avoid significant changes to the existing canopy within the Project area as this can lead to the following: • Increased sunlight to the ground surface which can directly impact the type of flora species that grow. • Increased sunlight to the ground surface can result in an increase of invasive flora species. • Changes to the ecosystem and to the leaf litter zone and how plants decay.
Inspection of the trail and nodes, as per existing QPWS procedures during operation, including: • Walking track maintenance – general procedures Procedural Guide (QPW/2015/1395 v1.01) (DES, 2015a) • Pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013) • Management of Cassowary incidents Operational Policy (v1) (DES, 2020) • Managing Indigenous Cultural Heritage Operational Policy (QPW/2015/1461 v1.01) (DES, 2015b)	This measure is considered to effective to in reducing impacts on MNES for the following reasons: • Inspection of the condition of the trail and erosion and sediment devices to make sure that they are not result in adverse impacts to adjoining areas and the waterways. • Checking the presence of weed and pest specicies and take corrective actions to avoid adverse impacts on MNES. • Checking that no damage is made to areas outside of the trail footprint and camp area including illegal fires and new tracks. • Checking that there is no evidence of damage to MNES flora species and/or injury to MNES fauna species.
Performance indicator	
No injury or death to humans or native fauna species, loss of vegetation and/or damage to property or buildings.	
No damage to known or unknown to cultural heritage sites.	
No vegetation clearing outside of the approved clearing footprint.	
No fires within Wangetti South Section	
No illegal activities occurring within the project to MNES	
All site personnel have undertaken the environmental induction prior to commencing work.	
Compliance with condition of contract	
Existing weeds and pathogens are identified and controlled onsite.	

Factor – WTWHA
Monitoring
Weekly inspections to assess the implementation of the above mitigation measures will be carried out the contractor during the construction phase, with records kept in a weekly environmental checklist.
At the start of each working week (or some other agreed schedule) provide reports to TDPD depending on work locations) stating the trails being worked on, their location and the number of personnel working on each. Report to provide contact details for key personnel in construction crew.
At the start of each working week, check the weather forecast and note any potential high-risk days (i.e. high-risk days are those with high temperatures and high winds. They generally only occur during the hot summer months or during periods of drought)
On the day before any anticipated high-risk days, check to see if a Total Fire Ban (TFB) has been called for the area. Local fire bans will be checked to see if they are in place, with any project works that pose a high fire risk not performed during this time. If a TFB day has been called, contact TDPD immediately to discuss whether it is safe/appropriate to work.
During the fire season, the following weather monitoring protocols apply: • At arrival to site in the morning, check weather observations and record in Fire Weather Log Book • Before returning to work after lunch, check weather observations and record in Fire Weather Log Book
Any non-conformances are to be documented and reported to TDPD and rectified immediately

Monitoring and maintenance provisions in the CEMP

Monitoring and maintenance provisions during the construction phase

The contractor will be required to develop an environment monitoring plan and schedule to be approved by the proponent for the construction phase of Wangetti South Section. The environment monitoring plan and schedule will include the monitoring requirements as outlined in the EMP, CEMP, TMP, CESCP, WPDMP and CMP.

During construction phase the Contractor will make these records available to the TDPD or any relevant authorities and their representatives on request.

Monitoring and maintenance provisions during the operational phase

Monitoring and maintenance during the operational phase will be carried out by DES according to current management programs and procedures (in line with the management instrument for the two protected areas).

Documentation, document control and records

The contractor and the TDPD will ensure that an adequate document control system is in place to ensure that only current documentation is in use.

Records collected as part of environmental management activities will be retained by the Contractor and the TDPD for the legally required period of time. Environmental records include but may not be limited to:

- Site inspection checklists
- Environmental audit reports
- Training records
- Monitoring data
- Complaints and associated records of communication
- Meeting minutes.

5.2.3 Cassowary Management Plan

Overview

The CMP guides planning/design, construction and operation/maintenance activities associated with the Wangetti South Section in consideration of the southern cassowary. The purpose of the plan is to provide guidance in managing potential impacts and negative interactions between cassowaries and human activities.

Structure of the CMP

Table 5.9 below provides a breakdown of the structure of the CMP and an overview of each section. It also discusses how the CMP has addressed the information requested by DAWE in Section 5.1.

Table 5.9 Structure of the CMP

Section	Comments	How this addresses DAWE's RFI
Section 1: Introduction	Outlines the purpose of the plan and the area in which the plan covers.	The CMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.
Section 2: Application of this plan	This section outlines the distribution, abundance and behavioural characteristics of the cassowary, used to identify suitable habitat for the cassowary and inform proposed mitigation measures.	The CMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant

Section	Comments	How this addresses DAWE's RFI
		approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans.
Section 3: Habitat management areas	This section utilises the information provided in Section 2 to identify priority habitat management areas along the alignment.	The CMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans.
Section 4: Wangetti trail management aspects	This section identifies mitigation measures relevant to each habitat management area. This section also outlines the roles and responsibilities during planning/design, construction and operation/maintenance and who is responsible for the implementation of the CMP.	The CMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.
Section 5: Summary	This section provides a summary of key behaviour aspects, threatening processes and general mitigation measures.	The CMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. • Details of the procedure for dealing with strikes, injury and deaths of native fauna species.

Section	Comments	How this addresses DAWE's RFI
		• Pre-clearance survey methodology, and its predicted effectiveness, for a commitment to avoid listed threatened flora species (including those identified in Section 2 above) and Southern Cassowary nests during the construction stage. • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.

Summary of the measures proposed within the CMP to avoid, mitigate and manage relevant impacts

A number of avoidance and mitigation measures have been established for the Project within the CMP and specific measures for the cassowary that are likely and may be impacted by the Project are provided below (refer to Table 5.10). Table 5.10 below presents the proposed environmental controls in response to the impact and the effectiveness of such controls for each aspect relating to the cassowary. Further to this, it nominates performance indicators used for measuring the controls and how the mitigation measures will be monitored. The management objective of the proposed measures is to prevent or minimise unavoidable impacts on the cassowary and associated habitat within the project area.

This section supports the provisions and mitigations detailed in the CMP developed for the Project, to ensure construction and operational activities are appropriately managed and impacts to the southern cassowary and their habitat with the Project area are reduced.

In addition, Table 5.10 below addresses the additional information requested by DAWE, including:

- Details of the procedure for dealing with strikes, injury and deaths of the southern cassowary
- Pre-clearance survey methodology, and its predicted effectiveness, for a commitment to avoid Southern Cassowary nests during the construction stage
- With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies
- The use of committed language (e.g. 'will' and 'must') when describing the proposed measures
- An assessment of the expected or predicted effectiveness of the proposed measures

- Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans
- Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures
- Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure
- Information on the timing, frequency and duration of the measures to be implemented.

Table 5.10 Avoidance and mitigation measures for the Southern cassowary

Factor – Southern cassowary	
Applicable MNES	
Casuarius casuarius johnsonii (Southern cassowary)	
Mitigation measures/controls	**Effectiveness**
Design and infrastructure of Dark Jungle and shared use trail may result in access to open water sources and food for southern cassowaries, resulting in species entering and relying on camp areas	
Site clearance survey of camp areas by experienced ecologist to be undertaken prior to any construction with the following requirements: • Location of potentially important cassowary foodplant trees within and immediately adjacent development footprint • Location and orientation of permanent water in relation to development footprint. Assessment of likely cassowary access routes to any of the above resources identified (tracks, pads etc).	This will assist in appropriate designing the signage and camp layout to raise awareness to users of the presence of cassowaries within the area. This has been based on research and will avoid hostile interactions with the southern cassowary and humans within the project area. This will assist in reducing injuries to the southern cassowaries.
Survey outcomes to be used in design of the camp layout including construction access routes, location of buildings, water and sewage requirements, waste management requirements.	
Provisions to be made to ensure that no open water is provided at the camps (e.g. basins, taps, laundry facilities, tanks, etc) that can be accessed by cassowaries, thus providing an attractant to the camp areas.	
Any grey water discharge is to go to a sump, and not to irrigation or any surface drain accessible by cassowaries.	
Signage for Dark Jungle at strategic locations advising of the requirements that cassowaries cannot access food and that all water sources and disposal areas are secure from cassowary access.	
Lighting (where required) to be confined to directional and subdued lighting and address Australian Standard AS/NZS 4282:2019. Control of the obtrusive effects of outdoor lighting, which provides information in Appendix C about the impact of artificial light on biota.	
Generators should not be used for power generation except as an emergency resource. Power generation should be reliant on alternative technologies e.g. solar	

Factor – Southern cassowary	
12V systems, lithium battery storage and backup, and similar low intensity energy systems.	
An audit of listed/declared weed species to be undertaken at the proposed camp site prior to construction to provide baseline data for future monitoring of weed incursions and/or introduction of new weeds. Species, abundance and distribution of weeds to be recorded.	
Trails in highest, high priority and moderate priority sections are to have clear line of sight for a minimum of 20 m from any significant (permanent or ephemeral) watercourse crossing to enable hikers to have a clear view of key cassowary utilisation areas.	
Signage at all such locations warning of cassowary crossing and their potential use of riparian areas.	
Steep descents with sharp changes in angle of direction where the opposite side cannot be seen on the approach should not occur in high priority or moderate priority trail sections. Realignment to obtain clear line of sight to avoid blind corners is the preferred option. Where possible, all constructed watercourse crossings will be at level that will not obstruct potential cassowary movement. Preference is given to a bed level crossing that will not obstruct waterflow, and to be comprised primarily of natural material, e.g. laid stone pavements. Where there are practical limitations to the construction of bed level crossings, crossings should be designed such that their height will not obstruct cassowary movement, i.e., are capable of being stepped up onto, and over (or under). Heights are to comply with the Building Code of Australia *AS 2156.2* (Walking Tracks Part 2: Infrastructure) and *AS 5100* (Bridge Design) with respect to requirements for handrails. Handrails/balustrades on bridges/crossings will pose an impediment to cassowary movement and hence crossings should be of a 'low fall' design, less than the 1300 – 1400 mm specified in *AS 5100* for bicycles.	
No clearing to be undertaken in highest, high or moderate priority shared use trail areas until site survey identifies potentially significant cassowary foodplants or high-quality habitat areas.	
Warning signs and speed limiting signs on approaches to bridges over permanent water where cassowaries may be likely to be encountered.	
Temporary fencing for construction purposes at camps (e.g. around open pits, newly laid concrete areas) will not be made of wire, nor obstruct fauna movement across the general site area. No fencing of any type to be used in vegetation retained for corridor/habitat purposes.	
Habitat management within priority areas	
Construction in watercourses must include consideration of the potential for interference with cassowary movements e.g. within the creek bed, or access to riparian resources. Watercourse crossings should either be at bed level, or at a level that enables cassowaries to traverse the watercourse bed	This will assist in appropriate measures being incorporating into the contractor's environmental management framework. This has been based on research and will avoid hostile interactions with the southern cassowary and humans within the project area.

Factor – Southern cassowary	
without obstruction, e.g., low enough that they can step onto and over the crossing. Handrails and balustrades on waterway crossings represent a significant obstacle to movement. Bridge/crossing structures should therefore be less than the 1300 to 1400mm height for 'low fall' defined structures in Building Code of Australia and relevant standards to avoid the need for handrails.	This will assist in reducing injuries to the southern cassowaries.
Signage at all such locations warning of cassowary crossing and their potential use of riparian areas.	
Steep descents with sharp changes in angle of direction where the opposite side cannot be seen on the approach should not occur in high priority or moderate priority trail sections. Realignment to obtain clear line of sight to avoid blind corners is the preferred option.	
An audit of listed/declared weed species to be undertaken at the proposed camp site prior to construction to provide baseline data for future monitoring of weed incursions and/or introduction of new weeds. Species, abundance and distribution of weeds to be recorded.	
Vegetation clearing reducing potential habitat for the southern cassowary	
Vegetation clearing is to be restricted to that as only required for the safe construction, operation and maintenance of camp sites.	This will assist in appropriate measures being incorporating into the contractor's environmental management framework. This has been based on research and will avoid hostile interactions with the southern cassowary and humans within the project area. This will assist in reducing injuries to the southern cassowaries. This mitigation measure will contribute to the localised knowledge of the species that may lead to the determination of the presence of the species, capture variations in habitat condition and threats throughout the construction period, informing performance evaluation of management measures and assisting in mitigating impacts to southern cassowary and their breeding places/habitat.
As above, vegetation clearing will be restricted to the minimum required for the safe construction, operation and maintenance of trails. Note that other agencies may have responsibilities for road/track maintenance according to the tenure and gazettal status. Vegetation to be cleared at camps is to be clearly demarcated on all drawings and plans, and in practice by highly visible means such as biodegradable survey tape. Obstructive visible barriers such as orange Tensar construction fencing is not to be used.	
Important food plant trees identified as part of the pre-clearance survey are to be included as components of retained vegetation. E.g. within movement corridors and preferably not left as isolates within clearings.	
Greenfield vegetation clearing is to be undertaken in accordance with protocols agreed with Traditional owner representatives and with a fauna/flora spotter present.	
Vegetation removed along trails will be the minimum required to ensure clear line of sight for cyclists and hikers approaching permanent or significant ephemeral watercourses (approximately 20 m prior) Vegetation waste is not to be mulched. Waste will be cut to practical sizes to transport to edge of clearings and allowed to naturally decompose.	

Factor – Southern cassowary	
All clearing is to comply with requirements of relevant permits and approval conditions, with specific reference to erosion and sediment control plans that clearly identify mechanisms to avoid the discharge of sediment during construction off site into local habitat.	
Any works involving the replanting of vegetation is not to use important cassowary food plants as found locally within or immediately adjacent to Dark Jungle, which may otherwise attract cassowaries into the proximity of humans.	
Weeds/ Pests/Pathogen infestations	
An audit of listed/declared weeds must be undertaken prior to construction as a baseline for future monitoring of weed incursions. Undertake a pre-clearing weed survey treatment and management and report areas of existing weed infestation. Pre-clearance on-ground weed, and pest surveys will be undertaken by an appropriately skilled person to confirm biosecurity matters within the project area and this will assist with determining the appropriate treatments to be used to treat weeds and pests.	These measures will be incorporated into the contractor's environmental management framework to manage any potential impacts associated with weed/pest/pathogen infestation and reduce their impact on cassowary habitat and food trees.
Biosecurity management, regular inspection of construction areas for fire ants, yellow crazy ants, potential Phytophthora infestation, and other highly invasive species that may be identified as a risk. All machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds and pathogens. Vehicles, plant and equipment to be used for the project would be required to be clean. Vehicles, plant and equipment to be inspected prior to being used to ensure they are clean. Disinfecting vehicles and machinery. This will be undertaken during the construction phase of the project and maintained throughout.	
Any weed/pests infestation shall be treated at earliest stage while small and manageable. Treatment methods to be approved by Wet Tropics Management Authority (WTMA), DES, TDPD and Queensland Parks and Wildlife Service (QPWS), as applicable.	
Weed material that is cleared within the project area must be disposed of appropriately. Any weed removal as part of the construction phase will be cleared and disposed of at an approved waste disposal facility. Any infestations that subsequently establish during the construction period will be treated, and post-construction weed management of rehabilitated areas will be undertaken.	
The contractor will be required to complete a pre-clearing pest survey and report documenting areas of existing electric ant infestation and identifying treatment and management requirements. Pre-clearance on-ground pest surveys will be undertaken by an appropriately skilled person. Before starting construction, discussions with Wet Tropics Management Authority, Douglas Shire Council and Cairns Regional Council to be undertaken during the pre-start trail review to discuss and agree on specific treatments regarding pest species including but not	

Factor – Southern cassowary	
limited to yellow crazy ants, electric ants, pigs and dogs	
Loud, persistent noises resulting in stress to cassowaries and potential abandonment of areas	
On-site standard construction hours to apply with EP (Noise) Policy 2019, local government statues and permit conditions.	These measures will be incorporated into the contractor's environmental management framework to manage any potential impacts associated with noise generation during construction and thereby reducing the impact on cassowary behaviour.
All machinery used in construction and operation should be silenced to manufacturers specifications and maintained to that condition. Blasting of hard rock areas for construction will not be permitted in any areas. Use of any recreational radios, playing of music, or general broadcasting will be strictly confined to in-vehicle operation whilst transiting to and from site only and not played within any highest, high or moderate priority areas during construction.	
Helicopters can only be used for the transport of materials to construction site in lowest, low and moderate priority habitat areas where: • They are able to operate outside of the ground effect zone when • hovering. • Drop zones are in low or lowest priority areas where likely • cassowary occurrence is nil or extremely unlikely. • Preclearance of any drop zones for materials near watercourses or	
Vehicle movement impacting on Cassowary habitat and movement	
Transit to construction sites will be via approved and designated access routes only, and no in-field unauthorised tracks/roads will be used.	These measures will be incorporated into the contractor's environmental management framework to manage any potential impacts associated with noise generation and vehicle movement during construction and thereby reducing the impact on cassowary behaviour.
Construction vehicle movements along formed roads through moderate and high/highest priority habitat areas is not to occur 5 to 7am, and between 5 to 7pm, when cassowaries are most active. This is applicable only to the Black Mountain Road, Southedge Road and Twin Bridges Road.	
Helicopters will not be used for the transport of construction personnel. Helicopters can only be used for the transport of materials to construction sites in all but Highest priority and High priorities areas where: • They are able to operate outside of the ground effect zone when hovering. • Drop zones are in low or lowest priority areas where likely cassowary occurrence is nil or extremely unlikely. • Preclearance of any drop zones for materials near watercourses or rainforest (essential habitat areas) identifies no evidence of cassowary presence. • Helicopter overfly of WTWHA is in accordance with regulatory provisions of the Wet Tropics Plan Helicopters can be used in any area where emergency evacuation is required.	

Factor – Southern cassowary	
Construction vehicles will be of the smallest practical size to access the required areas, this includes the use of quad bikes with trailers, small rubber tracked excavators, etc.	
Construction vehicle movements along formed roads through moderate and high/highest priority habitat areas is not to occur 5 to 7am, and between 5 to 7pm, when cassowaries are most active. This is applicable only to the Black Mountain Road, Southedge Road and Twin Bridges Road.	
Construction fencing limiting the movement of the Cassowary	
Consideration will be given to the use of high-vis materials on temporary fencing. Cassowaries are attracted to bright colours and the use of high-vis materials will be limited to occasions where worker safety is an issue. No fencing of any type to be used in vegetation retained for corridor/habitat purposes.	This will assist in appropriate measures being incorporating into the contractor's environmental management framework to manage any potential impacts associated with movement of cassowaries.
Interaction between Cassowaries and construction workers and trail users	
Domestic animals of all types are banned in all parts of the project area, even if restrained inside vehicles. This includes contractor service vehicles. Poultry has the potential to be a vector for the introduction of avian diseases (e.g. avian tuberculosis, aspergillus)	This will assist in appropriate measures being incorporating into the contractor's environmental management framework to manage any potential impacts associated with movement of cassowaries.
Feeding of cassowaries is banned in all parts of the project area and is to be a prominent message at trailhead hub locations, at camp areas, and in eco-accommodation areas. Signage will be placed in all these locations and be part of any information package given to hikers, campers, mountain bike riders. Penalties should be considered if users of the trails and facilities are identified deliberately feeding cassowaries.	
Deliberate loud noises including portable music devices, external speakers, radios etc cannot be used in any camp or along the high and moderate priority trail sections. Users may continue to use headphones with portable devices.	
The induction program for all construction personnel will include a component on cassowary management measures and will include methodologies for de-escalating confrontational interactions.	
On any construction work site, should a cassowary approach the works area, then works in that particular location will cease until the cassowary has left of its own accord. All construction work should have a plan for alternate work sites and tasks in this contingency.	
No organic/food waste at any time is to be disposed of on site. All waste is to be collected and removed at the end of each day. Temporary storage of non-organic waste, e.g. cutoffs from construction materials, can be stored under a cover until they can be transported from site.	
Trail users must not use any trail before first light and after last light each day, times dependent on the season. Times to be set by camp/trail operators with consideration of seasonal visibility early morning/late afternoon. Cassowaries may settle for the evening on road/track verges.	

Factor – Southern cassowary	
Interpretive signage at trail heads will reinforce this message for public trail users.	
Waste management within camp areas	
Waste containers should be in a secured receptacle, e.g. wooden palisade barricaded area, that cannot be accessed by cassowaries.	This will assist in appropriate measures being incorporating into the contractor's environmental management framework to manage any potential impacts associated with movement of cassowaries.
Wastewater management at camp area and eco-accommodation must take into account potential cassowary access and potential to impact on local water source quality. Wastewater discharge is not to occur into a situation where the discharge can be accessed by cassowaries and should go to a sump.	
Signage in camp and eco-accommodation must clearly identify locations of waste receptacles, and protocols in separating and disposing of waste.	
Organic waste cannot be composted on-site and must be disposed of (preferably off site) daily in a manner / location that is not detectable or accessible by cassowaries. This includes all kitchen waste from the eco accommodation area.	
Ensure that there is no cassowary accessible permanent water source within the camp and eco accommodation areas.	
Signage for camp and eco accommodation users at all water sources/disposal areas regarding water management and security from cassowary access. Rain water collection points off roofing (e.g. water tanks) to be sealed, with excess runoff to be directed to a sump. Storm water discharge from eco accommodation and drains about the camp areas must not drain into any perennial water course. Wastewater discharge at the camp area and eco-accommodation similarly must take into account potential cassowary access and potential to impact on local water source quality. As for storm waste water should be directed to a sump.	
Camp management to monitor condition of all potential water sources and ensure they are not available to cassowaries.	
Any watering of rehabilitation areas for establishment purposes is to be undertaken using handheld hoses and portable tanks and not through irrigation systems.	
The use of ground water is to be considered only after an assessment of the recharge capacity and the potential for impact on surface environmental flows of nearby watercourses.	
Construction in and around waterways	
Any development adjacent permanent or significant ephemeral watercourses (e.g. crossing works) will have full erosion and sediment control measures implemented and maintained for the duration of the works as per the ESCP to be developed for the project. The ESCP is not to be a generalised document but will address specific infrastructure requirements for any works in moderate, high and highest priority areas.	This will assist in appropriate measures being incorporating into the contractor's environmental management framework to manage any potential impacts associated with movement of cassowaries.
Construction in watercourses must include consideration of the potential for interference with	

Factor – Southern cassowary	
cassowary movements e.g. within the creek bed, or access to riparian resources. Watercourse crossings should either be at bed level, or at a level that enables cassowaries to traverse the watercourse bed without obstruction, e.g., low enough that they can step onto and over the crossing. Handrails and balustrades on waterway crossings represent a significant obstacle to movement. Bridge/crossing structures should therefore be less than the 1300 to 1400mm height for 'low fall' defined structures in Building Code of Australia and relevant standards to avoid the need for handrails.	
Performance indicator	
No injury or death to the southern cassowary. Compliance with condition of contract A plan of clearing will be prepared by the Construction Contractor. No collision with the southern cassowary. All site personnel have undertaken the environmental induction prior to commencing work. Existing pest species are identified and controlled onsite.	
Monitoring/audits	
Weekly inspections to assess the implementation of the above mitigation measures will be carried out by the contractor during the construction phase, with records kept in a weekly environmental checklist.	
Any non-conformances are to be documented and reported to TDPD and rectified immediately.	

5.2.4 Concept Erosion and Sediment Control Plan

Overview

The CESCP provides preliminary guidance to establish appropriate site erosion and sediment control (ESC) management measures to reduce potential adverse impacts during the construction phase of the Project. A copy of the CESCP is found in Appendix B. Prior to construction commencing the contractor will develop a detailed work ESCP will be developed by the contractor as part of the CEMP and will use the CESCP as a basis. The contractor will review the preliminary guidance provided in the CESCP and provide greater detail based on construction methodology, geotechnical conditions, and timing of works.

The CESCP does not prescribe or locate any permanent or temporary erosion or sediment control measures in detail but provides indicative locations for erosion and sediment control devices as one measure of meeting the contractor's responsibilities.

The CESCP has been developed in general accordance with IECA Best Practice Erosion and Sediment Control Guidelines (2008).

Structure of the CESCP

Table 5.11 below provides a breakdown of the structure of the CESCP and an overview of each section. It also discusses how the CESCP has addressed the information requested by DAWE in Section 5.1.

Table 5.11 Structure of the CESCP

Section	Comments	How this addresses DAWE's RFI
Section 1: Introduction	Includes project background, purpose and scope of the CESCP, and relevant guidelines and legislation.	The CESCP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. • Key International Erosion Control Association (IECA) best practice erosion and sediment control procedures that will be incorporated into the ESCP to mitigate and manage impacts on water quality.
Section 2: Site description	Details all characteristics of the Project including location, proposed works, topography, geology, soils, and hydrology and drainage.	The CESCP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. Key IECA best practice erosion and sediment control procedures that will be incorporated into the ESCP to mitigate and manage impacts on water quality.
Section 3: Erosion hazard assessment	Preliminary erosion hazard assessment in accordance with Section 5.2 of the IECA Manual	The CESCP in Appendix B addresses the following items raised by DAWE in Section 5.1:

Section	Comments	How this addresses DAWE's RFI
	(IECA 2008). A preliminary erosion hazard assessment provides an indication of the erosion risk of the Project as a whole.	• Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. • Key IECA best practice erosion and sediment control procedures that will be incorporated into the ESCP to mitigate and manage impacts on water quality.
Section 4: Construction staging and timing	Details the proposed construction staging of the Project, including the proposed staging of erosion and sediment controls.	The CESCP in Appendix B addresses the following items raised by DAWE in Section 5.1: Information on the timing, frequency and duration of the measures to be implemented.
Section 5: Erosion and sediment control measures	Identifies a range of suitable erosion, sediment and drainage control types, and their respective locations, that could be adopted for each disturbed area.	The CESCP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures. • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure. • Information on the timing, frequency and duration of the measures to be implemented.
Section 6: Monitoring and maintenance	Details the requirements for site inspections and monitoring of ESC, wet weather preparedness and non-conformances and corrective actions.	The CESCP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures. • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure. • Information on the timing, frequency and duration of the measures to be implemented.

Section	Comments	How this addresses DAWE's RFI
Section 7: Conclusion	Details recommendations for erosion and sediment control relevant for the Project.	The CESCP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. • Key International Erosion Control Association (IECA) best practice erosion and sediment control procedures that will be incorporated into the ESCP to mitigate and manage impacts on water quality.

Summary of the measures proposed within the CESCP to avoid, mitigate and manage relevant impacts for MNES

A number of avoidance and mitigation measures have been established for the Project in the CESCP and specific measures for each of the relevant MNES that are likely and may be impacted by the Project are provided below (refer to Table 5.12, Table 5-13 and Table 5-14). The below tables present the environmental factors and MNES potentially impacted by construction and operational activities, the proposed environmental controls in response to the impact and the effectiveness of such controls. Further to this, it nominates performance indicators used for measuring the controls and how the mitigation measures will be monitored. The management objective of the proposed measures is to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.

This section supports the provisions and mitigations detailed in the preliminary management plans developed for the Project, to ensure construction and operational activities are appropriately managed and impacts to significant environmental values associated with the Project area are reduced.

In addition, Table 5.12, Table 5-13 and Table 5-14 below address the additional information requested by DAWE, including:

- Key International Erosion Control Association (IECA) best practice erosion and sediment control procedures that will be incorporated into the ESCP to mitigate and manage impacts on water quality
- With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies
- The use of committed language (e.g. 'will' and 'must') when describing the proposed measures
- An assessment of the expected or predicted effectiveness of the proposed measures
- Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans
- Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures
- Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure
- Information on the timing, frequency and duration of the measures to be implemented.

Table 5.12 Avoidance and mitigation measures for MNES fauna species from the CESCP

Factor – MNES fauna species	
Applicable MNES	
• Threatened migratory bird species • Casuarius casuarius (Southern cassowary) • *Litoria dayi* (Australian lace lid) • *Litoria nannotis* (Waterfall frog) • *Litoria nyakalensis* (Mountain Mistfrog) • *Litoria rheocola* (Common mistfrog) • *Stiphodon semoni* (Opal cling goby)	
Mitigation measures/controls from the CESCP	**Effectiveness**
Erosion sediment controls will be confirmed during Pre-Start Trail Review and this will involve the project manager, trail construction works walking the alignment and confirming the erosion sediment controls to be installed. Following the Pre-Start Trail Review, the contractor will progressively install erosion sediment control devices where soil disturbance is expected to occur and where works occurs near waterway.	The mitigation measures and controls outlined in the CESCP align with the IECA best practice erosion and sediment control procedures. They are supported by Department of Environment and Science and the Wet Tropics Management Authority for works within the WTWMA. This measure will assist in preventing water quality and aquatic habitat degradation through minimising release of sediment and other contaminants to waterways as a result of the works. This will also reduce adverse impacts to the opal cling gobies that may be present with the waterways.
Opal cling goby to be managed during the construction phase in accordance with the following: • No instreams structures within opal cling goby potential habitat • minimising the size of the disturbance area • implementing an Erosion Sediment and Control Plan developed by the contractor. • minimising disturbance by noise, vibration and/or artificial lighting near waterways. All machinery used in construction and operation should be silenced to manufacturers specifications and maintained to that condition. Vegetation clearing to be undertaken in the dry season between May and November to avoid high and extreme rainfall and erosion risk in the months of December to April. If works are not completed by December, all land disturbance activities are to cease until April/May of the following year, if possible. Waterways and adjoining banks are to be left undisturbed for as long as practicable and rehabilitated as soon as construction works have been completed. Works adjacent permanent or significant ephemeral watercourses (e.g. bridge works) will have full erosion and sediment control measures implemented and maintained for the duration of the works as per the ESCP to be developed for the project. This will avoid harm to individual MNES present within water features.	This will assist in preventing water quality and aquatic habitat degradation through minimising release of sediment and other contaminants to waterways as a result of the works. This will also reduce adverse impacts to the opal cling gobies that may be present with the waterways. This mitigation measure will contribute to the localised knowledge of the species that may lead to the determination of the presence of the species, capture variations in habitat condition and threats throughout the construction period, informing performance evaluation of management measures and assisting in mitigating impacts to opal cling goby and their breeding places/habitat. The mitigation measures and controls outlined in the CESCP align with the IECA best practice erosion and sediment control procedures. They are supported by Department of Environment and Science and the Wet Tropics Management Authority for works within the WTWMA.

Factor – MNES fauna species	
Requirement for the contractor to design, install and maintain all erosion and sediment controls in line with their site-specific ESCP. All erosion and sediment control measures are to be inspected in accordance with IECA.	This will assist in minimising indirect impacts on waterways by reducing sediment loss as well as associated water quality impacts. Furthermore, this mitigation measure will reduce impacts on the waterways through inclusion of management measures for vegetation clearing and general environmental management.
Requirements for upstream and downstream water quality conditions to be monitored through visual and in situ recordings during the construction phase. Background water quality monitoring is to be undertaken within waterways likely to carry water during the dry months, and therefore during waterway crossing construction, to compare the site specific water quality to the *EPP Water and Wetland Biodiversity* WQO. If the site specific water quality differs considerably from the *EPP Water and Wetland Biodiversity* WQO, then the background water quality identified should be used as the preferred WQO.	MNES amphibian species and the opal cling goby are susceptible to changes to the water quality parameters in existing waterways. Therefore, the planning of appropriate and regular water quality monitoring will allow for early detection and corrective actions to be set in place if any impact to water quality is identified. This measure is considered to maintain habitat critical to the survival of MNES amphibian species and the opal cling goby.
Limiting construction equipment operating adjacent to waterways and undertaking hand construction where possible. Where a waterway crossing is required over mapped potential opal cling goby habitat, a single span bridge will be installed. Single span bridges for minor waterway crossings will be used to minimise disturbance with waterways and loss of aquatic habitats. For any part of the waterway bed or banks adjacent to the works that has been altered by construction activities, the site is restored and/or rehabilitated so that as a minimum: • Stability and profiles of the bed and banks are re-instated to natural stream profiles and stability within five (5) business days of the completion of the works • Exposed surfaces to be covered as soon as practicable with erosion control blankets, mats or mesh made from natural fibres • The waterway bed is retained with natural substrate or reconstructed with substrate comparable to the natural substrate size and consistency • Site conditions allow the rapid re-establishment of native vegetation and cover or native species are replanted to re-establish the natural plant community	This is considered effective in reducing adverse impacted to waterways and adjoining riparian areas that could support MNES species. It has also adopted standards outlined in the Fisheries Queensland, Department of Agriculture and Fisheries -Accepted development requirements for operational work that is constructing or raising waterway barrier works 2018.
Performance indicator	
No injury or death to native fauna species. Compliance with condition of contract. A plan of clearing will be prepared by the Construction Contractor. Implementation of the Contractor's Erosion and Sediment Control Plan. No difference in water quality upstream and downstream of all watercourses. All site personnel have undertaken the environmental induction prior to commencing work.	

Factor – MNES fauna species
Monitoring/audits
Weekly inspections to assess the implementation of the above mitigation measures, including all erosion and sediment controls will be carried out by the contractor during the construction phase, with records kept in a weekly environmental checklist.
Any non-conformances are to be documented and reported to TDPD and rectified immediately.

Table 5.13 Avoidance and mitigation measures for MNES flora species from the CESCP

Factor – MNES flora species	
Applicable MNES	
• *Canarium acutifolium* • *Dendrobium mirbelianum* (Dark-stemmed antler orchid) • *Diplazium cordifolium* • *Diplazium pallidum* • *Myrmecodia beccarii* (Ant plant) • *Phaius pictus* • *Phalaenopsis amabilis subsp. rosenstromii* (Native moth orchid) • *Polyscias bellendenkerensis* • *Toechima pterocarpum* (Orange tamarind) • *Vappodes lithocola* (Dwarf butterfly orchid) (Also known as *Dendrobium lithocola*, and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*) • *Vappodes phalaenopsis* (Cooktown orchid) (Also known as *Dendrobium phalaenopsis* and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*) • *Zeuxine polygonoides* (Velvet jewel orchid) (also known as *Rhomboda polygonoides*)	
Mitigation measures/controls	**Effectiveness**
Vegetation clearing to be undertaken during periods of none or minimal forecast rainfall. The majority of land disturbance works are to be undertaken in the dry season between May and November to avoid high and extreme rainfall and erosion risk in the months of December to April. If works are not completed by December, all land disturbance activities are to cease until April/May of the following year, if possible. Exposed surfaces to be covered as soon as practicable with erosion control blankets, mats or mesh made from natural fibres.	This will assist in minimising the movement of sediment that has the potential to indirectly impact MNES flora species. This measure is considered effective in reducing unnecessary damage by construction equipment and vehicles to the roots of the MNES flora species. Furthermore, this measure is considered effective in reducing sediment entering waterways within the project area which could reduce the water quality of the waterways and affect the opal cling goby and amphibian species.
Requirement for the contractor to design, install and maintain all erosion and sediment controls in line with their site-specific ESCP. All erosion and sediment control measures are to be inspected in accordance with IECA.	This will assist in minimising indirect impacts on flora species by reducing sediment loss. Furthermore, this mitigation measure will reduce impacts on flora species through inclusion of management measures for vegetation clearing and general environmental management. The mitigation measures and controls outlined in the CESCP align with the IECA best practice erosion and sediment control procedures. They are supported by Department of Environment and Science and the Wet Tropics

Factor – MNES flora species	
	Management Authority for works within the WTWMA.
Performance indicator	
A plan of clearing will be prepared by the Construction Contractor. Implementation of the Contractor's Erosion and Sediment Control Plan. No soil erosion observed during inspections.	
Monitoring/audits	
Weekly inspections to assess the implementation of the above mitigation measures, including all erosion and sediment controls will be carried out by the contractor during the construction phase, with records kept in a weekly environmental checklist.	
Any non-conformances are to be documented and reported to TDPD and rectified immediately.	

Table 5.14 Avoidance and mitigation measures for WTWHA from the CESCP

Factor – WTWHA	
Applicable MNES	
WTWHA	
Mitigation measures/controls	**Effectiveness**
Clearing is to be minimised within the WTWHA and limited to designated and demarcated areas. Exposed surfaces to be covered as soon as practicable with erosion control blankets, mats or mesh made from natural fibres. Vegetation clearing to be undertaken during periods of none or minimal forecast rainfall. The majority of land disturbance works are to be undertaken in the dry season between May and November to avoid high and extreme rainfall and erosion risk in the months of December to April. If works are not completed by December, all land disturbance activities are to cease until April/May of the following year, if possible.	This is considered an effective measure to avoid impacts to environmental features and MNES within the WTWHA and is supported by WTMA and DES.
Prior to conducting construction works within the WTWHA the contractor conducting the works has been informed of the requirements of the Wet Tropics Permit No: WTMA20001a The works supervisor must also be given direction by the relevant QPWS Ranger or a Wet Tropics Management Authority officer as to the nature and extent of the clearing or earthworks to be undertaken.	This will assist in educating the contractor on their environmental obligations where MNES are found onsite and cultural heritage obligations. The mitigation measures and controls are supported by Department of Environment and Science and the Wet Tropics Management Authority for works within the WTWMA.
A site-specific Erosion Sediment and Control Plan will be developed by the construction contractor prior to any works commencing onsite.	This measure will mitigate any potential soil erosion or sediment impacts to water quality and bed and banks (substrate and vegetation present) of adjoining aquatic habitats that may provide habitat and resources to MNES, as well as flora species. This mitigation measure is supported by Department of Environment and Science and the Wet Tropics Management Authority for works within the WTWMA.
Consider weather conditions and prevailing winds when conducting construction activities that may result in the excessive movement of sediment. Reduce clearing during periods of high wind.	This measure is considered effective in reducing dust and sediment movement within the project area. This measure is also considered effective in reducing dust within the project area which can cover native plants used by MNES fauna species and potentially

Factor – WTWHA	
Wetting the road/work area during dry periods to reduce dust being generated. Construction vehicles to be cleaned of soils before driving on sealed roads to reduce dust being generated.	reduces the plant's ability to photosynthesize. Furthermore, this measure is considered effective in reducing sediment entering waterways within the project area which could reduce the water quality of the waterways and affect the opal cling goby and amphibian species.
Requirements for upstream and downstream water quality conditions to be monitored through visual and in situ recordings during the construction phase. Background water quality monitoring will be undertaken within waterways likely to carry water during the dry months, and therefore during waterway crossing construction, to compare the site specific water quality to the *EPP Water and Wetland Biodiversity* WQO. If the site specific water quality differs considerably from the *EPP Water and Wetland Biodiversity* WQO, then the background water quality identified should be used as the preferred WQO.	MNES amphibian species and the opal cling goby are susceptible to changes to the water quality parameters in existing waterways. Therefore, the planning of appropriate and regular water quality monitoring will be carried out by the contractor during the construction phase to allow for early detection and corrective actions to be set in place if any impact to water quality is identified. This measure is considered to maintain habitat critical to the survival of MNES amphibian species and the opal cling goby.
Inspection of the trail and nodes, as per existing QPWS procedures during operation, including: • Walking track maintenance – general procedures Procedural Guide (QPW/2015/1395 v1.01) (DES, 2015) • Pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013) Erosion and sediment controls will also be inspected regularly to confirm their integrity and assess if further controls are required.	This measure is considered to effective to in reducing impacts on MNES for the following reasons: • Inspection of the condition of the trail and erosion and sediment devices to make sure that they are not result in adverse impacts to adjoining areas and the waterways. • Checking the presence of weed and pest specicies and take corrective actions to avoid adverse impacts on MNES. • Checking that no damage is made to areas outside of the trail footprint and camp area including illegal fires and new tracks. • Checking that there is no evidence of damage to MNES flora species and/or injury to MNES fauna species. The mitigation measures are supported by Department of Environment and Science and the Wet Tropics Management Authority for works within the WTWMA.
Performance indicator	
A plan of clearing will be prepared by the Construction Contractor. Implementation of the Contractor's Erosion and Sediment Control Plan. No difference in water quality upstream and downstream of all watercourses. No soil erosion or sediment movement observed during inspections. Compliance with condition of contract.	
Monitoring	
Weekly inspections to assess the implementation of the above mitigation measures, including erosion and sediment controls will be carried out by the contractor during the construction phase, with records kept in a weekly environmental checklist.	
At the start of each working week, check the weather forecast and note any potential high-risk days (i.e. high-risk days are those with high temperatures and high winds. They generally only occur during the hot summer months or during periods of drought).	
Any non-conformances are to be documented and reported to TDPD and rectified immediately	

Monitoring and maintenance provisions in the CESCP

General

In accordance with Section 7.2 of the IECA Manual, the Contractor shall make allowance for the preparation of a formal monitoring and maintenance program prior to site establishment. The monitoring and maintenance program shall make allowance for required site inspections (detailed in Section 6.1.3), monitoring of erosion and sediment control devices (including water quality monitoring) and reporting of results, inspections and non-compliance.

Responsible person

In accordance with Chapter 7 of the IECA Manual, the Contractor shall generally be responsible for all items prescribed in this Report. The Contractor shall identify appropriate persons to ensure compliance with erosion and sediment control requirements and objectives for the project duration.

The Contractor shall also ensure the following general management practices are incorporated:

- Establish an erosion and sediment control training program for site staff
- Appropriately control subcontractors and material suppliers
- Suitably control site traffic to minimise dust generation and undesirable soil compaction outside designated accesses
- Maintain adequate supplies of emergency erosion and sediment control materials and ensure that these items are available at all times, particularly prior to imminent rainfall
- Establish an appropriate site inspection routine as well as the staff responsible for these inspections.

Inspections and monitoring

Site inspections and monitoring are to be undertaken in accordance with the requirements outlined within the CESCP. ESCPs are living documents that can and should be modified as site conditions change, or if the adopted measures fail, to achieve the required treatment standard. When a site inspection detects a notable failure in the adopted ESC measures, the source of the failure must be investigated, and appropriate amendments made to the site and the plans.

The IECA Manual requires that all erosion and sediment control measures be inspected as per Table 5.15.

Table 5.15 Erosion and sediment control site inspection requirements

Frequency	Requirements
Daily (during rainfall)	• All drainage and instream, erosion and sediment control measures (when work is occurring on site) • Occurrences of excessive sediment deposition (whether on or off site) • Water quality monitoring where a visible change in water quality is observed downstream of a waterway crossing.
Weekly	• All drainage and instream, erosion and sediment control measures (when work is not occurring on site) • Occurrences of excessive sediment deposition (whether on or off site)

Frequency	Requirements
	• Occurrences of construction materials, litter or sediment placed, deposited, washed or blown from the site, including deposition by vehicular movements • Litter and waste receptors • Oil, fuel and chemical storage facilities.
Prior to anticipated runoff-producing rainfall (within 24 hours of occurring) Prior to rainfall event of sufficient intensity and duration to cause runoff (within 18 hours of occurring) Following run-off producing rainfall (within 18 hours of occurring)	• All drainage, erosion and sediment control measures • All temporary flow diversion and drainage works. • All drainage, erosion and sediment controls • All temporary flow diversion and drainage works • All instream erosion and sediment control measures • All drainage, erosion and sediment control measures • All instream erosion and sediment control measures • Occurrences of excessive sediment deposition (whether on or off site) • Occurrences of construction materials, litter or sediment placed, deposited, washed or blown from the site, including deposition by vehicular movements • Water quality monitoring where a visible change in water quality is observed downstream of a waterway crossing.

Water quality monitoring

Visual inspections of any active waterway is to be undertaken both upstream and downstream of the waterway crossing during construction to identify any changes in water quality through the construction area. If sediment-laden runoff is observed downstream of the waterway crossing, water quality monitoring will be required to ensure no contaminants from the site are discharged off site. Water quality performance requirements for the project will be in accordance with the water quality objectives (WQO) outlined in the *Environmental Protection (Water and Wetland Biodiversity) 2019: Great Barrier Reef River Basins – Wet Tropics Sub-Basin Environmental Values and Water Quality Objectives Basin No. 109-110 (DES 2019)* or background site specific water quality determined for the project, if background water quality varies considerably from the EP (Water and Wetland Biodiversity) WQO.

If the water quality objectives are not met, additional water quality monitoring may be required to assess the effectiveness of remediation erosion and sediment control measures.

Maintenance

Any erosion and sediment control failures or excess sediment build up identified during the site inspections is to be rectified as soon as practicable following identification.

Any sediment removed from devices will be disposed of in a lawful manner that does not cause ongoing soil erosion or environmental harm.

Reporting

Site check sheets will be filled out weekly, and monthly reports will be completed by the Contractor. Monthly reports shall include water quality monitoring reports (if required), details of the performance of the site's monitoring and maintenance activities, non-compliances and corrective actions implemented.

As the project has been identified as 'high risk', the Contractor may be required to engage an independent, appropriately qualified person (i.e. CPESC) to undertake erosion and sediment control audits to confirm compliance with best practice. This is to be confirmed as part of the Contractor's ESCP when the erosion risk hazard is updated based on soil data, the confirmed trail alignment and refined construction staging.

A register of all ESC inspections and audits, if undertaken, will be maintained for the duration of the project site works, and will be available for review during site inspections undertaken by a regulatory authority. Any environmentally relevant incidents which occur on the site should be recorded, and also be available for review during site inspections undertaken by regulatory authorities.

If erosion and sediment controls are found to be deficient or failed in service, due to unforeseen circumstances, corrective action is to be undertaken immediately which may include modifications to the approved ESCP.

Wet weather preparedness

In accordance with the IECA Manual, the project area shall be appropriately prepared for both likely and unlikely wet weather conditions. The Contractor will prepare a wet weather preparedness plan to establish appropriate erosion and sediment control measures and actions that may be implemented prior to a predicted wet weather event.

The following erosion and sediment control measures will be considered where appropriate for inclusion within the wet weather preparedness plan:

- Inspect the condition of all erosion and sediment control devices on site to ensure that these measures are operationally effective prior to the rainfall event
- Establish temporary flow diversion up-slope of open, newly formed batters
- Stabilise all drainage pathways and exposed surfaces still subject to construction with temporary erosion and sediment control techniques (i.e. erosion control blankets or hydraulic blankets)
- Secure erosion control blankets with additional anchorage such as rocks or timber stakes

Non-conformances and corrective actions

Where an environmental non-conformance occurs regarding erosion and sediment control (such as loss of sediment from the site or accidental discharge of sediment into adjacent waterways), the Contractor shall immediately inform DTIS of the incident. The Contractor must also prepare a monthly report detailing any incidents of environmental nuisance and non-conformance for review by DES, if requested in the ESCP.

The Contractor has a responsibility to report to DTIS all major environmental incidents that risk causing environmental harm under the *Environment Protection Act 1994.*

Where an environmental incident occurs, the following mitigation strategies shall be adopted as minimum:

- All non-conformances and incidents are to be corrected as soon as possible and strategies implemented to reduce the likelihood of the incident reoccurring

- Containment of the sediment laden runoff, where possible
- The environmental representative is to review the erosion and sediment control measures in place for effectiveness and check maintenance records
- The appropriate persons is to review the erosion and sediment control measures in place for effectiveness and check maintenance records
- An incident / accident report is to be completed for all incidents and non-conformances.

Where incidents have occurred, the Contractor shall ensure that all reasonable and practical control measures are implemented for future operations. This may include reviewing water quality monitoring data, where exceedances have been found, and implementing additional and/or alternative controls to achieve the required environmental outcomes.

5.2.5 Preliminary Weeds, Pest, and Diseases Management Plan

Overview

The WPDMP has been prepared to satisfy the obligations and complements the overarching Wangetti South Section Environmental Management Plan.

The objectives of the WPDMP is to:

- Protect the biodiversity of the surrounding landscape of the adverse impacts from weeds
- Reduce weed infestations by integrating control methods and cost-effective management
- Manage weeds in disturbed areas and to protect rehabilitated areas
- Manage the weed species that are currently present on the site as well as off-site work areas
- Prevent introduction of new weed infestations to the project area and adjoining areas
- Increase on-site awareness about the major weed species and manage pest species though strategic management, where possible.
- Avoid and effectively manage impacts associated with weeds, pests and diseases.

The WPDMP provides an overview of the strategy, methods and controls implemented as part of the Wangetti South Section to manage the issue of weeds, pests and diseases. Specifically, this WPDMP identifies weeds, pests and potential diseases within the Wangetti South Section and describes management strategy, to identify, avoid and, prevent/minimise and control the introduction of and spread of weeds, pests and diseases within the Wangetti South Section and to neighbouring areas.

Structure of the WPDMP

Table 5.16 below provides a breakdown of the structure of the WPDMP and an overview of each section. It also discusses how the WPDMP has addressed the information requested by DAWE in Section 5.1.

Table 5.16 Structure of the WPDMP

Section	Comments	How this addresses DAWE's RFI
Section 1: Introduction	Details the project background, purpose and objective of the WPDMP and site specific background documents.	The WPDMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the

Section	Comments	How this addresses DAWE's RFI
		proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.
Section 2: Roles and responsibilities	Outlines parties associated with the Wangetti South Section and the responsibilities regarding weeds, pests and disease management.	The WPDMP in Appendix B addresses the following items raised by DAWE in Section 5.1: Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure.
Section 3: Legal and other requirements	Details the applicable legislation, regulations, guidelines and strategies enacted by the Commonwealth, State of Queensland and local governments for weed, pest and disease management in the Wangetti South Section.	The WPDMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans
Section 4: Existing environment	Identifies the weeds, pests, diseases (pathogens) and biosecurity zones likely to occur within the Wangetti South Section.	No comment.

Section	Comments	How this addresses DAWE's RFI
Section 5: Impact assessment and mitigation	A summary of potential impacts associated with biosecurity matters that could be generated by activities undertaken during the construction and operational phases of the project and could impact on the ecological values of the receiving environment. The mitigation measures to be implemented for the Project.	The WPDMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.
Section 6: Reporting, auditing and review	Reporting, auditing and review requirements relating to weed, pests and diseases.	The WPDMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.

Summary of the measures proposed within the WPDMP to avoid, mitigate and manage relevant impacts

A number of avoidance and mitigation measures have been established for the project and specific measures for each of the relevant MNES that are likely and may be impacted by the project are provided below (refer to Table 5.17, Table 5.18 and Table 5.19). Table 5.17, Table 5.18 and Table 5.19 present the environmental factors and MNES potentially impacted by construction and operational activities, the proposed environmental controls in response to the impact and the effectiveness of such controls. Further to this, it nominates performance indicators used for measuring the controls and how the mitigation measures will be monitored. The management objective of the proposed measures is to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.

This section supports the provisions and mitigations detailed in the preliminary management plans developed for the Project, to ensure construction and operational activities are appropriately managed and impacts to significant environmental values associated with the Project area are reduced.

In addition, the Tables below address the additional information requested by DAWE, including:

- Details about how the proposed measures are consistent with Wet Tropics World Heritage Management Plan 2020 and Wet Tropics Strategic Plan 2020 – 2030
- With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies
- The use of committed language (e.g. 'will' and 'must') when describing the proposed measures
- An assessment of the expected or predicted effectiveness of the proposed measures
- Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans
- Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures
- Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure.

Table 5.17 Avoidance and mitigation measures for MNES fauna species from the WPDMP

Factor – MNES fauna species	
Applicable MNES	
• Threatened migratory bird species • Casuarius casuarius (Southern cassowary) • *Litoria dayi* (Australian lace lid) • *Litoria nannotis* (Waterfall frog) • *Litoria nyakalensis* (Mountain Mistfrog) • *Litoria rheocola* (Common mistfrog) • *Stiphodon semoni* (Opal cling goby)	
Mitigation measures/controls	**Effectiveness**
Records of pest animals observed on site to be recorded and addressed in accordance with the provision in the weed, pest and disease management plan.	This mitigation measure will assist in identifying and controlling pest species within the project area and determining appropriate treatments. This aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).

Factor – MNES fauna species	
	It is noted in the Recovery plan for the southern cassowary *Casuarius casuarius johnsonii* that the two key pest species that affect the cassowary are dogs and pigs and attacks on cassowaries are known to cause injury and death and their presence potentially affects cassowary feeding, movements and behaviour. By recording pest animals within Wangetti South Section this information can then be shared with the State Government departments and WTMA to assist in the implementation of existing eradication programs dealing with pest species.
Operational and maintenance traffic to use nominated roads and nominated service tracks when accessing the exiting the project area. Designated vehicle routes within the project area to have a firm and even surface, be wide and high enough for the largest vehicle using them and be well maintained and free from obstructions.	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans. This aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
All machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds, pests and pathogens. Operational staff and maintenance staff disinfecting clothing, footwear, equipment and other personal items. Disinfecting vehicles during the operational phase of the project and maintained throughout.	This will assist in minimising impacts to MNES fauna species and its habitat through the management of pest species. This aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
Performance indicator	
Compliance with condition of contract	
Existing pest species are identified and controlled onsite.	
Monitoring/audits	
Weekly inspections to assess the implementation of the above mitigation measures with records kept in a weekly environmental checklist.	
Any non-conformances are to be documented and reported to TDPD and rectified immediately	

Table 5.18 Avoidance and mitigation measures for MNES flora species from the WPDMP

Factor – MNES flora species
Applicable MNES
• *Canarium acutifolium* • *Dendrobium mirbelianum* (Dark-stemmed antler orchid) • *Diplazium cordifolium* • *Diplazium pallidum* • *Myrmecodia beccarii* (Ant plant) • *Phaius pictus* • *Phalaenopsis amabilis subsp. rosenstromii* (Native moth orchid) • *Polyscias bellendenkerensis* • *Toechima pterocarpum* (Orange tamarind)

Factor – MNES flora species	
• *Vappodes lithocola* (Dwarf butterfly orchid) (Also known as *Dendrobium lithocola*, and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*) • *Vappodes phalaenopsis* (Cooktown orchid) (Also known as *Dendrobium phalaenopsis* and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*) • *Zeuxine polygonoides* (Velvet jewel orchid) (also known as *Rhomboda polygonoides*)	
Mitigation measures/controls	**Effectiveness**
Site induction and toolbox talks with the construction crew will occur prior construction to educate them about flora species in the project area.	This will assist in training all onsite personnel to inform them of their environmental obligations where MNES are found onsite. This aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
No unapproved clearing to occur beyond the required limits for construction	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem.
Identified sensitive areas are demarcated and managed appropriately with minimal impacts	This measure will avoid unnecessary impacts to known habitats to be retained adjacent to the Project. Recording and reporting of any incidences of noncompliance allows for identification of potential adaptive management strategies.
All machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds and pathogens. Vehicles, plant and equipment to be used for the project would be required to be clean with Weed and Seed Hygiene Declaration certificates. Vehicles, plant and equipment to be inspected prior to being used to ensure they are clean. Disinfecting vehicles and machinery. This will be undertaken during the construction phase of the project and maintained throughout.	This is considered to be an effective weed management control and is supported by DES and WTMA. This aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
Undertake a pre-clearing weed survey treatment and management and report areas of existing weed infestation.	Identification of weed species and locations of infestations will facilitate appropriate management strategies.
Performance indicator	
Compliance with condition of contract	
Existing weeds and pathogens are identified and controlled onsite.	
Monitoring/audits	
Weekly inspections to assess the implementation of the above mitigation measures with records kept in a weekly environmental checklist.	
Any non-conformances are to be documented and reported to TDPD and rectified immediately	

Table 5.19 Avoidance and mitigation measures for WTWHA from the WPDMP

Factor – WTWHA
Applicable MNES
WTWHA

Factor – WTWHA	
Mitigation measures/controls	**Effectiveness**
All site personnel shall attend environmental training as part of the site induction process prior to entering the work site. As part of this training, a cultural heritage induction should be delivered to all site personnel before entering the site, with the notification procedure in the event of an unexpected find to be clearly indicated during the induction	This will assist in training all onsite personnel in regard to their environmental obligations where MNES are found onsite and cultural heritage obligations. This aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
Within the WTWHA minimise clearing to designed and demarcated areas; weed and pest management to avoid disturbance and degradation of flora and fauna environmental values.	This is considered an effective measure to avoid impacts to environmental features and MNES within the WTWHA and is supported by WTMA and DES.
Prior to conducting construction works within the WTWHA the contractor conducting the works has been informed of the requirements of the Wet Tropics Permit No: WTMA20001a The works supervisor has obtained a briefing describing the natural values of the subject site from the relevant QPWS Ranger or a Wet Tropics Management Authority officer. The works supervisor must also be given direction by the relevant QPWS Ranger or a Wet Tropics Management Authority officer as to the nature and extent of the clearing or earthworks to be undertaken.	This will assist in educating the contractor on their environmental obligations where MNES are found onsite and cultural heritage obligations.
Equipment and shoe wash down areas will be in place prior entering the site to avoid the spread of weeds and pathogens. Construction crews required to disinfect clothing, footwear, equipment and other personal items.	This is considered to be an effective weed management control and is supported by DES and WTMA. This aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
All machinery and vehicle hygiene protocols to be followed at all times to prevent the introduction of weeds and pathogens. Vehicles, plant and equipment to be used for the project would be required to be clean with Weed and Seed Hygiene Declaration certificates. Vehicles, plant and equipment to be inspected prior to being used to ensure they are clean. Disinfecting vehicles and machinery. This will be undertaken during the construction phase of the project and maintained throughout.	This is considered to be an effective weed management control and is supported by DES and WTMA.
Trail construction will minimise disruption of forest canopy wherever possible to avoid additional sunlight that can promote weed growth on forest floor.	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem.
Inspection of the trail and nodes, as per existing QPWS procedures during operation, including: • Walking track maintenance – general procedures Procedural Guide (QPW/2015/1395 v1.01) (DES, 2015a) • Pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013)	This measure is considered to effective to in reducing impacts on MNES for the following reasons: • Inspection of the condition of the trail and erosion and sediment devices to make sure that they are not result in adverse impacts to adjoining areas and the waterways. • Checking the presence of weed and pest specicies and take corrective actions to avoid adverse impacts on MNES. • Checking that no damage is made to areas outside of the trail footprint and

Factor – WTWHA	
	camp area including illegal fires and new tracks. • Checking that there is no evidence of damage to MNES flora species and/or injury to MNES fauna species.
Performance indicator	
All site personnel have undertaken the environmental induction prior to commencing work.	
Compliance with condition of contract	
Existing weeds and pathogens are identified and controlled onsite.	
Monitoring	
Weekly inspections to assess the implementation of the above mitigation measures will be carried out by the contractor during the construction phase with records kept in a weekly environmental checklist.	
At the start of each working week (or some other agreed schedule) provide reports to TDPD depending on work locations) stating the trails being worked on, their location and the number of personnel working on each. Report to provide contact details for key personnel in construction crew.	
At the start of each working week, check the weather forecast and note any potential high-risk days (i.e. high-risk days are those with high temperatures and high winds. They generally only occur during the hot summer months or during periods of drought)	
On the day before any anticipated high-risk days, check to see if a Total Fire Ban (TFB) has been called for the area. Local fire bans will be checked to see if they are in place, with any project works that pose a high fire risk not performed during this time. If a TFB day has been called, contact TDPD immediately to discuss whether it is safe/appropriate to work.	
During the fire season, the following weather monitoring protocols apply: • At arrival to site in the morning, check weather observations and record in Fire Weather Log Book • Before returning to work after lunch, check weather observations and record in Fire Weather Log Book	
Any non-conformances are to be documented and reported to TDPD and rectified immediately	

5.2.6 Preliminary Traffic Management Plan

Overview

The TMP provides preliminary guidance to help establish appropriate traffic control and traffic management procedures manage potential hazards associated with the traffic environment during the Project and to reduce potential adverse impacts to people and wildlife during the construction and operational phases of the project.

It is expected that prior to any construction activity and operational activity for the Project, a detailed work specific TMP will be developed by the contractor as part of the EMP. The contractor should review the preliminary guidance provided in this TMP and provide greater detail based on construction methodology, operational activities, and timing of works. The TMP will also need to be in general accordance with the MUTCD, Austroads Guide to Traffic Management and Transport and Main Roads Specifications MRTS02 Provision for Traffic.

Structure of the TMP

Table 5.20 below provides a breakdown of the structure of the WPDMP and an overview of each section. It also discusses how the TMP has addressed the information requested by DAWE in Section 5.1.

Table 5.20 Structure of the TMP

Section	Comments	How this addresses DAWE's RFI
Section 1: Introduction	Details project background, and purpose and objectives of the TMP.	The TMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details of the procedure for dealing with strikes, injury and deaths of native fauna and the loss of flora species • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.

Section	Comments	How this addresses DAWE's RFI
Section 2: Project overview	Provides an overview of the Project including location, impacted properties, proposed works during construction and operational phases, and impacts to existing traffic and road environments.	No comment.
Section 3: Traffic hazard risk assessment	Identifies traffic related risks that have been identified with the Project and could take place during the construction and operational phases of the Project.	No comment.
Section 4: General specifications	Discusses the mitigation measures that have been developed to minimise the impacts to existing road network, pedestrians and MNES within the Project area and surrounding area associated by the movement of vehicles within the Wangetti South Section.	The TMP in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details of the procedure for dealing with strikes, injury and deaths of native fauna and the loss of flora species

Section	Comments	How this addresses DAWE's RFI
		• Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.

Summary of the measures proposed within the TMP to avoid, mitigate and manage relevant impacts

A number of avoidance and mitigation measures have been established for the Project and specific measures for each of the relevant MNES that are likely and may be impacted by the Project are provided below (refer to Table 5-21, Table 5-22 and Table 5-23). The below tables present the environmental factors and MNES potentially impacted by construction and operational activities, the proposed environmental controls in response to the impact and the effectiveness of such controls. Further to this, it nominates performance indicators used for measuring the controls and how the mitigation measures will be monitored. The management objective of the proposed measures is to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.

This section supports the provisions and mitigations detailed in the preliminary management plans developed for the Project, to ensure construction and operational activities are appropriately managed and impacts to significant environmental values associated with the Project area are reduced.

In addition, Table 5-21, Table 5-22 and Table 5-23 below address the additional information requested by DAWE, including:

- Details about how the proposed measures are consistent with Wet Tropics World Heritage Management Plan 2020 and Wet Tropics Strategic Plan 2020 – 2030
- Details of the procedure for dealing with strikes, injury and deaths of native fauna and the loss of flora species
- Pre-clearance survey methodology, and its predicted effectiveness, for a commitment to avoid listed threatened flora species (including those identified in Section 2 above) and Southern Cassowary nests during the construction stage
- With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies
- The use of committed language (e.g. 'will' and 'must') when describing the proposed measures
- An assessment of the expected or predicted effectiveness of the proposed measures
- Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans

- Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures
- Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure
- Information on the timing, frequency and duration of the measures to be implemented.

Table 5.21 Avoidance and mitigation measures for MNES fauna species from the TMP

Factor – MNES fauna species	
Applicable MNES	
Threatened migratory bird species *Casuarius casuarius* (Southern cassowary) *Litoria dayi* (Australian lace lid) *Litoria nannotis* (Waterfall frog) *Litoria nyakalensis* (Mountain Mistfrog) *Litoria rheocola* (Common mistfrog) *Stiphodon semoni (*Opal cling goby*)*	
Mitigation measure	**Effectiveness**
Contractor and operator to implement JSEA safe work method statement. Contractor and operator to implement access management plan for access to site of works. Construction crew and maintenance staff operating vehicles and mobile plant to have the appropriate certification and completed the required training. The contractor and operator are required to prepare the following documents by a suitably qualified person: • Site access/vehicle movement plan to show where all site access points within the project area. • Prepare a TMP and Traffic Guidance Scheme (TGS) by a suitable qualified person. The TGS shows all traffic control devices and their layouts on a plan and shall be consistent with the approved TMP. Where any change to existing traffic arrangements is proposed or where construction conflicts with normal traffic movements, the Contractor shall prepare a TGS which clearly details the revised traffic arrangements at all locations affected by the change or conflict. A separate TGS is required for each stage of the works where changes are made to the traffic control devices. Traffic shall be controlled at all times, during construction, in accordance with the provisions of the MUTCD Part 3 and the TMP.	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans.
Signage erected along tracks and roads where the trail connects to inform construction crew and operational staff of access points to the project area	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans. This measure is also consistent with the mitigation measures in the Recovery plan for the southern cassowary *Casuarius casuarius johnsonii* in that it educates construction crew about native wildlife which assists in reducing human—cassowary interactions.
Signage around awareness of fauna species and sensitive areas.	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans.

	This measure is also consistent with the mitigation measures in the Recovery plan for the southern cassowary *Casuarius casuarius johnsonii* in that it educates construction crew about native wildlife which assists in reducing human—cassowary interactions.
Site inductions at the start of the construction phase with construction crews and then with maintenance staff regarding: undertaking works and the movement of vehicles within road reserves, existing access tracks. Wildlife present within the project area that could pose a hazard to vehicles and mobile plant Incident response procedures will be developed to detail actions to be taken in the event of wildlife injury or mortality	This will assist in training all onsite personnel in regard to their environmental obligations where MNES fauna species are found onsite. This measure is also consistent with the mitigation measures in the Recovery plan for the southern cassowary *Casuarius casuarius johnsonii* in that it educates construction crew about native wildlife which assists in reducing human—cassowary interactions.
Appropriate scheduling of deliveries of construction material and during the operational phase to reduce frequency and a nominated set out area to be agreed upon with DES and the construction contractor away from MNES and areas of high ecological significance. Visitors including visiting drivers to be made aware of the work area layout, given a copy of the site access plan prior to visiting the site. Provide drivers with safe access to amenities away from loading areas or other vehicular traffic.	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans.
Construction traffic and operational traffic to use nominated roads and nominated service tracks when accessing and exiting the project area. Designated vehicle routes within the project area to have a firm and even surface, be wide and high enough for the largest vehicle using them and be well maintained and free from obstructions. Service tracks to be clearly sign-posted to indicate speed limits and traffic calming measures (if required) Reducing speed is very important where administrative control measures are the only reasonably practicable approach. Speed limits to be implemented and enforced. Speed limits for to be adopted for the construction phase and operational phase to be developed in consultation with the construction contractor, TDPD, DES, WTMA and DTMR.	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans. These measures will avoid hostile interactions with the southern cassowary and humans within the project area. This will assist in reducing injuries to the southern cassowaries.
Traffic control devices on service tracks to be installed and operated with consideration of the (QPWS Technical Manual QPWS road works signage) this includes the following: • Arriving at the works site: • Pre-work preparation and work site assessment - On arrival at the work site a series of actions is required before any work can commence including undertaking a risk assessment of the proposed work site to identify all potential hazards to workers required to work on the work site. • Select the most appropriate traffic guidance scheme - The most appropriate standardised Traffic Guidance Scheme shall be selected according to road and traffic conditions at the site and the work requirements of the officer.	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans. These measures will avoid hostile interactions with the southern cassowary and humans within the project area. This will assist in reducing injuries to the southern cassowaries.

• Installation of traffic control devices Traffic control devices approved for use by the QPWS technical manual for QPWS road works signage should only be installed according to the approved standardised Traffic Guidance Schemes provided in this document. Any work site requiring a traffic guidance scheme beyond the scope of this document shall require the engagement of an appropriately qualified Traffic Controller or Police Officer. Operation of the work site: The person in control of the work site on or near roads shall: ensure traffic control devices remain in good condition while deployed; ensure traffic control devices remain in place according to the Traffic Guidance Scheme in use; make a record of the time of any inspection or reinspection of the traffic control devices and the Traffic Guidance Scheme being used. Photographs be taken of any changes to the work site; and make a record of any incidents that occur on or in relation to the work site that might have ongoing consequences. Maintenance of traffic guidance scheme – Personnel should ensure that the traffic control devices remain in place according to the standardised Traffic Guidance Scheme being used. Maintenance of devices - Ineffective signs and devices shall be replaced by similar items in good condition, if they cannot be made effective by cleaning or repair. Signs and devices that are no longer in good condition should be returned and replaced. Non-repairable signs should be destroyed so that they are not inadvertently reused.	
Regular inspection of service tracks during the construction phase and permanent access tracks during the operational phase to make sure that they are in good condition.	This will assist in minimising indirect impacts on waterways by reducing sediment loss as well as associated water quality impacts which has implications for the opal cling goby. Furthermore, this mitigation measure will reduce impacts on the waterways through inclusion of management measures for vegetation clearing and general environmental management.
The contractor and the operator will be required to protect pedestrians and wildlife and to make sure people, wildlife and vehicles cannot interact. Spotters to be nominated on the ground to guide plant and ensure no collisions with other workers in the project area.	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans. These measures will avoid hostile interactions with the southern cassowary and humans within the project area. This will assist in reducing injuries to the southern cassowaries.
The contractor and operator will be required to make sure clear road markings like reflective paint and signs should be used to alert pedestrians and vehicle operators to traffic hazards in the work area where working within existing road reserves. Signs should be provided to indicate exclusion and safety zones, parking areas, speed limits, movement of wildlife, vehicle crossings and hazards like blind corners and steep gradients. Signs and road markings should be regularly checked and maintained so they can be easily seen.	This is considered to be effective in avoiding fauna injury and mortality due to individuals remaining within the clearing area.
If reasonably practicable the construction and operational personnel should eliminate the need for reversing by using drive-through loading and unloading systems, multi-directional mobile plant. Where this is not possible consider: using devices like reversing sensors, reversing cameras, mirrors, rotating lights or audible reversing	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans. These measures will avoid hostile interactions with the southern cassowary and humans within the project area. This will assist in reducing injuries to the southern cassowaries.

alarms using a person to direct the reversing vehicle if they cannot see clearly behind—this person should be in visible contact with the driver at all times and wear high-visibility clothing providing designated clearly marked, signposted and well-lit reversing areas, and excluding non-essential workers from the area.	
Construction and operational activities will only occur during daytime hours.	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans. These measures will avoid hostile interactions with the southern cassowary and humans within the project area. This will assist in reducing injuries to the southern cassowaries.
Motorised vehicles may range from quad bikes (or similar) to 4WD vehicles and light trucks. All drivers are to be aware of speed limits for the varying sections of road/track.	These measures are considered effective in avoiding collision with wildlife and avoiding fauna habitat areas being disturbed by humans. These measures will avoid hostile interactions with the southern cassowary and humans within the project area. This will assist in reducing injuries to the southern cassowaries.
Performance indicator	
No vehicle or mobile plant collision with fauna species within the project area. Record register of the traffic management training completed by the construction crew.	
Monitoring	
The following parameters will be included in a monitoring program to be developed by the construction contractor (for implementation during the construction phase): The speed limits throughout the project area (regular basis) Vehicle routes within project area and on existing road network (regular basis) Driver behaviour within project area (Ongoing on a case by case basis) Interactions with wildlife (Ongoing on a case by case basis) Traffic Management Inspection to be undertaken for the project. Regular performance/compliance audits of the Contractor's and operator's traffic control measures to be undertake and feedback provided.	

Table 5.22 Avoidance and mitigation measures for MNES flora species from the TMP

Factor – MNES flora species	
Applicable MNES	
• *Canarium acutifolium* • *Dendrobium mirbelianum* (Dark-stemmed antler orchid) • *Diplazium cordifolium* • *Diplazium pallidum* • *Myrmecodia beccarii* (Ant plant) • *Phaius pictus* • *Phalaenopsis amabilis subsp. rosenstromii* (Native moth orchid) • *Polyscias bellendenkerensis* • *Toechima pterocarpum* (Orange tamarind) • *Vappodes lithocola* (Dwarf butterfly orchid) (Also known as *Dendrobium lithocola*, and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*) • *Vappodes phalaenopsis* (Cooktown orchid) (Also known as *Dendrobium phalaenopsis* and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*) • *Zeuxine polygonoides* (Velvet jewel orchid) (also known as *Rhomboda polygonoides*)	
Mitigation measures/controls	**Effectiveness**

Factor – MNES flora species	
Contractor and operator to implement JSEA safe work method statement. Contractor and operator to implement access management plan for access to site of works. Construction crew and maintenance staff operating vehicles and mobile plant to have the appropriate certification and completed the required training. The contractor and operator are required to prepare the following documents by a suitably qualified person: • Site access/vehicle movement plan to show where all site access points within the project area. • Prepare a TMP and Traffic Guidance Scheme (TGS) by a suitable qualified person. The TGS shows all traffic control devices and their layouts on a plan and shall be consistent with the approved TMP. Where any change to existing traffic arrangements is proposed or where construction conflicts with normal traffic movements, the Contractor shall prepare a TGS which clearly details the revised traffic arrangements at all locations affected by the change or conflict. A separate TGS is required for each stage of the works where changes are made to the traffic control devices.Traffic shall be controlled at all times, during construction, in accordance with the provisions of the MUTCD Part 3 and the TMP.	These measures are considered effective in avoiding fauna habitat areas and flora species from being disturbed by humans. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries.
Signage erected along tracks and roads where the trail connects to inform construction crew and operational staff of access points to the project area	These measures are considered effective in ensuring that the traffic during the construction and operational phases keep to designated tracks to avoid disturbing vegetated areas.
Signage around awareness of sensitive areas.	These measures are considered effective in ensuring that the traffic during the construction and operational phases keep to designated tracks to avoid disturbing vegetated areas.
Site inductions at the start of the construction phase with construction crews and then with maintenance staff regarding: undertaking works and the movement of vehicles within road reserves, existing access tracks. Wildlife present within the project area that could pose a hazard to vehicles and mobile plant Incident response procedures will be developed to detail actions to be taken in the event of wildlife injury or mortality	This will assist in training all onsite personnel in regard to their environmental obligations where MNES flora species are found onsite.
Construction traffic and operational traffic to use nominated roads and nominated service tracks when accessing and exiting the project area. Designated vehicle routes within the project area to have a firm and even surface, be wide and high enough for the largest vehicle using them and be well maintained and free from obstructions. Service tracks to be clearly sign-posted to indicate speed limits and traffic calming measures (if required) Reducing speed is very important where administrative control measures are the only reasonably practicable approach. Speed limits to be implemented and enforced.	These measures are considered effective in ensuring that the traffic during the construction and operational phases keep to designated tracks to avoid disturbing vegetated areas.

Factor – MNES flora species	
Speed limits for to be adopted for the construction phase and operational phase to be developed in consultation with the construction contractor, TDPD, DES, WTMA and DTMR.	
Traffic control devices on service tracks to be installed and operated with consideration of the (QPWS Technical Manual QPWS road works signage) this includes the following: • Arriving at the works site: • Pre-work preparation and work site assessment - On arrival at the work site a series of actions is required before any work can commence including undertaking a risk assessment of the proposed work site to identify all potential hazards to workers required to work on the work site. • Select the most appropriate traffic guidance scheme - The most appropriate standardised Traffic Guidance Scheme shall be selected according to road and traffic conditions at the site and the work requirements of the officer. • Installation of traffic control devices Traffic control devices approved for use by the QPWS technical manual for QPWS road works signage should only be installed according to the approved standardised Traffic Guidance Schemes provided in this document. Any work site requiring a traffic guidance scheme beyond the scope of this document shall require the engagement of an appropriately qualified Traffic Controller or Police Officer. Operation of the work site: The person in control of the work site on or near roads shall: • ensure traffic control devices remain in good condition while deployed; • ensure traffic control devices remain in place according to the Traffic Guidance Scheme in use; • make a record of the time of any inspection or reinspection of the traffic control devices and the Traffic Guidance Scheme being used. Photographs be taken of any changes to the work site; and • make a record of any incidents that occur on or in relation to the work site that might have ongoing consequences. Maintenance of traffic guidance scheme – Personnel should ensure that the traffic control devices remain in place according to the standardised Traffic Guidance Scheme being used. Maintenance of devices - Ineffective signs and devices shall be replaced by similar items in good condition, if they cannot be made effective by cleaning or repair. Signs and devices that are no longer in good condition should be returned and replaced. Non-repairable signs should be destroyed so that they are not inadvertently reused.	These measures are considered effective in ensuring that the traffic during the construction and operational phases keep to designated tracks to avoid disturbing vegetated areas.
Regular inspection of service tracks during the construction phase (and permanent tracks during the	These measures are considered effective in ensuring that the traffic during the construction and operational phases keep to designated

Factor – MNES flora species	
operational phase) to determine if additional surface treatment is required	tracks to avoid disturbing vegetated areas. This aligns with the provisions in the Walking track maintenance – general procedures Procedural Guide (QPW/2015/1395 v1.01) (DES, 2015a).
The contractor and operator will be required to make sure clear road markings like reflective paint and signs should be used to alert pedestrians and vehicle operators to traffic hazards in the work area where working within existing road reserves. Signs should be provided to indicate exclusion and safety zones, parking areas, speed limits, movement of wildlife, vehicle crossings and hazards like blind corners and steep gradients. Signs and road markings should be regularly checked and maintained so they can be easily seen.	This is considered to be effective in avoiding impacts to MNES flora species for the following reasons: • Avoids damaging the root systems for flora species. • Avoid accidental damage or disturbance to flora species • Avoid compacting the nature surface which could affect the germination of flora species.
If reasonably practicable the construction and operational personnel should eliminate the need for reversing by using drive-through loading and unloading systems, multi-directional mobile plant. Where this is not possible consider: using devices like reversing sensors, reversing cameras, mirrors, rotating lights or audible reversing alarms using a person to direct the reversing vehicle if they cannot see clearly behind—this person should be in visible contact with the driver at all times and wear high-visibility clothing providing designated clearly marked, signposted and well-lit reversing areas, and excluding non-essential workers from the area.	This is considered to be effective in avoiding impacts to MNES flora species for the following reasons: • Avoids damaging the root systems for flora species. • Avoid accidental damage or disturbance to flora species • Avoid compacting the nature surface which could affect the germination of flora species.
Motorised vehicles may range from quad bikes (or similar) to 4WD vehicles and light trucks. All drivers are to be aware of speed limits for the varying sections of road/track.	These measures are considered effective in avoiding damage to MNES flora species.
Performance indicator	
No vegetation clearing outside of the approved clearing footprint.	
No fires within Wangetti South Section	
All site personnel have undertaken the environmental induction prior to commencing work.	
Compliance with condition of contract	
Existing weeds and pathogens are identified and controlled onsite.	
Monitoring/audits	
The following parameters will be included in a monitoring program to be developed by the construction contractor: • The speed limits throughout the project area (regular basis) • Vehicle routes within project area and on existing road network (regular basis) • Driver behaviour within project area (Ongoing on a case by case basis) • Traffic flow to manage congestion (as required) • Traffic Management Inspection to be undertaken for the project. • Regular performance/compliance audits of the Contractor's traffic control measures to be undertake and feedback provided.	

Table 5.23 Avoidance and mitigation measures for WTWHA from the TMP

Factor – WTWHA	
Applicable MNES	
WTWHA	
Mitigation measure	**Effectiveness**
Contractor and operator to implement JSEA safe work method statement. Contractor and operator to implement access management plan for access to site of works. Construction crew and maintenance staff operating vehicles and mobile plant to have the appropriate certification and completed the required training The contractor and operator are required to prepare the following documents by a suitably qualified person: Site access/vehicle movement plan to show where all site access points within the project area. Prepare a TMP and Traffic Guidance Scheme (TGS) by a suitable qualified person. The TGS shows all traffic control devices and their layouts on a plan and shall be consistent with the approved TMP. Where any change to existing traffic arrangements is proposed or where construction conflicts with normal traffic movements, the Contractor shall prepare a TGS which clearly details the revised traffic arrangements at all locations affected by the change or conflict. A separate TGS is required for each stage of the works where changes are made to the traffic control devices. Traffic shall be controlled at all times, during construction, in accordance with the provisions of the MUTCD Part 3 and the TMP.	This will assist in training all onsite personnel in regard to their environmental obligations where MNES are found onsite and cultural heritage obligations. This aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
Signage erected along tracks and roads where the trail connects to inform construction crew and operational staff of access points to the project area	This measure is considered effective in reducing unnecessary impacts to sensitive environmental aeras within WTWHA.
Signage around awareness of sensitive areas.	This will assist in training all onsite personnel in regard to their environmental obligations where MNES are found onsite and cultural heritage obligations. This aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
Site inductions at the start of the construction phase with construction crews and then with maintenance staff regarding: undertaking works and the movement of vehicles within road reserves, existing access tracks. Wildlife present within the project area that could pose a hazard to vehicles and mobile plant Incident response procedures will be developed to detail actions to be taken in the event of wildlife injury or mortality	This will assist in educating the contractor on their environmental obligations where MNES are found onsite and cultural heritage obligations.
Gates with locks to be installed at service tracks where they connect to the existing road network to restrict the illegal use of the tracks by members of the public.	This measure is considered effective in reducing unnecessary impacts to sensitive environmental areas within WTWHA.
Construction traffic and operational traffic to use nominated roads and nominated service tracks when accessing and exiting the project area. Designated vehicle routes within the project area to have a firm and even surface, be wide and high enough for the largest vehicle using them and be well maintained and free from obstructions. Service tracks to be clearly sign-posted to indicate speed limits and traffic calming measures (if required)	This measure is considered effective in reducing unnecessary impacts to sensitive environmental areas within WTWHA.

Reducing speed is very important where administrative control measures are the only reasonably practicable approach. Speed limits to be implemented and enforced. Speed limits for to be adopted for the construction phase and operational phase to be developed in consultation with the construction contractor, TDPD, DES, WTMA and DTMR.	
Traffic control devices on service tracks to be installed and operated with consideration of the (QPWS Technical Manual QPWS road works signage) this includes the following: Arriving at the works site: Pre-work preparation and work site assessment - On arrival at the work site a series of actions is required before any work can commence including undertaking a risk assessment of the proposed work site to identify all potential hazards to workers required to work on the work site. Select the most appropriate traffic guidance scheme - The most appropriate standardised Traffic Guidance Scheme shall be selected according to road and traffic conditions at the site and the work requirements of the officer. Installation of traffic control devices Traffic control devices approved for use by the QPWS technical manual for QPWS road works signage should only be installed according to the approved standardised Traffic Guidance Schemes provided in this document. Any work site requiring a traffic guidance scheme beyond the scope of this document shall require the engagement of an appropriately qualified Traffic Controller or Police Officer. Operation of the work site: The person in control of the work site on or near roads shall: ensure traffic control devices remain in good condition while deployed; ensure traffic control devices remain in place according to the Traffic Guidance Scheme in use; make a record of the time of any inspection or reinspection of the traffic control devices and the Traffic Guidance Scheme being used. Photographs be taken of any changes to the work site; and make a record of any incidents that occur on or in relation to the work site that might have ongoing consequences. Maintenance of traffic guidance scheme – Personnel should ensure that the traffic control devices remain in place according to the standardised Traffic Guidance Scheme being used. Maintenance of devices - Ineffective signs and devices shall be replaced by similar items in good condition, if they cannot be made effective by cleaning or repair. Signs and devices that are no longer in good condition should be returned and replaced. Non-repairable signs should be destroyed so that they are not inadvertently reused.	This measure is considered effective in reducing unnecessary impacts to sensitive environmental areas within WTWHA.
Regular inspection of service tracks during the construction phase and operation phase of the project to determine if additional surface treatment is required	These measures are considered effective in ensuring that the traffic during the construction phase keeps to designated tracks to avoid disturbing sensitive areas within WTWHA. This aligns with the provisions in the Walking track maintenance – general procedures Procedural Guide (QPW/2015/1395 v1.01) (DES, 2015a).
The contractor and the operator will be required to protect pedestrians and wildlife and to make sure people, wildlife and vehicles cannot interact. Spotters to be nominated on	These measures are considered effective in ensuring that the traffic during the construction and operational phases keep

the ground to guide plant and ensure no collisions with other workers in the project area.	to designated tracks to avoid disturbing vegetated areas.
The contractor and operator will be required to make sure clear road markings like reflective paint and signs should be used to alert pedestrians and vehicle operators to traffic hazards in the work area where working within existing road reserves. Signs should be provided to indicate exclusion and safety zones, parking areas, speed limits, movement of wildlife, vehicle crossings and hazards like blind corners and steep gradients. Signs and road markings should be regularly checked and maintained so they can be easily seen.	This is considered to be effective in avoiding impacts to high ecological areas within WTWHA.
If reasonably practicable the construction and operational personnel should eliminate the need for reversing by using drive-through loading and unloading systems, multi-directional mobile plant. Where this is not possible consider: using devices like reversing sensors, reversing cameras, mirrors, rotating lights or audible reversing alarms using a person to direct the reversing vehicle if they cannot see clearly behind—this person should be in visible contact with the driver at all times and wear high-visibility clothing providing designated clearly marked, signposted and well-lit reversing areas, and excluding non-essential workers from the area.	This measure is considered effective in reducing unnecessary impacts to sensitive environmental areas within WTWHA.
Construction and operational activities will only occur during daytime hours.	This measure is considered effective in reducing unnecessary impacts to sensitive environmental areas within WTWHA.
Motorised vehicles may range from quad bikes (or similar) to 4WD vehicles and light trucks. All drivers are to be aware of speed limits for the varying sections of road/track.	This measure is considered effective in reducing unnecessary impacts to sensitive environmental areas within WTWHA.
Performance indicator	
No vehicle or mobile plant collision with fauna species within the project area. No vehicle or mobile plant adversely impacting environmental sensitive area and/or cultural heritage areas. Record register of the traffic management training completed by the construction crew. No vehicle or mobile plant collision with other road users/construction crew.	
Monitoring	
The following parameters will be included in a monitoring program to be developed by the construction contractor: The speed limits throughout the project area (regular basis) Interactions with wildlife (Ongoing on a case by case basis) Interactions with other road users (Ongoing on a case by case basis) Traffic Management Inspection to be undertaken for the project. Regular performance/compliance audits of the Contractor's and operator's traffic control measures to be undertake and feedback provided.	

5.2.7 Matters of National Environmental Significance flora pre-clearance survey methodology

Overview

The purpose of the Matters of National Environmental Significance flora pre-clearance survey methodology was 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 MNES under the EPBC Act. The 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 to be adopted.

Structure of the MNES flora pre-clearance survey methodology

Table 5.24 below provides a breakdown of the structure of the MNES flora pre-clearance survey methodology and an overview of each section. It also discusses how the MNES flora pre-clearance survey methodology has addressed the information requested by DAWE in Section 5.1.

Table 5.24 Structure of the MNES flora pre-clearance survey methodology

Section	Comments	How this addresses DAWE's RFI
Section 1: Introduction	Details the project background, purpose of the document.	The MNES flora pre-clearance survey methodology in Appendix B addresses the following items raised by DAWE in Section 5.1: • Pre-clearance survey methodology, and its predicted effectiveness, for a commitment to avoid listed threatened flora species during the construction stage • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures • Details of the procedure for dealing the loss of flora species • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.

Section	Comments	How this addresses DAWE's RFI
Section 2: MNES flora pre-clearance survey methodology	A discussion of the methodology, the target species, the survey team, the area to be targeted and the timing of the survey.	The MNES flora pre-clearance survey methodology in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of the proposed measures to be undertaken to avoid, mitigate and manage the relevant impacts of the proposed action. • With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies to manage and monitor: • Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans • Details of the procedure for dealing the loss of flora species • Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure • Information on the timing, frequency and duration of the measures to be implemented.
Section 3: Reporting	Details of the reporting process and mechanism for the MNES flora pre-clearance survey during the PSTR.	The MNES flora pre-clearance survey methodology in Appendix B addresses the following items raised by DAWE in Section 5.1: • Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures. • Information on the timing, frequency and duration of the measures to be implemented.
Section 4: Predicted effectiveness	A discussion of the effectiveness of adopting the MNES flora pre-clearance survey methodology in order to avoid potential impacts to MNES flora species	The MNES flora pre-clearance survey methodology in Appendix B addresses the following items raised by DAWE in Section 5.1:

Section	Comments	How this addresses DAWE's RFI
		An assessment of the expected or predicted effectiveness of the proposed measures.

Summary of the measures proposed within the MNES flora pre-clearance survey methodology to avoid, mitigate and manage relevant impacts

A number of avoidance and mitigation measures have been established for the Project and specific measures for each of the relevant MNES that are likely and may be impacted by the project are provided below (refer to Table 5-25, Table 5-26 and Table 5-27). The below tables present the environmental factors and MNES potentially impacted by construction and operational activities, the proposed environmental controls in response to the impact and the effectiveness of such controls. Further to this, it nominates performance indicators used for measuring the controls and how the mitigation measures will be monitored. The management objective of the proposed measures is to prevent or minimise unavoidable impacts on the MNES and associated habitat within the project area.

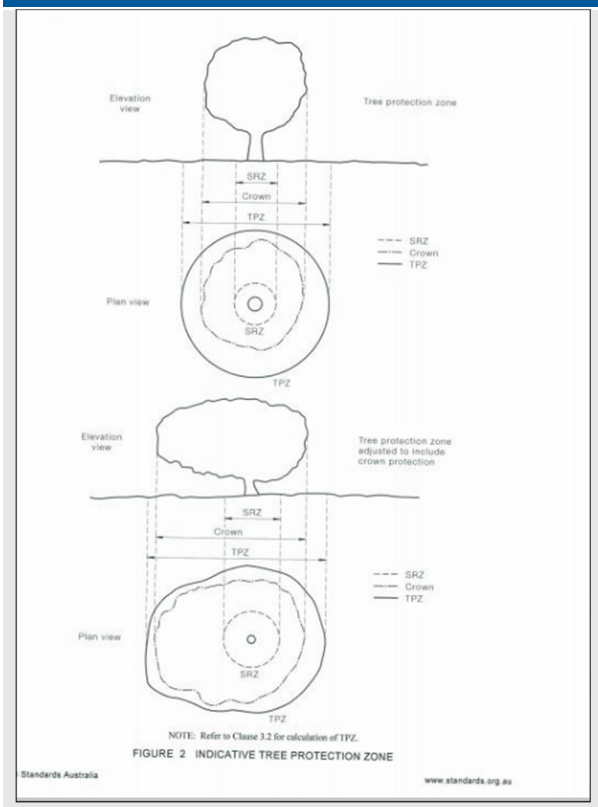
This section supports the provisions and mitigations detailed in the preliminary management plans developed for the Project, to ensure construction and operational activities are appropriately managed and impacts to significant environmental values associated with the Project area are reduced.

In addition, the Tables below address the additional information requested by DAWE, including:

- Details about how the proposed measures are consistent with Wet Tropics World Heritage Management Plan 2020 and Wet Tropics Strategic Plan 2020 – 2030
- Details of the procedure for dealing with the loss of flora species
- Pre-clearance survey methodology, and its predicted effectiveness, for a commitment to avoid listed threatened flora species (during the construction stage
- With reference to relevant legislation and policies, how the proposed measures will incorporate QPWS operational policies
- The use of committed language (e.g. 'will' and 'must') when describing the proposed measures
- An assessment of the expected or predicted effectiveness of the proposed measures
- Any statutory or policy basis for the proposed measures, including reference to the SPRAT Database and relevant approved conservation advice, and a discussion on how the proposed measures are not inconsistent with the relevant recovery plans and threat abatement plans
- Details of ongoing management, including monitoring programs to support an adaptive management approach and determine the effectiveness of the proposed measures
- Details on measures, if any, proposed to be undertaken by State and local government, including the name of the agency responsible for approving each measure
- Information on the timing, frequency and duration of the measures to be implemented.

Table 5.25 Avoidance and mitigation measures for MNES flora species from the MNES flora pre-clearance survey methodology

Factor – MNES flora species	
Applicable MNES	
• *Canarium acutifolium* • *Dendrobium mirbelianum* (Dark-stemmed antler orchid) • *Diplazium cordifolium* • *Diplazium pallidum* • *Myrmecodia beccarii* (Ant plant) • *Phaius pictus* • *Phalaenopsis amabilis subsp. rosenstromii* (Native moth orchid) • *Polyscias bellendenkerensis* • *Toechima pterocarpum* (Orange tamarind) • *Vappodes lithocola* (Dwarf butterfly orchid) (Also known as *Dendrobium lithocola*, and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*) • *Vappodes phalaenopsis* (Cooktown orchid) (Also known as *Dendrobium phalaenopsis* and the Queensland Flora Census 2019 groups this species into *Dendrobium bigibbum*) • *Zeuxine polygonoides* (Velvet jewel orchid) (also known as *Rhomboda polygonoides*)	
Mitigation measures/controls	**Effectiveness**
Where an MNES flora species is encountered, the tree protection zone of the individual tree (or the host tree / adjacent tree, as relevant to the particular flora species) is to be determined and an exclusion zone established. In accordance with Australian Standard Protection of Trees on Development Sites (AS 4970-2009), the formula to use is: Tree Protection Zone radius = DBH (trunk diameter measured at 1.4m above ground) x 12 For trees with a diameter at breast height larger than 1.5 m, a maximum tree protection zone radius of 18 m is to be established. As per AS 4970-2009, encroachment of up to 10 percent of the tree protection zone is allowable when the suitably qualified and experienced the botanist/ecologist assesses that this will not adversely affect plant health.	This measure will reduce impacts to individual trees as a result of works occurring within their root zone.

Factor – MNES flora species	
 Source: Standards Australia, 2009	
During vegetation clearing preference is given to trimming vegetation rather than clearing to retain overhead canopy.	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem. This measure is considered to effective to avoid significant changes to the existing canopy within the Project area as this can lead to the following: • Increased sunlight to the ground surface which can directly impact the type of flora species that grow. • Increased sunlight to the ground surface can result in an increase of invasive flora species. • Changes to the ecosystem and to the leaf litter zone and how plants decay.
During the MNES flora pre-clearance survey, the botanist/ecologist will comprehensively traverse the project footprint on foot in search of MNES plants. 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 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. The re-positioning of the footprint will be to an appropriate distance from the MNES plant within the construction allowance corridor to allow for a buffer from the impact. The distance will be determined by calculating the tree protection zone (TPZ) in accordance with Australian Standard Protection of Trees on Development Sites (AS 4970-2009). Where the MNES species is epiphytic, lithophytic or a ground layer species, the TPZ will be calculated for the host	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. This flora pre-clearance survey is expected to be highly effective in identifying any MNES flora species that are present within the project footprint for the following reasons:

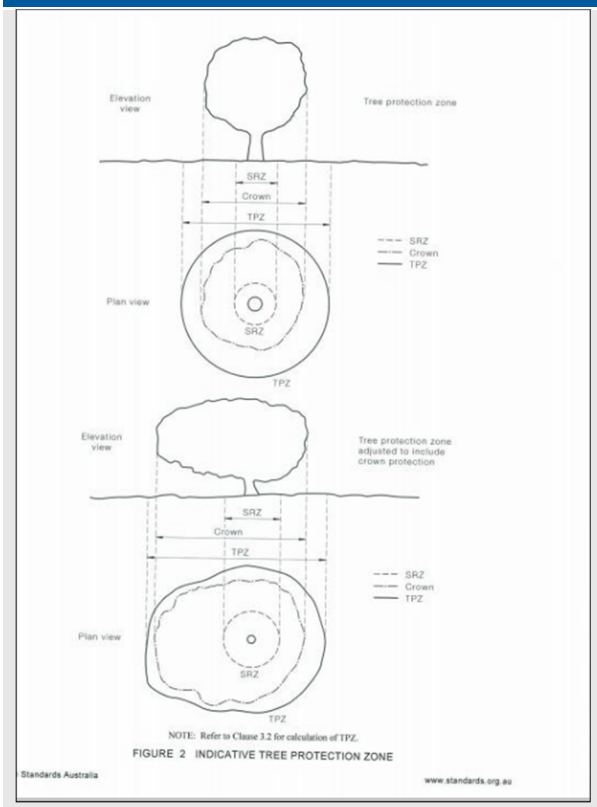
Factor – MNES flora species	
tree or an adjoining tree/s that functions in providing habitat conditions (primarily shading) required to sustain the MNES species. Upon completion of works in the vicinity of an exclusion zone, all marking will be removed. Vegetation clearing must only take place in those areas where pre-clearance surveys have been completed. During the PSTR, the scope of the environmental issue is visually identified and marked as an exclusion zone (using different coloured flagging tape or bunting). The exact alignment of the trail is flagged, ensuring an adequate buffer from the exclusion zone. 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, which will enable before/after comparison. Refer to the Wangetti South Section Matters of National Environmental Significance flora pre-clearance survey methodology.	• 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. The flora pre-clearance survey 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 preclearance 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. This measure will avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area.
Site induction and toolbox talks with the construction crew will occur prior construction to educate them about flora species in the project area.	This will assist in training all onsite personnel to inform them of their environmental obligations where MNES are found onsite. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing

Factor – MNES flora species	
	outside the specified, pre-approved boundaries.
Clearing for trail, public campsite and associated structure construction is to avoid, where practical, trees greater than 10 cm diameter at breast height (dbh).	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem. This measure is considered to effective to avoid significant changes to the existing canopy within the Project area as this can lead to the following: • Increased sunlight to the ground surface which can directly impact the type of flora species that grow. • Increased sunlight to the ground surface can result in an increase of invasive flora species. • Changes to the ecosystem and to the leaf litter zone and how plants decay.
Suitability qualified botanist/ecologist to be available during the construction phase to provide advice.	This will assist in detecting flora species that are present within the clearing area. This measure will assist in avoiding impacts to individuals remaining in the vicinity of the Project area.
Where unavoidable, restrict vegetation clearing to the smallest practical work area with retention of vegetation associated with riparian areas.	This measure will avoid unnecessary impacts to known habitats to be retained adjacent to the Project and avoid impacts to waterways. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries. This measure will also assist in minimising indirect impacts on waterways by reducing sediment loss as well as associated water quality impacts. Furthermore, this mitigation measure will reduce impacts on the waterways through inclusion of management measures for vegetation clearing and general environmental management.
Clearing for public campsite facilities and associated structures is to be restricted to the footprint of individual features such as camping platforms, amenities blocks, rainwater tanks and tracks or raised walkways. Clearing is only to occur where it is unavoidable.	This measure will reduce impacts on MNES and assist in reducing impacts to the ecosystem. This measure will also avoid unnecessary impacts to potential habitats to be retained adjacent to the Project area. It also reduces flora clearing outside the specified, pre-approved boundaries.
All vegetation that is cleared should not be stockpiled and should be dispersed of within the 40 m corridor to resemble the natural surrounds and to allow natural decomposition processes to take place.	This is considered acceptable for works within WTWHA avoid additional areas to disturbed and is supported by DES and WTMA.
Undertake a pre-clearing weed survey treatment and management and report areas of existing weed infestation.	Identification of weed species and locations of infestations will facilitate appropriate management strategies. Weeds and pathogens are major threats to the survival and habitat of native flora species within the Project area, and this measure is considered to be effective in reducing the spread of the weeds and pathogens during the construction phase. This measure also aligns with the provisions in the pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013).
Performance indicator	

Factor – MNES flora species
No vegetation clearing outside of the approved clearing footprint.
No fires within Wangetti South Section
All site personnel have undertaken the environmental induction prior to commencing work.
Compliance with condition of contract
Existing weeds and pathogens are identified and controlled onsite.
Monitoring/audits
Weekly inspections to assess the implementation of the above mitigation measures with records kept in a weekly environmental checklist.
Any non-conformances are to be documented and reported to TDPD and rectified immediately

Table - Avoidance and mitigation measures for WTWHA from the MNES flora pre-clearance survey methodology

Factor – WTWHA	
Applicable MNES	
WTWHA	
Mitigation measures/controls	**Effectiveness**
Where an MNES flora species is encountered, the tree protection zone of the individual tree (or the host tree / adjacent tree, as relevant to the particular flora species) is to be determined and an exclusion zone established. In accordance with Australian Standard Protection of Trees on Development Sites (AS 4970-2009), the formula to use is: Tree Protection Zone radius = DBH (trunk diameter measured at 1.4m above ground) x 12 For trees with a diameter at breast height larger than 1.5 m, a maximum tree protection zone radius of 18 m is to be established. As per AS 4970-2009, encroachment of up to 10 percent of the tree protection zone is allowable when the suitably qualified and experienced the botanist/ecologist assesses that this will not adversely affect plant health.	This measure will reduce impacts to individual trees as a result of works occurring within their root zone.

Factor – WTWHA	
 Source: Standards Australia, 2009	
Within the WTWHA minimise clearing to designed and demarcated areas; weed and pest management to avoid disturbance and degradation of flora and fauna environmental values.	This is considered an effective measure to avoid impacts to environmental features and MNES within the WTWHA and is supported by WTMA and DES.
Prior to conducting construction works within the WTWHA the contractor conducting the works has been informed of the requirements of the Wet Tropics Permit No: WTMA20001a The works supervisor has obtained a briefing describing the natural values of the subject site from the relevant QPWS Ranger or a Wet Tropics Management Authority officer. The works supervisor must also be given direction by the relevant QPWS Ranger or a Wet Tropics Management Authority officer as to the nature and extent of the clearing or earthworks to be undertaken.	This will assist in educating the contractor on their environmental obligations where MNES are found onsite and cultural heritage obligations.
Inspection of the trail and nodes, as per existing QPWS procedures during operation, including: • Walking track maintenance – general procedures Procedural Guide (QPW/2015/1395 v1.01) (DES, 2015a) • Pest plant and pathogen spread prevention Operational Policy (QPW/2013/476 v1.03) (DES, 2013) • Management of Cassowary incidents Operational Policy (v1) (DES, 2020) • Managing Indigenous Cultural Heritage Operational Policy (QPW/2015/1461 v1.01) (DES, 2015b)	This measure is considered to effective to in reducing impacts on MNES for the following reasons: • Inspection of the condition of the trail and erosion and sediment devices to make sure that they are not result in adverse impacts to adjoining areas and the waterways. • Checking the presence of weed and pest specicies and take corrective actions to avoid adverse impacts on MNES. • Checking that no damage is made to areas outside of the trail footprint and camp area including illegal fires and new tracks.

Factor – WTWHA	
	• Checking that there is no evidence of damage to MNES flora species and/or injury to MNES fauna species.
Performance indicator	
No injury or death to humans or native fauna species, loss of vegetation and/or damage to property or buildings.	
No damage to known or unknown to cultural heritage sites.	
No vegetation clearing outside of the approved clearing footprint.	
No fires within Wangetti South Section	
No illegal activities occurring within the project to MNES	
All site personnel have undertaken the environmental induction prior to commencing work.	
Compliance with condition of contract	
Existing weeds and pathogens are identified and controlled onsite.	
Monitoring	
Weekly inspections to assess the implementation of the above mitigation measures will be carried out by the contractor during the construction phase, with records kept in a weekly environmental checklist.	
At the start of each working week (or some other agreed schedule) provide reports to TDPD depending on work locations) stating the trails being worked on, their location and the number of personnel working on each. Report to provide contact details for key personnel in construction crew.	
At the start of each working week, check the weather forecast and note any potential high-risk days (i.e. high-risk days are those with high temperatures and high winds. They generally only occur during the hot summer months or during periods of drought)	
On the day before any anticipated high-risk days, check to see if a Total Fire Ban (TFB) has been called for the area. Local fire bans will be checked to see if they are in place, with any project works that pose a high fire risk not performed during this time. If a TFB day has been called, contact TDPD immediately to discuss whether it is safe/appropriate to work.	
During the fire season, the following weather monitoring protocols apply: • At arrival to site in the morning, check weather observations and record in Fire Weather Log Book • Before returning to work after lunch, check weather observations and record in Fire Weather Log Book	
Any non-conformances are to be documented and reported to TDPD and rectified immediately	

6. Rehabilitation requirements

6.1 Information request

The Department notes that a Rehabilitation Plan is required under the proponent's Wet Tropics Permit (No: WTMA20001a) from the Wet Tropics Management Authority. To enable a robust assessment of the effectiveness of the plan to rehabilitate temporary impacts on relevant MNES, please include the Rehabilitation Plan (in approved or draft format) as an attachment to the preliminary documentation.

Further, the stand-alone document must summarise the proposed rehabilitation activities for all disturbed areas associated with the proposed action. At a minimum, the stand-alone document must include details on:

- rehabilitation acceptance criteria, including a discussion of how the rehabilitation will restore habitat for relevant listed threatened species, in particular the southern cassowary and opal cling goby;
- procedures, including contingency measures that will be undertaken to achieve the rehabilitation acceptance criteria; and
- a monitoring program to determine the success of the rehabilitation activities implemented by the proponent.

Please include the Rehabilitation Plan (in approved or draft format) as an attachment to the preliminary documentation.

If relevant, the preliminary documentation must provide details of any further rehabilitation activities proposed to be undertaken as required by Commonwealth, State and local government legislation. Attach relevant Commonwealth, State and local government approvals and permits as supporting documents to the preliminary documentation.

Comments:

A rehab plan has not been developed for the project.

6.2 Response to the information request

Wangetti Trail Rehabilitation Plan

The below methodology is based on other QPWS projects, including the Whitsunday Craig Trail (2019/8450) and the Scenic Rim Trail (2016/7847). These projects generally created a small corridor of disturbance surrounded by native vegetation – a situation where natural regeneration is the preferred method of rehabilitation. Similarly, the preference for the Wangetti Trail is to minimise impacts to the greatest extent possible and allow any disturbed areas to naturally regenerate as part of the rehabilitation process.

Natural regeneration relies on dispersal to restore native plants and ecological processes to a site. Although no replanting is anticipated, other interventions may be required to manipulate, assist or accelerate the successional process, for example managing potential pest incursions.

The objective of the rehabilitation plan is to encourage the re-establishment of native flora species in disturbed areas along the Wangetti Trail and minimise disruptions to the habitat of the southern cassowary, opal cling goby and other species of national and state significance. Regular inspections will be undertaken along the shared-use trail and service tracks by the contractor during the construction phase to determine if they require active rehabilitation.

Any vegetation that is removed will be cut into small pieces and dispersed throughout the surrounding area (where possible), with no large windrows or stockpiles to be present within the project area. Any retained vegetation will be used during rehabilitation.

Shared-use trail and access tracks

The maximum width of the shared-use trail will be 1500 mm. A temporary disturbance of up to 500 mm of the 1500 mm trail has been allowed during the construction phase and will require rehabilitation. Temporary (construction) footprint will be left in such a manner that natural regeneration of the local vegetation community will be encouraged.

To achieve this, compacted sections will be de-compacted to encourage regrowth. Any scarification is to be perpendicular to the slope to reduce soil erosion and sites will be reshaped to a natural landform, where practical. Logs, leaf litter and vegetation material will be randomly spread over the disturbed area to prevent weed establishment and encourage re-establishment of native flora.

If available, large rocks will be used to clearly indicate that service tracks are closed. Upon completion, closed service tracks must appear unusable to park visitors to discourage continued use.

Camping areas

Each camping area will have a maximum permanent disturbance footprint area of 0.25 ha. Any additional cleared areas will be rehabilitated. Any compacted areas will be de-compacted to encourage regrowth of native flora species, with any scarification to be perpendicular to the slope to reduce soil erosion and areas reshaped to the natural landform, where practical. Logs, leaf litter and vegetation material will be randomly spread over the site, to indicate to park users that the area is not usable.

Watercourse crossings

The project will be constructed in accordance with the precautionary principle, with watercourse interference to be avoided in habitat which does or is likely to contain endangered species, such as the opal cling goby. Bridges will be set back from the creek bank and will be used instead of rock armouring and boulder crossings to mitigate potential impacts on the watercourse. Where clearing of riparian vegetation is unavoidable during construction, the approach will be to minimise clearing and disturbance to the greatest extent possible. Creek banks and vegetation will be reinstated as soon as practicable to deter trail users from directly accessing the waterways. These areas will be listed as ‘priority revegetation areas’ within the rehabilitation plan. These locations will be monitored carefully during the construction phase by a method agreed between TDPD and DES. To minimise erosion and destabilisation of creek banks, erosions controls will be constructed or installed, where necessary.

Weeds and invasive species

Probably the most significant obstacle to ecological restoration is weeds.

Weed removal will be undertaken during initial vegetation clearing during the construction phase. Material from any restricted invasive plant species will be cleared and disposed of at an approved waste disposal facility. Any infestations that subsequently establish during the construction period will be treated, and post-construction weed management will be undertaken as part of the contract defects stage.

Imported materials will only be used where absolutely required and materials cannot be found within the construction corridor. Imported materials are to be procured from a suitable supplier and checked for weeds prior to importing to site.

Cassowary Management

A CMP has been developed to ensure the project limits the impact it has on the southern cassowary ('cassowary' *Casuarius casuarius johnsonii*).

A summary of proposed actions is below:

- Site clearance survey of camp areas to be undertaken prior to start of construction to identify cassowary food plant trees within and adjacent to development footprint and likely cassowary access routes to these resources;
- Natural corridors of vegetation for cassowary movement are maintained;
- No open water at camps that can be accessed by cassowaries;
- Vegetation clearing will be restricted to the minimum required for the safe construction, operation and maintenance of trails, within the construction corridor;
- Vegetation to be cleared will be clearly marked with biodegradable survey tape, rather than visible, physical barriers;
- Important food plant trees will be included as components of retained vegetation in movement corridors;
- Vegetation removal will be limited to the minimum required to ensure clear line of sight for visitors approaching permanent or ephemeral watercourses.

Ongoing management

Legislative obligations for protected area management

There is a statutory requirement to develop a management instrument (a management plan or management statement) for all areas dedicated under the NC Act. Management plans and statements must be consistent with the NC Act's management principles, and they provide strategic management direction and are prepared under the 'Values-Based Management Framework (DES, 2019) - an adaptive management approach that is aimed at enhancing and protecting key values and delivering a level of service that meets custodial and legislative requirements.

Under the *Nature Conservation (Protected Areas Management) Regulation 2017*, recreation and commercial activities on protected areas are managed or controlled to minimise their impact. All activities on protected areas must be consistent with the management principles and with any management plan for the area.

Macalister Range National Park and Mowbray National Park have current management instruments that will be referred to throughout the development of the Wangetti Trail to ensure consistency with the management principles:

- *Macalister Range National Park Management Statement 2013*
- *Mowbray National Park, Mowbray National Park (Recovery) and Mowbray Conservation Park Management Statement 2013*

Health Checks

QPWS applies a contemporary management process that is based on international best practice, and targets management towards the most important features of each park: their key values. Key values are defined through an assessment process and Health Checks are the tools for efficiently and routinely assessing the condition of these key values.

Health Checks help QPWS monitor the condition of a park's key values and prioritise management efforts, along with delivering on our custodial obligations. Health Checks provide

condition assessments of natural values for the majority of estate. Where highly significant values require management intervention, detailed, targeted monitoring or research may be warranted, and these activities are outlined in the park's Monitoring and Research Strategy.

QPWS uses the Health Check system to evaluate our performance and ensure that on-ground actions lead to the identified outcomes.

Ongoing maintenance of the Wangetti Trail will be incorporated into the statutory obligations and existing procedures, such as the QPWS Health Checks, to assess the condition of key park values.

It is noted that WTMA currently undertake the following activities that benefit and support cassowary habitat within the WTWHA:

- Weed and pest management programs
- Research strategy that invites collaboration with research providers to build knowledge of the Wet Tropics Bioregion, related to environmental and cultural topics, the social importance of the WHA, and how best to conserve and enhance the WTWHA
- Wet Tropics Tour Guide Program to educate natural and cultural values of the WTWHA, including avoiding adverse impacts on cassowaries.

Timeframe for achieving key rehabilitation

The success criteria for rehabilitation works proposed for Wangetti South Section is that disturbed areas will be indistinguishable from undisturbed areas after 12 months. It should be self-sustaining with no requirement for further revegetation works.

Where required, during the first 12 months, the nominated contractor/developer will be required to rectify any failed revegetation in accordance with the defects liability period. Additional revegetation will be undertaken using indigenous or endemic species appropriate for the disturbed ecosystem."

Table 6.1 Rehabilitation treatment table

Activity	Values	Pre-activity condition	Treatment	Objective/Target
Trails	**Regional ecosystems** • 7.11.1b - Mesophyll vine forest recovering from disturbance, with *Acacia spp.* canopy or emergents. Lowlands and foothills on metamorphics, of the very wet and wet rainfall zones (No concern) • 7.11.44 - *Eucalyptus tereticornis* open forest to woodland on coastal metamorphic foothills (Of Concern) • 7.11.49 - *Eucalyptus leptophleba, Corymbia clarksoniana* and *E. platyphylla* open forest to woodland on metamorphic foothills (Of Concern) • 7.11.51a - *Corymbia clarksoniana, E. tereticornis, E. drepanophylla* woodland, low woodland to open forest with Allocasu*arina torulosa, A. littoralis, Lophostemon suaveolens, Acacia cincinnata, A. flavescens, Banksia aquilonia, Xanthorrhoea johnsonii.* Metamorphics (Of Concern) • 7.11.5c - *Eucalyptus pellita, Corymbia intermedia, C. tessellaris* open forest with *Acacia celsa, A. cincinnata, A. mangium* and *A. flavescens* and with a very well-developed vine forest understorey. Lowlands and foothills on metamorphics, of the very wet and wet rainfall zones. (No Concern) • 7.11.7a - Complex notophyll vine forests (with emergent *Agathis robusta*). Foothills and uplands of areas excluding the Seaview Range Subregion. Moist rainfall zone. (No Concern) • 7.12.59 – *E. leptophleba* and *Corymbia clarksoniana* open forest to woodland, on foothills on granite and rhyolite (Endangered) • 7.12.61a – *E. tereticornis* open forest to tall open forest and woodland. Includes communities ranging from those dominated *by E. tereticornis* to mixtures of that species with *C. intermedia, E. drepanophylla, Lophostemon suaveolens* and *A.a torulosa*. Foothills and uplands on granite and rhyolite, of the moist and dry rainfall zones (Of Concern) • 7.12.7a - Complex notophyll vine forests (with emergent *Agathis robusta*). Foothills and uplands on granite and rhyolite north of the Herbert River. Moist rainfall zone (No Concern) • 7.3.10a - Mesophyll vine forest. Moderately to poorly-drained alluvial plains, of moderate fertility. Lowlands of the very wet and wet zone (Endangered) • 7.3.44 – *E. leptophleba, C. clarksoniana* open forest to woodland, on alluvium, in near-coastal areas with moderate rainfall (Endangered) • 7.3.8b – *M. viridiflora* open forest to open woodland with eucalypt emergents (or sparse eucalypt overstorey) of species such as *C. clarksoniana, E. platyphylla, L. suaveolens* and *E. drepanophylla*. Poorly drained alluvium, mostly on the coastal plains. Floodplain (other than floodplain wetlands) (Endangered). **Species habitat** • *Casuarius casuarius johnsonii* (Southern Cassowary) • *Myrmecodia beccarii* (Ant plant) – Vulnerable • *Toechima pterocarpum* (Orange tamarind) – Endangered • *Vappodes lithocola* (Dwarf butterfly orchid) – Endangered • *Zeuxine polygonoides* (Velvet jewel orchid) – Vulnerable.	Undisturbed native vegetation	Compacted areas will be rehabilitated to encourage regrowth and could include light cultivation and the removal of weeds. The methodology will be confirmed with qualified botanists/ecologist during the rehabilitation process. Logs, leaf litter and vegetation material to be scattered across site to limit erosion, weed establishment and damage from human activity. Monitoring for erosion, weeds and pest impacts. Important food plant trees are to be included as components of retained vegetation within vegetation corridors. If any replanting along trail edges is required, food plant trees will not be utilised to reduce risk of human/cassowary interactions.	**Short-term** A state that allows the eventual complete rehabilitation **Long-term (within one year)** Construction buffer returned to pre-disturbance condition
Service tracks	**Regional Ecosystems** • 7.3.10a - Mesophyll vine forest. Moderately to poorly-drained alluvial plains, of moderate fertility. Lowlands of the very wet and wet zone (Endangered)	Previously cleared service track	Service tracks will be required for continued use during operation. Minimal clearing will be required to provide continued	**Short-term** Pre-disturbance condition during construction

Activity	Values	Pre-activity condition	Treatment	Objective/Target
	• 7.3.44- *Eucalyptus leptophleba, Corymbia clarksoniana* open forest to woodland, on alluvium, in near-coastal areas with moderate rainfall (Endangered) • 7.11.49 – E. *leptophleba, C. clarksoniana* and *E. platyphylla* open forest to woodland on metamorphic foothills (Of Concern) **Species habitat** • *Casuarius casuarius johnsonii* (Southern Cassowary) • *Myrmecodia beccarii* (Ant plant) – Vulnerable • *Toechima pterocarpum* (Orange tamarind) – Endangered • *Vappodes lithocola* (Dwarf butterfly orchid) – Endangered • *Zeuxine polygonoides* (Velvet jewel orchid) – Vulnerable.		safe access for emergency and maintenance vehicles	**Long-term (within one year)** Pre-disturbance condition post construction
Camping areas	**Regional Ecosystems** • 7.11.49 - *Eucalyptus leptophleba, Corymbia clarksoniana* and *E. platyphylla* open forest to woodland on metamorphic foothills (Of Concern) **Species habitat** • *Casuarius casuarius johnsonii* (Southern Cassowary) • *Myrmecodia beccarii* (Ant plant) – Vulnerable • *Toechima pterocarpum* (Orange tamarind) – Endangered • *Vappodes lithocola* (Dwarf butterfly orchid) – Endangered • *Zeuxine polygonoides* (velvet jewel orchid) - Vulnerable	Undisturbed native vegetation	Compacted areas will be decompacted to encourage regrowth. Logs, leaf litter and vegetation material to be scattered across site to limit erosion, weed establishment and damage from human activity. Any viable vegetation removed will be replanted onsite.	**Short-term** A state that allows the eventual complete rehabilitation **Long-term (within one year)** Construction buffer returned to pre-disturbance condition
Watercourse crossings	**Ecosystems** • Waterways (permanent/temporal) • Drainage lines **Species Habitat** • *Stiphodon semoni* (Opal cling goby) • *Endangered frogs* *Casuarius casuarius johnsonii* (Southern Cassowary)	Undisturbed natural watercourses.	Mitigate against erosion through the installation of erosion controls. No change in water quality through prevention of sedimentation – contaminants discharged offsite and all sediment controls are functioning and have the required capacity prior to predicted (greater than 50% chance) rainfall events. Maintain natural hydrology - utilise bridge crossings and avoid rock armouring and boulder crossings in potential opal cling goby habitat.	**Short-term** Pre-disturbance condition during construction **Long-term (within one year)** Pre-disturbance condition post construction

7. Environmental offsets – Residual significant impacts

7.1 Information request

Environmental offsets are measures that compensate for the residual adverse impacts of an action on the environment. Offsets provide environmental benefits to counterbalance the impacts that remain after the implementation of avoidance and mitigation measures. It is important to consider environmental offsets early in the assessment process and correspondence with the Department regarding offsetting is highly encouraged – in particular where a deviation from the 90 percent offset requirement is proposed.

It is the Department's standard practice that a draft Offset Management Strategy and a draft Offset Area Management Plan (OAMP) are included in the preliminary documentation for assessment and approval. Further, it is the Department's expectation that the environmental offset is legally secured under relevant Queensland legislation prior to the commencement of the proposed action. Where this is not achievable, the Department will recommend to the Minister (or delegate) that the conditions of approval require the environmental offset/s or the OAMP be approved, and legally secured, prior to the commencement of the proposed action.

The preliminary documentation must include an assessment of the likelihood of residual significant impacts occurring on relevant MNES, after avoidance, mitigation and management measures have been applied. The identified environmental offset must clearly state whether the conservation gain on the relevant MNES is proposed to be achieved by:

- improving existing habitat for the protected matter
- creating new habitat for the protected matter
- reducing threats to the protected matter
- increasing the values of a heritage place
- averting the loss of a protected matter or its habitat that is under threat.

A direct offset must compensate for at least 90 percent of the impact in accordance with the EPBC Act Environmental Offsets Policy (2012) (Offsets Policy). Deviation from the 90 percent direct offset requirement will only be considered where:

- it can be demonstrated that a greater benefit to the protected matter is likely to be achieved through increasing the proportion of other compensatory measures in an offsets package
- scientific uncertainty is so high that it isn't possible to determine a direct offset that is likely to benefit the protected matter.

The preliminary documentation must include an assessment of residual significant impacts, in accordance with the Offsets Policy, on relevant listed threatened species and communities, and the World and National Heritage values of the Wet Tropics of Queensland. If it is determined that a residual significant impact is likely, include a draft Offset Management Strategy that provides, at a minimum:

- the nature of the conservation gain to be achieved for relevant MNES
- details of the environmental offset/s (in hectares) for residual significant impacts of the proposed action on relevant MNES
- details of potential offset area/s (including a map) to compensate for the residual significant impact on relevant MNES

- details of how the environmental offset/s meets the requirements of the Offsets Policy, available at: www.environment.gov.au/epbc/publications/epbc-act-environmental-offsets-policy
- for each relevant listed threatened species and ecological community, the methodology, with justification and supporting evidence, used to inform the inputs of the Offsets Assessment Guide in relation to the project area, including:
    - quantum of impact – area (in hectares)
    - quantum of impact – quality (using the Queensland Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy [Version 1.2, April 2017], or subsequent revision)
- for each relevant listed threatened species and ecological community, the methodology, with justification and supporting evidence, used to inform the inputs of the Offsets Assessment Guide in relation to each potential offset area/s, including:
    - time over which loss is averted (max. 20 years)
    - time until ecological benefit
    - risk of loss (%) without offset
    - risk of loss (%) with offset
    - confidence in result (%)
- evidence that the relevant listed threatened species and communities, and/or their habitat, can be present in the potential offset area/s
- information about how the potential offset area/s provides connectivity with other relevant habitats and biodiversity corridors
- details of the mechanism to legally secure the environmental offset/s (under Queensland legislation or equivalent) to provide enduring protection for the potential offset area/s against development incompatible with conservation.

Where offset area/s have been nominated, include a draft OAMP as an attachment to the preliminary documentation which also provides:

- details to demonstrate how the environmental offset/s compensate for residual significant impacts of the proposed action on relevant MNES, in accordance with the principles of the Offsets Policy and all requirements of the Offsets Assessment Guide
- a description of the offset area/s, including location, size, condition, environmental values present and surrounding land uses
- baseline data and other supporting evidence that documents the presence of the relevant listed threatened species and communities, and the quality of their habitat within the offset area/s
- baseline data and other supporting evidence that documents the World and National Heritage values to achieve a conservation gain of increasing the World and National Heritage values
- for each relevant listed threatened species and ecological community, an assessment of the site habitat quality for the offset area/s using the Queensland Guide to determining terrestrial habitat quality: A toolkit for assessing land based offsets under the Queensland Environmental Offsets Policy (Version 1.2, April 2017), or subsequent revision

- details of how the offset area/s will provide connectivity with other habitats and biodiversity corridors and/or will contribute to a larger strategic offset for the relevant listed threatened species and communities
- maps and shapefiles to clearly define the location and boundaries of the offset area/s, accompanied by the offset attributes (e.g. physical address of the offset area/s, coordinates of the boundary points in decimal degrees, the relevant MNES that the environmental offset/s compensates for, and the size of the environmental offset/s in hectares)
- for each relevant listed threatened species and ecological community, specific offset completion criteria derived from the site habitat quality to demonstrate the improvement in the quality of habitat in the offset area/s over a 20 year period
- details of the management actions, and timeframes for implementation, to be carried out to meet the offset completion criteria
- interim milestones that set targets at 5-yearly intervals for progress towards achieving the offset completion criteria
- details of the nature, timing and frequency of monitoring to inform progress against achieving the 5-yearly interim milestones (the frequency of monitoring must be sufficient to track progress towards each set of milestones, and sufficient to determine whether the offset area/s are likely to achieve those milestones in adequate time to implement all necessary corrective actions)
- proposed timing for the submission of monitoring reports which provide evidence demonstrating whether the interim milestones have been achieved
- timing for the implementation of corrective actions if monitoring activities indicate the interim milestones have not been achieved
- risk analysis and a risk management and mitigation strategy for all risks to the successful implementation of the OAMP and timely achievement of the offset completion criteria, including a rating of all initial and post-mitigation residual risks in accordance with a risk assessment matrix
- for each relevant listed threatened species and ecological community, evidence of how the management actions and corrective actions take into account relevant approved conservation advices and are consistent with relevant recovery plans and threat abatement plans
- details of the legal mechanism for legally securing the proposed offset area/s, such that legal security remains in force over the offset area/s for at least 20 years to provide enduring protection for the offset area/s against development incompatible with conservation.

The draft OAMP must be prepared by a suitably qualified ecologist and in accordance with the Department's Environmental Management Plan Guidelines (2014), available at: www.environment.gov.au/epbc/publications/environmental-management-plan-guidelines.

7.2 Response to the information request

In response to RFI item 7 - *Environmental offsets – Residual significant impacts* and following discussions with DAWE, a southern cassowary offset approach has been developed for Wangetti Trail South Section. The offset approach has been broken down into the following sections:

- Background
- Offset methodology
- Offset considerations
- Details about the proposed offset
- Comparison with direct offset
- Benefits of the proposed approach.

7.2.1 Background

The proposed Wangetti Trail in North Queensland is considered to have the potential to have residual impacts on a nationally threatened species, the southern cassowary (*Casuarius casuarius johnsonii*). This proposal has been developed to outline the proposed approach the State of Queensland, acting through DTIS, will take to offset these residual impacts.

This approach is applicable only to the Wangetti South section of the project, a 29.7 km shared use trail from Wangetti to Palm Cove.

Managing impacts

The *Recovery plan for the southern cassowary (2007)* identifies the primary threats to the species to be:

- Habitat loss from clearing: more than 80 percent of coastal lowland habitat has gone
- Habitat fragmentation: much of remaining habitat is fragmented, isolating groups and disrupting movement
- Habitat degradation: through invasion of weeds such as pond apple and changed fire regimes
- Roads and traffic: cassowaries are killed by vehicles on roads
- Dog attacks: urban development brings more domestic dogs
- Hand feeding: brings cassowaries closer to vehicle traffic and dogs
- Diseases: aspergillosis, avian tuberculosis and parasites
- Natural catastrophic events: cyclones.

Without mitigation measures, the project could have the following impacts:

- Construction activity resulting in the removal of vegetation
- Construction activities impact flora and fauna biodiversity in the area
- Illegal collection of wildlife
- Development within ecologically significant areas
- Injury to cassowaries and reduced foraging resources
- Additional disturbance and disruption of flora and fauna due to the increased access of area

- Additional noise and vibration associated with construction may negatively impact flora and fauna
- Lights sources generated from construction adversely impact on wildlife.

To ensure adequate protections are in place for the project and to mitigate any impacts on the primary threats to the southern cassowary, the following documents have been prepared:

- CMP - to mitigate potential impacts on the cassowary during the construction and operation of the trail
- Preliminary Environmental Management Plan for Wangetti South Section – to guide responsible environmental management during the construction and operation phases of the project
- CEMP for Wangetti South Section – to guide construction activities and prevent or minimise the environmental impacts and disturbance on site and the surrounding environment

These documents contain a number of mitigation measures to reduce risk and to ensure the ongoing protection of the southern cassowary. These include:

- Site clearance survey of camp areas by an experienced ecologist to be undertaken prior to any construction, with the following requirements:
  - Location of potentially important cassowary foodplant trees within and immediately adjacent to the development footprint
  - Location and orientation of permanent water in relation to the development footprint
  - Assessment of likely cassowary access routes to any of the above resources identified (tracks, pads etc)
- Vegetation clearing is to be restricted to that as only required for the safe construction, operation and maintenance of camp and eco accommodation infrastructure
- Important foodplant trees identified as part of the preclearance survey are to be included as components of retained vegetation e.g. within movement corridors and preferably not left as isolated areas within clearings
- No clearing to be undertaken in highest, high or moderate priority shared use trail areas until site survey identifies potentially significant cassowary foodplants or high-quality habitat areas
- No cassowary-accessible permanent water source within the camp and eco accommodation areas.

Mitigation measures are considered to be effective in mitigating the risk associated with all other potential impacts, except for those that relate to land clearing for the permanent project footprint. As a result of these control measures, the offset will only address the ‘low’ residual risk associated with the permanent clearing.

Purpose of an offset

In accordance with the overarching principles of the *Environment Protection and Biodiversity Conservation Act 1999 Environmental Offsets Policy* (October 2012), a suitable offset needs to:

- deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action
- be built around direct offsets but may include other compensatory measures
- be in proportion to the level of statutory protection that applies to the protected matter

- be of a size and scale proportionate to the residual impacts on the protected matter
- account for and manage the risks of the offset not succeeding
- be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs
- be efficient, effective, timely, transparent, scientifically robust and reasonable
- have transparent governance arrangements including being able to be readily measured, monitored, audited and enforced.

7.2.2 Offset methodology

Overview

The approach that has been adopted for the offset methodology to determine the environmental offset for impacts to southern cassowary habitat involved in determining:

- the impact area
- the cost estimate per hectare for rehabilitating an area from low to high quality habitat, provided in consultation with an NRM group
- alternative offset approaches, being Queensland Environmental Offsets Policy proponent-driven land-based or financial settlement offset options
- comparison with direct offset for a suitable area for a land-based offset that achieves an offset requirements for residual impacts
- proposed total cost estimate for a suitable rehabilitation area that meets the offset calculator area requirements
- selection of a preferred suitable NRM group
- identifying the preferred offset approach, including conservation gain benefits.

In determining the most suitable offset proposal for the project, DTIS has taken consideration of a number of aspects, including the following:

- Availability of suitable data with regard to the existing habitat and population dynamics of the southern cassowary within the Project and immediate surrounding areas
- The characteristics of the Project and immediate surrounding areas and its suitability for providing offset for the protection of the species with respect to suitable habitat, existing land uses, presence of existing linear infrastructure, presence of residential and urban areas and the extent of fragmented habitat
- Availability of suitable habitat for use as an offset for the protection of the southern cassowary in the region
- Availability of data and proven methodologies to assist in the protection of southern cassowary populations.

To determine the appropriate offset, the following assumptions have been made:

- All essential habitat has been included in the calculation
- Only the permanent footprint of the project has been considered, as a residual impact from the clearing of habitat (on the basis that temporary disturbance is rehabilitated)
- Service tracks have been excluded from the calculation, as these are pre-existing and additional clearing is not required.

7.2.3 Impact area

Permanent disturbance footprints for the project comprise the 1.5 m wide trail and proposed campsite area. The total permanent disturbance footprint is estimated at 4.62 ha within the southern cassowary habitat.

The proponent proposes the delivery of an offset based on the EPBC Act Environmental Offsets Policy, and the EPBC Act Offset Assessment Guide (the offset calculator) (Department of Sustainability, Environment, Water, Population and Communities 2012b). For calculation of the offset, using the offsets calculator, assumptions and inputs have been made as outlined below.

For the purposes of offset calculations, average habitat quality of the impact area has been determined as 2 (out of 10) on the scale provided in the offset calculator. This is based on the fact that 98.5% of the impact area is being located within lowest quality habitat, and the remaining 1.5% within low quality habitat, as described in the CMP. The scale provided in the CMP was aligned to the 1-10 scale provided in the offset calculator as per Table 7.1 below.

Table 7.1 Offset calculator

Habitat category (Cassowary Management Plan)	Equivalent habitat quality score (offset calculator)	Median habitat quality score
Lowest	1 to 2	1.5
Low	2 to 4	3
Moderate	4 to 6	5
High	6 to 8	7
Highest	8 to 10	9

The median habitat value across the entire footprint was calculated at 1.52 and rounded up to the nearest score value of 2.

7.2.4 The cost estimate per hectare for rehabilitating an area from low to high quality habitat, provided in consultation with an NRM group

The proponent proposes to offset the permanent loss of 4.62 ha of primarily marginal quality cassowary habitat with a starting area of 2.5 ha of replacement land, which will be of poor quality (with a rating of 2 out of 10). This is based on the assumption that land to be rehabilitated will, despite being located in a suitable location (i.e. geographically suitable and located adjacent to existing, high quality habitat), exhibit low or negligible cassowary habitat potential – i.e. be significantly cleared or degraded, or be non-remnant, low value vegetation.

The impact footprint areas and associated habitat quality scores, with adjusted impact areas and land required to offset is provided in Table 7.2.

Table 7.2 Impact areas and habitat quality adjusted impact areas

Area	Zoning (Cassowary management plan) and habitat score (offsets calculator)	Impact area (ha)	Total quantum of impact (adjusted ha)	Land proposed to meet quantum of impact (ha)	Estimated offset cost
Wangetti South (WS) 1	Lowest (1.5)	1.98	0.93	2.5 (net adjusted value provides 148.75% of quantum of impact	Based on NRM estimate ($50,000 to $80,000 per hectare) **$125,000 to $200,000** **Up to $250,000** (with additional contingency and costs)
WS2	Lowest (1.5)	1.3			
WS3	Low (3)	0.06			
WS4	Lowest (1.5)	1.03			
Campsite 1	Lowest (1.5)	0.25			
	TOTAL	**4.62**			

The following additional inputs to the offset calculator have been used to demonstrate compliance with the offset requirements:

- Time over which loss is averted is 20-years, assuming that the offset will provide for the permanent protection of additional cassowary habitat, through conservation agreements with landholders providing adequate legal security.
- Time until ecological benefit is 3.5-years, based on an estimate of rehabilitation timeframes provided by a Natural Resource Management (NRM) Group to undertake all administrative and on-ground actions necessary to establish and secure the offset.
- Risk of loss of habitat potential is considered to be high (75%), and future habitat quality without an offset is considered to be low (2 out of 10) based on the assumption that without intervention via the offset, it is unlikely to become cassowary habitat in the future, and without legal security being provided will be vulnerable to further degradation or development.
- Risk of loss with the offset is low (10%), assuming that the offset location, once secured and rehabilitated, will be managed by an appropriate NGO and provided adequate legal protection from future disturbance or loss.
- Future habitat quality is considered to be highest (with a minimum score of 8 out of 10) due to the availability of potential suitable replacement land within nearby areas that are geographically significant cassowary habitat areas (principally along the Black Mountain corridor to the west of the project area). Creation of cassowary habitat of substantially greater quality than what is currently present in the proposed impact footprint is critical for achieving a desirable conservation outcome.
- Confidence in result is considered extremely high (100%) given that the NGO employed to undertake the offset will be required to have a proven track record of delivering high quality conservation outcomes.

Based on these input and assumptions, the offset calculator has estimated that the provision of 2.5 ha of starting replacement land will be sufficient to satisfy the requirements of an offset for the proposed impact footprint, providing 148.75% of the offset requirement.

The proposed offset results in an offset that is well above the minimum requirement as shown in the offset calculator. This is the proponents preferred approach as it aims to provide a substantial conservation benefit while also providing flexibility to meet offset obligations. Should offset actions not meet target offset size or future habitat quality, adjustments may be made to the quantum of land provided or to the final habitat quality, while still achieving an adequate offset. Potential adjustment scenarios are provided in Table 7.3 below.

Table 7.3 Offset area and future habitat quality variable adjustments

Scenario	Starting offset area (ha)	Minimum target future habitat quality	% Offset requirement achieved
Scenario 1 - Recommended	**2.5**	**8**	**148.75%**
Scenario 2 – reduced offset area	1.7	8	101.15%
Scenario 3 – reduced final habitat quality	2.5	6	108.38%
Scenario 4 – reduced offset area and habitat quality	2	7	102.85%

Consultation with a NRM Group identified the total per hectare cost of delivering an offset as being $50,000-$80,000, for a total cost of $125,000-$200,000 for the proposed 2.5 ha area. Assuming that rehabilitation costs are likely to be at the higher end of this range (due to the assumption that highly degraded land will be used), and allowing for contingencies, **the proponent proposes a financial contribution of up to $250,000 to cover costs associated with the offset**. The estimated offset cost is shown in Table 7.4.

Table 7.4 Estimated offset cost

Impact area (ha)	Median habitat quality	Total quantum of impact (adjusted ha)	Land required to meet quantum of impact (ha)	Estimated offset cost per hectare	Estimated total offset cost (including additional contingency upper limit)
4.62	1.52 (rounded up to 2)	0.93	2.5 (net adjusted value provides 148.75% of quantum of impact)	Estimated $50,000 to $80,000 per hectare	**$125,000 to $200,000** **Up to $250,000**

7.2.5 Alternative offset approaches, being Queensland Environmental Offsets Policy proponent-driven land-based or financial settlement offset options

As discussed in Section 7.2.4, the calculation methodology employs a variation of the financial offset methodology of the Queensland Environmental Offsets Policy (QEOP), where:

- The standard 4:1 multiplier has been replaced with a sliding scale multiplier based on habitat quality (the habitat quality multiplier) as defined in the Cassowary Management Plan
- Landholder incentive payment and administrative cost components have been omitted.

Employing the unvaried QEOP financial offset methodology provides a substantially larger offset liability and financial contribution. This is demonstrated in Table 7.5 below where the impact area (4.62 ha) was inputted into the QEOP offset calculator.

Table 7.5 Offset calculation

Impact area	Offset liability (with 4:1 multiplier)	Financial offset components	Total financial contribution
4.62 ha	18.48 ha	On-ground cost = $369,600.00 Landholder incentive payment = $235,139.52 Administrative cost = $92,400.00	$697,139.52

This outcome of the QEOP offset calculator is not supported, as the resulting financial contribution far exceeds what is considered commensurate with the scale of the impact on cassowary habitat. Specifically, this is due to the QEOP methodology:

- Using a 4:1 impact multiplier to determine offset liability and on-ground cost, which does not consider habitat quality. As the impact area overwhelmingly comprises low and lowest quality cassowary habitat, using this multiplier substantially overestimates impact and offset liability.
- Including $327,539.52 in additional landholder incentive payments and administrative costs which will not be required to employ an existing NRM group to undertake the offset (as opposed to an offset being managed entirely by the State).

Therefore, the offset determined in Section 7.2.4 is a more effective way of calculating an appropriate offset for the Project.

7.2.6 Comparison with direct offset for a suitable area for a land-based offset that achieves an offset requirements for residual impacts

DTIS may pursue a direct offset via the acquisition of new lands and restoration of the area as cassowary habitat. At this stage DTIS has not identified a parcel of land on which to undertake a direct offset. However, DTIS has undertaken a preliminary scoping of two options for the acquisition of lands to facilitate a direct offset:

- Acquiring properties adjacent to existing protected cassowary habitat
- Converting other State lands in the area containing cassowary habitat, in particular forestry lands and Unallocated State Land to protected areas.

7.2.6.1 Private properties

DTIS investigated 18 private properties located adjacent to existing protected areas around the proposed Project area (refer to Table 7.6 below), to determine:

- Whether there are sufficient lands in strategically important areas (i.e., contiguous to existing secured cassowary habitat) on which an offset may be facilitated
- The extent of essential cassowary habitat outside of existing protected areas (based on the Queensland Government's essential habitat mapping)
- Potential costs involved with the purchase of land, or compensation to landholders on whose land cassowary offsets may be taken. This is based on statutory land values for

rateable properties in Queensland undertaken annually in accordance with the *Land Valuation Act 2010.*

DTIS also undertook an assessment of five properties against the EPBC Act Environmental Offsets Assessment Guide calculator to determine their capacity to support a direct offset.

The initial desktop study indicates that there may be existing high quality essential cassowary habitat that could be acquired for a direct offset, particularly on properties to the west of the project, along Black Mountain Road (those that are identified as having high or very high potential). However, this study has several significant limitations that make acquisition of private lands not feasible at this stage, at least compared with the proposed indirect option:

- Actual cassowary habitat values have not been adequately assessed. Substantial further work would be required to undertake on-ground assessment of the actual habitat values of these areas in order to ensure that a suitable conservation outcome is achieved
- Statutory land values should be taken as indicative only. A formal valuation would be required which may result in more expensive land valuation
- The Queensland Government is not in a position to manage a cassowary offset long term and would likely need to engage an NRM group to manage the offset long term. A process initiated by the State and then passed on to a third party NRM group would likely substantially increase administrative burden – for example, the Queensland Government assumes a minimum of $50,000 to facilitate the establishment of an offset via a financial settlement with a third party, in addition to on-ground costs, land purchases and reaching legal agreements with landholders. This would substantially reduce funding available to manage the offset area for the life of the offset (or for 20 years). The proposed option allows the offset to be incorporated into a larger, ongoing cassowary management program, which substantially reduces initial and ongoing management costs.

Table 7.6 Private property information

Lot/plan	Tenure	Area (ha)	Estimated value p/ha	Description	Cassowary habitat potential	Offset potential
10CP851634	Freehold	28.81	$24,644.22	Located south of Wangetti	very low - does not contain or is not close to or contiguous with essential habitat	NA
2AP192331 PER208185	Leasehold	1.7	$96,050	Located in Wangetti	low - contains small areas of non-contiguous cassowary habitat	NA
12NR7187	Freehold	1.8	$22,7777.80	Located in Wangetti	low - contains small areas of non-contiguous cassowary habitat	Not suitable for cassowary offset – substantial rehabilitation requirements and is not adjacent to protected areas or essential cassowary habitat. Insufficient area, even when combined with adjacent 21N5583
21N5583	Freehold	1.667	$23,9952	Located in Wangetti	low - contains small areas of non-contiguous cassowary habitat	Not suitable for cassowary offset – substantial rehabilitation requirements and is not adjacent to protected areas or essential cassowary habitat. Insufficient area, even when combined with adjacent 12NR7187.
35SP217474 25NR6642 AAP12195	Freehold Leasehold	0.4828	$1,159,901	Located on Captain Cook Highway	very low - does not contain or is not close to or contiguous with essential habitat	NA
33NR5055	Reserve	1610	$434.78	Inland block along Black Mountain Road	medium - includes large patches/corridors of contiguous and non-contiguous cassowary habitat on site and significant non-remnant patches	NA
124N157509	Freehold	129.499	$4,092.70	Inland block along Black Mountain Road	medium - includes large patch of essential habitat surrounded	Not likely to be suitable. While it contains potential habitat, it is isolated from protected habitat.

Lot/plan	Tenure	Area (ha)	Estimated value p/ha	Description	Cassowary habitat potential	Offset potential
					by non-remnant and cleared areas	substantial rehabilitation of cleared lands would be required to achieve conservation benefit.
67NR828	Freehold	64.7269	$4,789.35	Inland block along Black Mountain Road	high - contains large contiguous areas of essential habitat (adjoining national park)	Areas of remnant vegetation on site would support a cassowary offset, and could be immediately secured via amalgamation with the adjacent national park. Block is large enough to sustain significantly larger offset than required.
68-69SP219105	Freehold	62.112	$4,990.98	Inland block along Black Mountain Road	high - includes very large contiguous areas of essential habitat	NA
14-15C157379	Freehold	269.432	$2,338.25	Inland block along Black Mountain Road	high - includes large contiguous areas of essential habitat	NA
2SP173573	Freehold	34.53	$5,719.66	Inland block along Black Mountain Road	very high - greater than 50% coverage of contiguous essential habitat (adjoining national park)	NA
78SP222756	Freehold	31.47	$6,116.94	Inland block along Black Mountain Road	very high - greater than 90% coverage of contiguous essential habitat (adjoining national park)	NA
77SP222756	Freehold	34.8984	$5,802.56	Inland block along Black Mountain Road	very high - greater than 75% coverage of contiguous essential habitat (adjoining national park)	NA
209SR786	Freehold	24.281	$7,516.17	Inland block along Black Mountain Road	very high - greater than 75% coverage of contiguous essential habitat (adjoining national park)	NA

Lot/plan	Tenure	Area (ha)	Estimated value p/ha	Description	Cassowary habitat potential	Offset potential
110N157433	Freehold	64.75	$4,247.10	Inland block along Black Mountain Road	medium - includes large patches/corridors of contiguous and non-contiguous cassowary habitat on site and significant non-remnant patches	NA
144NR7080	Freehold	63.53	$9,759.17	Located near Palm Cove	very high - greater than 50% coverage of contiguous essential habitat (adjoining national park)	NA
13NR1169	Freehold	36.6923	$9,573.65	Inland block along Black Mountain Road	very high - 100% essential habitat inholding within national park	Entire site could be a viable cassowary offset, and could be immediately secured via amalgamation with the adjacent national park. Block is large enough to sustain significantly larger offset than required.
13NR5512	Lands Lease	9.764	$97,296.19	Located at Ellis Beach	medium - includes small area of contiguous essential habitat	NA

7.2.6.2 Acquiring State lands (forestry lands)

A preliminary assessment of essential habitat in the vicinity project area shows substantial areas of cassowary habitat within State lands, particularly in Kuranda and Formartine State forests, and Kuranda West Forest Reserve (refer to Table 7.7).

Table 7.7 Essential habitat in adjoining State land

Forest	Area of essential cassowary habitat in hectares (% of total tenure area)
Kuranda West Forest Reserve	950 ha (15.5%)
Kuranda State Forest	616 ha (9.3%)
Formartine State Forest	416 ha (23%)

However, neither State forest nor Forest Reserve tenures present viable options for placement of a direct cassowary offset as:

- Forest reserve tenure is intended as a transitional tenure between forestry and protected area tenures, to allow inconsistent land uses to be extinguished prior to transfer of the area. Forest reserves therefore are already set aside for conservation purposes, and effectively already have national park level protection, and so would not satisfy the additionality requirements of the EPBC environmental offsets policy.
- State forests contain a variety of uses that are wholly incompatible with cassowary conservation, such as forestry (in particular plantation forestry) and grazing. Essential cassowary habitat in these areas is either located in marginal buffer areas adjacent to these inconsistent uses that would be subject to ongoing disturbance or are located in areas that would be isolated from adjacent cassowary habitat by surrounding inconsistent forestry uses.

7.2.6.3 Acquiring other State lands (Unallocated State Land)

DTIS has also investigated whether other State Lands may be available to provide a cassowary offset. DTIS has identified seven parcels of Unallocated State Land (USL) that border, or are inholdings within, Macalister Range or Kuranda national parks (refer to Table 7.8 below), that have been determined to be suitable additions to the protected area estate. A desktop analysis of these parcels found that there are insufficient suitable USL parcels to facilitate a direct cassowary offset – the majority of parcels are located in areas that do not contain cassowary habitat values. Only one parcel contains significant essential habitat, however it is not large enough to support the direct offset required for the project.

Table 7.8 State land that contains potential cassowary habitat

Parcel	Area (ha)	Location	Cassowary habitat potential
88AP12218	0.23	Small area between Kennedy Highway and Kuranda National Park, northwest of Cairns	Medium – Located entirely within essential cassowary habitat and contiguous to existing, protected habitat, but directly adjacent to highway
10USL9994	2.11	Inholding within Macalister Range NP. Former mining lease ~3km north of Wangetti	Low – not located adjacent to essential cassowary habitat. Surrounded by and contains high value vegetation that is not cassowary habitat
12USL9994	2.07	Inholding within Macalister Range NP. Former mining lease ~3km north of Wangetti	Low – not located adjacent to essential cassowary habitat. Surrounded by and contains high

Parcel	Area (ha)	Location	Cassowary habitat potential
			value vegetation that is not cassowary habitat
18USL9994	0.35	Inholding within Macalister Range NP, located ~3.3km west of Wangetti	High – more than 50% located within essential cassowary habitat. Too small to provide cassowary offset for the project
48AP16233	1.38	Narrow inholding within Macalister Range NP, directly west of Wangetti	Low – almost entirely not located within essential cassowary habitat. Small, isolated patch of essential habitat at northern extent of block.
8USL9994	0.64	Inholding within Macalister Range NP. Former mining lease ~3km north of Wangetti	Low – not located adjacent to essential cassowary habitat. Surrounded by and contains high value vegetation that is not cassowary habitat
9USL9994	0.51	Inholding within Macalister Range NP. Former mining lease ~3km north of Wangetti	Low – not located adjacent to essential cassowary habitat. Surrounded by and contains high value vegetation that is not cassowary habitat

7.2.7 Proposed total cost estimate for a suitable rehabilitation area that meets the offset calculator area requirements

DTIS is proposing to work with an NRM group in the region that has active or proposed programs with regard to cassowary conservation. A significant cassowary conservation gain will be achieved through:

- Ensuring that funds are used specifically to secure degraded land that has high cassowary habitat potential (due to geographical location and/or proximity to existing, secured habitat), which maximises conservation gain for the cassowary and effectiveness of the offset.
- Acquisition being strategically focussed on securing potential cassowary habitat with greater landscape/strategic benefits – being located adjacent to larger, contiguous, protected areas of cassowary habitat (such as within the national park estate) or that providing linkages between such areas.
- Requiring the offset to achieve rehabilitation to a state equivalent to high or highest habitat quality category, as described in the CMP – as the majority (98.5%) of the impacts to be offset occurred within areas determined to be lowest quality habitat, and there being no moderate or greater quality habitat in the area, focussing on achieving higher quality habitat restoration provides a substantial conservation gain.

It is considered that costs will be in the range of $50,000 to $80,000 per hectare, and these costs will be refined further as potential sites are investigated. It is expected that this will be sufficient funds to establish and secure approximately 2.5 hectares of high quality cassowary habitat.

This proposal aligns with objectives 1, 3 and 7 from the *Recovery Plan for the Southern Cassowary (2007)* as outlined below and in Appendix D:

- **Specific objective 1:** Protect essential cassowary habitat and landscape corridors

  Action 1.4 Investigate strategies to conserve cassowary habitat on private lands

- **Specific objective 3:** Implement strategies to protect cassowary populations by minimising the adverse impacts of roads, dogs, pigs and cyclone events

  Action 3.4 Support existing planning and management strategies that target pests and weeds in cassowary habitat

- **Specific objective 7:** Engage the community in cassowary conservation and education

  Action 7.1 Involve community in cassowary conservation

This proposal also aligns with the criteria within the EPBC Act Offset Policy, and this is demonstrated in Table 7.9 below.

Table 7.9 Offset compliance with the EPBC Act Offset Policy

Offset compliance with EPBC Act Offset Policy	
Offset must	**Proposed offset**
1. Deliver an overall conservation outcome that improves or maintains the viability of the aspect of the environment that is protected by national environment law and affected by the proposed action	DTIS will provide funding to rehabilitate suitable but degraded land within the Black Mountain Corridor to high quality cassowary habitat, in line with Objective 1 of the Recovery Plan for the Southern Cassowary (2007). This land will then be subject to a covenant or similar protection measure to ensure ongoing protection of the landscape.
2. Be built around direct offsets but may include other compensatory measures	The funding will allow for the delivery of a land-based offset, through an organisation that has a thorough understanding of the local environment and is best placed to identify its applications.
3. Be in proportion to the level of statutory protection that applies to the protected matter	The offset proposal has been defined based on the EPBC Act Offsets Assessment Guide, and therefore is considered consistent with the statutory protection afforded to the protected matter
4. Be of a size and scale proportionate to the residual impacts on the protected matter	The offset proposal has been defined based on the EPBC Act Offsets Assessment Guide, and therefore is considered proportionate to the size and scale of residual impacts on the protected matter. This offset funding will provide an additional area of high quality habitat for the southern cassowary that is not already existing or protected.
5. Effectively account for and manage the risks of the offset not succeeding.	An appropriate reporting mechanism will be developed to ensure that any procedural or establishment issues, or degradation in vegetation quality, is raised as soon as practicable, to ensure that corrective actions can be implemented.
6. Be additional to what is already required, determined by law or planning regulations or agreed to under other schemes or programs (this does not preclude the recognition of state or territory offsets that may be suitable as offsets under the EPBC Act for the same action	There are no Queensland State approvals for the southern cassowary for this Project. This funding is for the purpose of providing conservation gains for residual impacts to the southern cassowary by the Project.
7. Be efficient, effective, timely, transparent, scientifically robust and reasonable	The offset proposal includes clearly documented frameworks with an appropriate level of scientific rigour applied, relevant to the level of risk posed to the protected matters.
8. have transparent governance arrangements including being able to be readily measured,	An appropriate contract will be drafted between both parties to ensure suitable monitoring and auditing requirements are

Offset compliance with EPBC Act Offset Policy	
Offset must	**Proposed offset**
monitored, audited and enforced	maintained and that the delivered offset meets DTIS' expectations.

7.2.8 Selection of a preferred suitable NRM group

This section provides a discussion of the process that DTIS undertook to find and determine a suitable NRM group to work with in order to deliver the indirect offset.

DTIS met with WTMA to discuss the indirect offset approach. WTMA advised of NRM groups in the region that have suitable programs requiring funding that the State can support. DTIS met with NRM Group 1 and NRM Group 2 to discuss the proposed offset approach and the suitability of this, with consideration for the work that the NRM groups already undertake. Details of the discussions and proposed offset are included below and outlined in Table 7.10.

Table 7.10 List of NRM groups that have existing programs for cassowary conservation

NRM Group	Details of current projects and capacity for group to deliver
NRM Group 1	NRM Group 1 have received funding through the federal government for delivery of rainforest-based programs. They work with the community and private landholders to revegetate degraded properties, remove pest species and protect habitats. Approximately $200,000 per year is provided through the rainforest program to priority landholders in 6 key areas, which includes the Black Mountain Corridor. Costs incurred by NRM Group 1 typically covers material costs, whilst landholders or community groups will often make in-kind donations of labour. Otherwise, the usual costs to rehabilitate land is approximately $30-40,000 per hectare. The group's preference is to rehabilitate land and enter into a covenant to ensure ongoing land protection. The costs to protect existing vegetation is less than that of restoring a site to equivalent quality and then protecting. Whilst representing 50% of the annual funding that NRM Group 1 usually provides, they appear well placed to deliver an effective land-based outcome.
NRM Group 2	Early conversations indicated that NRM Group 2's primary focus is on campaigning all levels of government for retrofitting wildlife bypasses around road corridors to connect key habitat areas. The group also conducts revegetation works around key corridor areas to provide food trees for cassowaries. Costs associated with delivery of projects is low, as the group maintains a 10,000 plant nursery and relies on volunteers to deliver revegetation works. The group also collect GPS data for sighted cassowaries and uploads this information to WildNet. Future priorities of the group are to conduct more planting works and to have more involvement with Traditional Owners. There is the potential that a monetary contribution of the size DTIS is proposing may be beyond the capacity of the group.

DTIS' preference is to partner with NRM Group 1 to deliver an indirect offset, due to their experience in the area. NRM Group 1 has managed multi-million dollar habitat restoration projects for the state and federal governments for more than 15 years, including $50 million worth of projects in the last 5 years varying in scale from $30,000 to $15 million.

NRM Group 1 estimates that it will take approximately 3.5 years to deliver an offset. This would be 6 months to identify and enter into contracts with priority landholders, followed by 12 months to implement the restoration, and 2 years to undertake maintenance of the project sites.

Further details about NRM Group 1's capacity to deliver the indirect offset is outlined in the sections below.

NRM Group 1's ability to accept the indirect offset

NRM Group 1 is one of three member/owners of the North Queensland NRM Alliance which is an NGO set up to provide administrative support and build cross-regional collaboration through the Wet Tropics, Northern Gulf and Cape York regions. The North Queensland NRM Alliance holds a Regional Land Partnership Service Agreement with the DAWE. NRM Group 1 has significant investment from DAWE through this service agreement as the key subcontractor for the Wet Tropics region, including through Sustainable Agriculture, Regional Land Partnership, Reef Trust and Fisheries Habitat Restoration programs. This is a service delivery, rather than the traditional grant-based approach to NRM funding.

NRM Group 1 also receives significant State government grant funding, particularly through DES's Natural Resource Investment Program (NRIP) and one of DES' managers. If NRM Group 1 were to partner with the State government to deliver this offset, it can be done through a Federal or State government contract as above.

Details about the criteria/ outcomes based measurable items would use to define the success of the improvements to cassowary habitat

NRM Group 1 has significant internal expertise in monitoring and evaluation, biodiversity and GIS, and all of DES' projects have associated monitoring and evaluation plans.

NRM Group 1 currently deliver a DAWE-funded Regional Land Partnerships project (2018-2023) worth $2M in the Wet Tropics". The project seeks to improve the trajectory and/or condition of Southern Cassowary, Mabi Forest and Littoral Rainforest by working with the Cassowary, Mabi and Littoral rainforest recovery teams/groups to design, implement and monitor activities that increase the extent, connectivity and/or condition of rainforest habitat in priority locations and reduce invasive species threats adjacent to the Wet Tropics World Heritage Area. Outcomes are being achieved through revegetation, weed management, habitat protection and cassowary vehicle strike solutions in agreed priority locations in the landscape.

As part of the project, NRM Group 1 are measuring the following indicators, which could be used for the Wangetti South Project:

- *Change in baseline of cassowary habitat extent* - Changes in cassowary habitat extent assessed through mapping new revegetation areas. Each revegetation site has a revegetation plan including a monitoring plan specifying data collection and reporting requirements. Percent cover native vegetation in representative plots is recorded before and after revegetation. Native canopy cover is the agreed method for measuring plant growth, site capture and trajectory to increased habitat extent.
- *Change in baseline of cassowary habitat connectivity* - Changes in cassowary habitat connectivity is assessed through mapping new revegetated areas and weed management areas with EPBC Cassowary Corridors. Each revegetation site and weed management site has a revegetation plan or weed management plan including a monitoring plan specifying data collection and reporting requirements, i.e. area revegetated/weeded, species lists planted/removed, numbers of stems planted/removed, before and after photo points.
- *Change in baseline of cassowary habitat condition* - Changes in baseline of cassowary habitat condition is assessed through mapping new weed management activities. Each weed management site has a weed management plan including a monitoring plan specifying data collection and reporting requirements. Percent cover native vegetation in representative plots is recorded before and after weed treatment. Native canopy cover is the agreed method for measuring site capture and trajectory to improved rainforest

condition. It also measures whether native vegetation in the plot survived the treatment, as damage to natives should be avoided, unless the site is being prepared for revegetation and a clean site is required for efficiency.

- *Change in baseline of protected habitat extent* - Changes in protected habitat extent is assessed by mapping new protected areas; i.e. cadastral areas with a habitat protection agreement.

Outline how NRM Group 1 would improve the habitat quality on a site for cassowary

NRM Group 1 would advocate for revegetation of non-remnant sites in identified priority EPBC Act cassowary corridors (with a geographic focus on the Black Mountain corridor) and that the non-remnant sites would be protected by a conservation agreement. Given the sensitivity of this trail development and the desire of the State government to produce a product that is 'world class', it is very important that the offset is of equal ecological value in extent and quality to that which has been affected by building the shared use trail. NRM Group 1 would involve the Cassowary Recovery Team, WTMA and other key stakeholders as part of the process.

7.2.9 Identifying the preferred offset approach, including conservation gain benefits

DTIS is of the view that the proposed approach of a financial offset that provides funding to an NRM group to undertake land-based rehabilitation will provide a better overall conservation outcome than a direct offset.

The proposed methodology provides a financial that more accurately reflects the extent of impacts on higher quality potential cassowary habitat, and the negligible low administrative costs associated with employing an NRM group to facilitate the offset.

If DTIS were to take responsibility for sourcing a suitable parcel of land, there would likely be significant time delays in identifying appropriate land and establishing protection measures. In addition, a substantial portion of funds would be lost via administrative costs, thus reducing the effectiveness of the contribution.

By providing funding to an NRM group (NRM Group 1 being the preferred group), DTIS is able to invest in a well-establish and robust program, and support a consolidated, regional effort for cassowary conservation. This allows the Department to take advantage of expert knowledge on key areas for cassowary conservation and to ensure that high quality land is targeted.

DTIS would propose to develop an offset strategy which would involve working with NRM Group 1 to deliver an indirect offset for the Project. As part of the development of the offset strategy the following will be considered:

- It is estimated that it will take approximately 3.5 years to deliver an offset. This would be 6 months to identify and enter into contracts with priority landholders, followed by 12 months to implement the restoration, and 2 years to undertake maintenance of the project sites.
- Investing the indirect offset into rehabilitation works of non-remnant sites in identified priority EPBC Act cassowary corridors with a geographic focus on the Black Mountain corridor to create cassowary habitat area. An investigation will be undertaken into the process of setting up a conservation agreement over the non-remnant sites. This approach is considered to contribute to a gain in developing cassowary habitat in the region, while protecting the rehabilitated land. The size of area of the non-remnant site is anticipated to be between 2.5 ha and 5.5 ha and this would need to be confirmed.
- Liaising with WTMA and the Cassowary Recovery Team

- Adopting outcomes based measurable items, as recommended by NRM Group 1 to define the success of the improvements to cassowary habitat:
  - Change in baseline of cassowary habitat extent
  - Change in baseline of cassowary habitat connectivity
  - Change in baseline of cassowary habitat condition
  - Change in baseline of protected habitat extent.

To ensure an effective offset is delivered, DTIS will enter into a contract with the successful NRM group (NRM Group 1) and ensure that robust reporting measures and corrective actions are in place to ensure that the quality of land does not degrade.

8. Social and economic matters

8.1 Information request

The preliminary documentation must include a discussion and analysis of the social and economic impacts of the proposed action, both positive and negative. Economic and social impacts must be considered at the local, regional and national levels.

Matters of interest may include:

- details of any further public consultation activities undertaken since the referral was submitted, including any consultation with Indigenous stakeholders, and their outcomes
- projected economic costs and benefits of the project (in dollars), including the basis for their estimation through cost/benefit analysis or similar studies
- employment opportunities expected to be generated by the proposed action (including construction, operational and maintenance stages).

8.2 Response to the information request

8.2.1 Public consultation

Further consultation

To increase market share of arrivals into Queensland and attract HVTs, diversification of the product offering in the region is critical. HVTs participating in walking and mountain biking are increasing in numbers, leading to increasing demand for quality trail networks that can meet different user needs.

Preliminary consultation with tourism bodies, accommodation operators and other industry participants revealed that the TNQ region needs additional tourism drawcards that utilise the State's iconic natural assets. The market considers that Queensland has fallen behind other states as tourism activity in national parks has been limited. The market sounding helped to identify key opportunities for the Wangetti Trail, including:

- There is market appetite for a new tourist offering in TNQ such as an iconic trail for walkers and mountain bikers
- The demand for multi-day walks is growing including at the high value end of the segment
- Emphasise connections of the Wangetti Trail to the GBR
- Traditional Owner engagement is important and should start early in the project – Indigenous businesses should be supported by the State and provided with sufficient lead-in time to prepare for the project
- Cultural experiences could be a differentiator and need to be immersive and authentic
- An immersive nature experience is important for a "great walk"
- A holistic approach is needed to marketing and storytelling across all proposed trail projects in Queensland
- Shorter trail options, such as two or three days, are potentially a gap in the market that the Wangetti Trail may fill.

The market also provided feedback on the various components of a delivery model. The market preference is for:

- Longer term leases – 20 years or more

- Early involvement in the site design
- Private delivery, operation and maintenance of the eco-accommodation
- State de-risking through such things as obtaining environmental approvals and provision of the base infrastructure.

Overall, there was overwhelming support for the Wangetti Trail and the opportunities it presents for the local region and for Queensland.

Between Monday 3 August 2020 and Friday 11 September 2020, DTIS (formerly the Department of State Development, Tourism and Innovation) undertook a second round of community consultation on the Wangetti Trail.

During this time members of the public were invited to view and comment on the amended alignment for the Wangetti Trail along with additional information on the proposed trail construction methodology, proposed campsite construction methodology, proposed waterway crossings and approvals process.

A set of Frequently Asked Questions was also developed to assist with the consultation.

The community consultation undertaken in August and September 2020 was in addition to the first round of consultation undertaken between 8 April 2019 and 31 May 2019.

Appendix F provides the Community Consultation Summary Report which outlines responses primarily generated through the online engagement tool, Social PinPoint, email and Facebook.

Indigenous engagement

As discussed in Section 3.2 of this report and the Wangetti Trail Project Consultation Report 2020, focused engagement was undertaken with the Yirrganydji Aboriginal Corporation (YGAC). The Yirrganydji People are recognised Traditional Owners for the country on which the Wangetti Trail traverses. Engagement with YGAC and their Land and Sea Rangers Corporation was formalised through a MOU that outlined the project vision, objectives, governance framework, business case activities and responsibilities and commercial compensation. This agreement and the working relationship developed with the Yirrganydji People has established a strong relationship of trust and productivity, which has continued throughout the project phases as part of a process to agree and register an Indigenous Land Use Agreement for the Wangetti Trail.

To date, the following activities have been undertaken/are in development with the Yirrganydji people relating to the assessment and delivery of the Wangetti Trail Project:

- Execution of an MOU with the Yirrganydji Gurabana Aboriginal Corporation (YGAC) to participate in the business case development process including definition of overall aspirations for business opportunities for the trail as a precursor to an Indigenous Land Use Agreement (ILUA) and the engagement of Yrriganydji Land and Sea Rangers to provide cultural heritage advice during ground-truthing activities.
- Development of a statutory structure plan for the Wangetti Land Trust Aboriginal Land Act freehold land to be developed as a trail hub for the Wangetti Trail. Establishment of Traditional Owner owned and operated auxiliary trail infrastructure in this location is strongly supported by the Project Team and Douglas Shire Council by way of formal Council resolution.
- Execution of a Cultural Heritage Agreement protocol and engagement of cultural heritage monitors for the construction of the Mowbray River pedestrian bridge
- Drafting of an ILUA for the Wangetti Trail to be agreed and finalised before works commence in early 2021.

Engagement with the Traditional Owner Groups is ongoing and paramount to the successful delivery of the Wangetti Trail. Traditional Owners will be involved throughout all stages of the project – particularly during the procurement process for the eco-accommodation operator.

8.2.2 Projected economic costs and benefits and employment opportunities

The economic assessment of the Wangetti Trail considered the costs and benefits of the project over a thirty year period to assess the economic viability of the Wangetti Trail.

Costs

Capital expenditure (CAPEX) and operating expenditure (OPEX) costs were provided by World Trail, Bligh Tanner and DES. The CAPEX includes the following components listed in Table 8.1.

Table 8.1 CAPEX assumptions

Assumption	Comment/Source
Trail construction	Trail construction plus boardwalks, gully crossings and helicopter emergency pads.
Trail structures	Includes structural elements of the trail which includes bridges.
Campsites	This includes: • Public campsite infrastructure • Eco-accommodation base infrastructure • Eco-accommodation infrastructure (provided by private sector), including replacement costs every 10 years • Enabling works for both public campsite and eco-accommodation sites (access trail upgrades, solar panels and batteries, external roadworks upgrade).
Contingency	The contingency has been estimated as 20% for the Wangetti Trail and structures, and 30% for campsites and optional items.

The OPEX includes the following components listed in Table 8.2.

Table 8.2 OPEX assumptions

Public facilities	Eco-accommodation
• Trail – Bridges and boardwalks – Fire and pest management • Administration: – Webpage and booking management – Marketing – Production of maps/souvenirs etc.	• Maintenance and repairs: – Toilet systems – Structures – Grounds • Operations: – Salaries and wages – Food and beverages – Transfers – Other provisioning • Administration:

Public facilities	Eco-accommodation
• Campsites: – Toilet systems – Structures (camping decks and adventure hubs) – Grounds.	– Online booking systems and booking management – Marketing – Insurance.

A breakdown of the total costs over the appraisal period has been presented in Table 8.3.

Table 8.3 Capital and operating costs (total $real) ($'000)

Expenditure item	Total $real	Total present value (PV) at 7% discount rate
Total capital cost	$47,021	$33,320
• Trail, public campsites and infrastructure	$29,776	
• Eco-accommodation and support infrastructure	$17,245	
Total operating cost	$119,170	$39,580
Total costs	$166,192	$72,901

Benefits

A key objective for the Wangetti Trail is to encourage growth in regional tourism visitation and economic development in TNQ. The Wangetti Trail is expected to deliver significant flow-on benefits for the TNQ region and Queensland, stimulated by additional visitation and non-local expenditure generated by the new ecotourism and adventure tourism offering and establishment of complementary commercial offerings around it. To estimate the incremental visitors to TNQ as a result of the development of the Wangetti Trail, PwC used a 'bottom-up' approach based on assumptions relating to capacity, visitor nights, seasonality and occupancy rates. These assumptions produced an estimate for the number of total trail users per year, displayed in Table 8.4.

Table 8.4 Wangetti Trail estimated annual demand

		High (Mar – Oct)			Low (Nov – Dec)			
	Capacity	Days	Occupancy	People	Days	Occupancy	People	**Total**
Public	40	245	60%	5,880	61	40%	976	6,856
Eco-accom	20	245	85%	4,165	61	50%	610	4,775
Total users per year								11,631

To capture the proportion of these visitors that will travel to TNQ specifically to visit the Trail (i.e. induced visitors) and their subsequent expenditure on and off the trail, PwC used feedback from industry and desktop research to estimate visitor origins, their spends and whether their visit to the Wangetti Trail was purposeful or incidental. The total incremental revenue was then factored

down to include only the producer surplus component. The induced visitor expenditure assumptions and estimates are displayed in Table 8.5.

Table 8.5 Annual induced visitor expenditure

Input	Public	Eco-accommodation	All visitors
Number of incremental visitors (annual)	6,856	4,775	11,631
Spend per trip	Domestic - $711 International - $939	Domestic - $2,946 International - $4,380	-
Surplus ratio	23%	23% *(applied to off-trail spend only)*	-
Total induced visitor expenditure ($real) ($'000)	**$819**	**$9,760**	**$10,580**

The induced expenditure represents an additional $10.5 million being injected into the TNQ economy annually.

8.2.3 Non-monetisable benefits

In addition to the increased visitor expenditure induced by the Wangetti Trail, a significant benefit will be the increase in jobs for the region. The Wangetti Trail will generate an increase in job creation across TNQ, throughout all phases of the project lifecycle.

As the Wangetti Trail is situated between Palm Cove and Port Douglas, it will provide both direct and indirect employment opportunities over several regional locations in the area and across multiple industries. Direct employment will be created through the construction phase, with a range of skilled and unskilled jobs required to complete the Wangetti Trail. It is envisaged that construction of the project may involve training previously unskilled workers who may then be able to maintain the Wangetti Trail once operational. During the operational phase of the trail, direct and indirect jobs are expected through the entire TNQ region, specifically in retail trade, tour operator services, accommodation, food and beverage, and transportation sectors. An independent State funded assessment of the Wangetti Trail was conducted in an earlier stage of the Project and includes a preliminary economic impact assessment (EIA). The assessment estimated that the Trail could create 259 to 436 jobs throughout the construction and operation phases, including direct, indirect and induced employment[3].

The Wangetti Trail is primed to be a catalyst that stimulates the region's employment and business development opportunities, particularly for the Traditional Owners. There is significant potential to draw on the knowledge, resources and skills of the Traditional Owners, including partnerships with established businesses, to create sustainable and long-term employment opportunities. The market sounding confirmed strong support for authentic Traditional Owner engagement in the Wangetti Trail through commercial arrangements and meaningful cultural experiences for users.

3 Tulipwood Economics (2018).

There are a number of other non-monetisable benefits that will be realised through all phases of the Wangetti Trail, including:

- Additional tourism and safety benefit, via the new Mowbray Bridge viewing platform and boardwalk day experience
- Health benefits gained by use of the trail, including improved health outcomes that are both physical and psychological
- Increased social capital for Traditional Owners through promoting Indigenous engagement in the operation and maintenance of the Wangetti Trail.

CAPEX and OPEX costs (exclusive of GST) were considered against the Wangetti Trail's benefits to assess the economic viability of the Wangetti Trail. The key outputs of the Cost Benefit Analysis (CBA) are listed in Table 8.6.

Table 8.6 Economic analysis results ($'000)

Expenditure item	Project case
PV of incremental cost	$72,901
PV of incremental benefit	$96,542
Net Present Value	**$23,641**
Benefit cost ratio	**1.3**

While there are significant CAPEX and OPEX costs associated with developing the Wangetti Trail, there are a number of significant economic benefits that may be realised. The most significant benefit will be the increased visitor expenditure in TNQ, induced by domestic and international tourists travelling to the region specifically to use the Wangetti Trail. Given the NPV is positive and the BCR is greater than one, this indicates a strong economic rationale for the Wangetti Trail.

The sensitivity analysis demonstrated that the benefits will be most sensitive to increases and decreases to CAPEX and OPEX, and also to the number of days that visitors depart onto the Wangetti Trail.

9. Ecologically sustainable development (ESD)

9.1 Information request

The preliminary documentation must include a discussion of how the proposed action will conform to the principles of ESD. To assist, the National Strategy for Ecologically Sustainable Development (1992) is available at: www.environment.gov.au/about-us/esd/publications/national-esd-strategy

9.2 Response to the information request

9.2.1 Overview

An assessment against the National Strategy for Ecologically Sustainable Development (NSESD) has been undertaken to demonstrate that the Wangetti South Section conforms to the principles of ESD. DAWE has advised that the assessment should focus on the core objectives outlined in Part One of the NSED and the tourism objectives in Part 2 Sectoral Issues – Chapter 7.

The NSESD was prepared by the Ecologically Sustainable Development Steeling Committee in 1992. The NSESD provides broad strategic directions and framework for governments to direct policy and decision-making. The strategy facilitates a coordinated and co-operative approach to ESD and encourages long-term benefits for Australia over short-term gains. The Department of the Environment, Water, Heritage and the Arts is the lead Government agency for developing and implementing national policy, programs and legislation to protect and conserve the natural environment.

Ecologically sustainable development (ESD) is defined in the National Strategy for Ecologically Sustainable Development (Commonwealth of Australia, 1992) (the National Strategy) as 'development which aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations…*to develop ways of using those environmental resources which form the basis of our economy in a way which maintains and, where possible, improves their range, variety and quality. At the same time, we need to utilise those resources to develop industry and generate employment'* (Commonwealth of Australia, 1992). The National Strategy requires that arrangements are developed to ensure that the principles and objectives of ESD are delivered.

The NSESD includes a goal, core objectives, and guiding principles as noted below.

9.2.2 Assessment against Part One - Introduction in the NSESD

The goal of the NSESD is to foster development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.

The Wangetti South Section is considered to align with the goal of the NSESD and this is demonstrated by the responses provided to each of the NSESD core objectives in Table 9.1.

Table 9.1 Assessment against the NSESD core objectives

NSESD Core Objectives	Comments
To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations	Wangetti South Section will create new opportunities for employment, through the management and maintenance of the trail and camping area. It will also be vehicle for potential employment of the local indigenous community – directly through the construction and ongoing maintenance and management of the trail, and indirectly through the tourism services offered to the users of the trail. It will leverage off the tourism services and infrastructure in place already at its southern and northern terminals, Palm Cove and Port Douglas respectively
To provide for equity within and between generations	Wangetti South Section has been designed to cater for both hikers and mountain bike riders including the young and old who are capable of tackling intermediate (blue square with blue outline) as defined in the Australian Mountain Bike Trail Guidelines Trail Difficulty Rating System (MTBA TDRS) and Grade 3 walking track. It is intended to be used by a range of user groups including: • Dedicated visitors – people who travel to the region for the sole purpose of doing the Wangetti Trail • Casual visitors – people who travel to the region for a range of experiences and activities, including the Wangetti Trail • Local residents – people who live locally and use the trail for recreation and/or exercise. • School Groups.
To protect biological diversity and maintain essential ecological processes and life-support systems	Wangetti South Section will showcase Queensland's natural and cultural values in the beautiful Wet Tropics World Heritage areas. This unique trail experience is intended to not only obtain global recognition, but also educate the public about cultural heritage and the environment while providing employment opportunities, increasing local tourism, and thus supporting development of the local economy. This trail design will respect and utilize the knowledge of the traditional owners of the land and provide the Yirrganydji people an opportunity to educate and inform visitors about the significance of the region The project is intended to be a new adventure/nature based tourism product of National Significance. The project has been designed and will be constructed to have a minimal impact on the Wet Tropics natural environment and this is achieved by the following design and construction measures:

NSESD Core Objectives	Comments
	• Being sympathetic to the terrain and topography and create a sense of purpose and movement through the landscape. It will use existing access tracks and previously disturbed areas where possible. The trail will allow for winding around natural obstacles and integrating within the natural environment. Vegetation disruption, including canopy cover will be minimised. • It has been designed and positioned to consider the landscape character of the area. The alignment has been sited in accordance with the natural landform to avoid earthworks. The surface of the trail will be predominantly natural soil, the tread of the trail will be constructed from the natural soil and rock found along the trail. Materials used during the construction phase will be required to respond to the local environment and be locally sourced where possible. • A 40 m wide construction corridor is proposed within which a 1.5 m wide permanent trail will be established, referred to as the construction allowance corridor to allow flexibility for the placement of infrastructure to avoid, to the greatest extent possible, impacting on MSES and MNES. • The shared use trail will use a variety of construction treatments to minimise erosion of soils and to direct surface water off the trail and they include: grade reversals, rock wailing and retaining walls, spoon drains, installation of fibre rolls, sediment fence to be installed along the contour wherever practical, rock armouring is used to prevent soil erosion and compaction, to provide traction for users, or to harden the trail surface in boggy areas. • All vehicles including hiking and mountain bike riders will be required to stay on the designated tracks and not deviate from them. Weed, pest and disease control measures will be implemented during the construction and operational phases of the project to prevent the introduction of weeds and pest and to minimise the spread of existing infestations within the project area.

The NSESD also has a set of guiding principles to achieve the core objectives as discussed above and the Wangetti South Section has been assessed against the guiding principles in Table 9.2.

Table 9.2 Assessment against the ESD Guiding Principles

Guiding Principles	Comments
Guiding Principles *Guiding Principle 1: decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations.* A key consideration of ESD when integrating both long and short-term economic, environmental and social considerations is inter-generational and intra-generational equity. Inter-generational equity is the concept that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations, while intragenerational equity is applied within the same generation. This project would benefit current and future generations through employment. It would also provide stimulus to local and regional economies, thus contributing to future generations through social welfare, amenity and infrastructure.	The project incorporates a range of operational and physical controls and environmental management and mitigation measures to minimise potential impacts on the environment both short-term and long-term. These have been factored into the project through the assessment of the social, economic and environmental impacts of the project. Management measures to be implemented in relation to the potential impacts of the project relate to terrestrial and aquatic ecology, biosecurity, water quality and potential flooding, air quality, noise and vibration, Aboriginal and historic heritage, land use and tenure, traffic, waste, employment opportunities and an increase in visitors.
Guiding Principle 2: where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. The precautionary principle emphasizes the need to address the threats of irreversible damage, even in circumstances where there is scientific uncertainty about environmental risk. Environmental assessment involves predicting what the environmental outcomes of a development are likely to be, while maintaining a conservative approach in the event of uncertainty.	During the construction phase, the project is expected to cause localised losses of habitat predominately due to clearing for shared use trail, proposed waterway crossings and camp sites, and temporary disturbance of wildlife through construction noise and vibration. During the operation phase, the project is expected to be relatively benign for most environmental matters. Mitigation measures to prevent environmental degradation and reduce adverse environmental effects on MNES and the surrounding environment will be incorporated into a CEMP and EMP. The CEMP and EMP will outline and describe how the nominated contractor/developer will, during the construction phase and the operational phase, comply with the relevant environmental obligations and legislative requirements, outline how the contractor will minimise environmental risks and achieve environmental outcomes on the project by providing a structured approach to ensure appropriate environmental management

Guiding Principles	Comments
	measures and controls are implemented. In accordance with ESD principles, the project has addressed the conservation of biodiversity and ecological integrity by proposing an environmental management framework designed to conserve ecological values, where practicable, after consideration of potential project impacts. This includes the development and implementation of the following management plans: • EMP • CEMP • CESCP • WPDMP • TMP • MNES flora pre-clearance survey methodology.
Guiding Principle 3: the global dimension of environmental impacts of actions and policies should be recognised and considered.	Given this project is the establishment of a shared use mountain bike and walking trial, it is considered that impacts apply at a local scale only. The Wangetti South Section is considered to meet the intent of the world heritage values and natural heritage values associated with WTWHA (refer to section 3.2). The Wangetti South Section has been designed to minimise impact and identify and present outstanding natural values of the surrounding environment, including the WTWHA. The Wangetti South Section will provide the public with an immersive, nature experience centred on the unique features of the area and allow for greater sharing of environmental knowledge and connection. The Project has adopted the principles of the mitigation hierarchy, whereby impacts are addressed through the preferential order of avoidance, minimisation and compensation (offset).

Guiding Principles	Comments
	Throughout the project design, avoidance measures have been considered wherever possible, including minimisation of the total disturbance footprint of the Project and locating proposed infrastructure in previously disturbed areas. Where this avoidance is not possible, the proposed clearing footprint will be minimised to the greatest extent possible through selection of clearing techniques. Regular maintenance of the Wangetti South Section is also proposed during operation to clearly define trail areas and promote use of designated areas. This will create clear designation of public use areas and help to maximise protection and conservation of the surrounding WTWHA.
Guiding Principle 4: the need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised.	Wangetti South Section has been designed such that it is responsive to the natural environmental values, enhancing conservation and protection of a cherished part of Tropical North Queensland. World Trail were appointed to design the alignment and completed a walkthrough, working closely with Traditional Owners, specialist consultants and engineers. The project is being delivered by the DSDILGP in partnership with the DES, QPWS and the Traditional Owners of the country on which the trail traverses. The project is expected to deliver approximately 150 jobs, attract over 11,000 visitors pa and yield up to $300M in direct benefits to the region. The project would benefit current and future generations through employment. It would also provide stimulus to local and regional economies, thus contributing to future generations through social welfare, amenity and infrastructure.
Guiding Principle 5: the need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised.	The commitments to conservation and sustainability can be maintained in an

Guiding Principles	Comments
	environmentally sound manner for the project in the following ways: • The camp site will be built to modern best-practice standards for sustainable accommodation and amenities. • Renewable, durable, non-toxic and environmentally sustainable materials to be considered during the construction phase of the camp sites. • The shared use trail and its ancillary facilities will be low-impact and, to the greatest extent possible, ecologically sustainable and preserve and protect community resources.
Guiding Principle 6: cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms.	Given this project is the establishment of a shared use mountain bike and walking trial, this principle is not applicable to this project.
Guiding Principle 7: decisions and actions should provide for broad community involvement on issues which affect them.	TDPD is committed to delivering its projects with transparency and integrity. Throughout the project lifecycle, there has been extensive engagement with the local community, tourism industry, councils and regional organisations and conservation interest groups. The Wangetti Trail Project Team maintains a project website and e-newsletter which is updated regularly with any and all project updates. TDPD have prepared the Wangetti Trail Project Consultation Report which provides an account of the various community and stakeholder engagement activities at and across certain phases of the project. As part of the project, TDPD has continued to engage with Traditional Owners regarding the proposed works and to avoid impacts on cultural heritage values. The consultation report also articulates how the proposed trail alignment and infrastructure has responded dynamically to community concerns, expert advice, market

Guiding Principles	Comments
	feedback and engagement with the Traditional Owners of the country.

Table 9.3 Assessment against the Tourism Part 2 Sectoral Issues - Chapter 7

Tourism Objectives	Comments
Objective 7.1 -To ensure tourism strategies developed at all levels of government are based on ESD principles and provide effective mechanisms for industry and community input Governments will: • encourage agencies at all levels of government who are currently preparing tourism strategies, to include ESD principles and guidelines in their strategic tourism plans • where strategic and geographically-based tourism strategies have not been, or are not currently being developed, encourage action as a high priority • work with industry and community groups to develop guidelines on environmentally appropriate tourism development and tourist activity	The Wangetti South Section Project is being delivered by DTIS in partnership with the Department of Environment and Science, Queensland Parks and Wildlife Services and the Traditional Owners of the country on which the trail traverses. DSDILGP is committed to delivering its projects with transparency and integrity. Throughout the project lifecycle, there has been extensive engagement with the local community, tourism industry, councils and regional organisations and conservation interest groups. During the planning and design phase of the project. DSDILGP undertook engagement with the following engagement activities: • Direct engagement with the tourism market • Execution of preliminary agreement with Traditional Owners for business case activities and support for project • Focused consultation with community • Engagement of independent technical experts • Engagement of Wet Tropics Management Authority, QPWS, DES, DR, DTMR Douglas Shire Council and Cairns Regional Council. As a result of the engagement process it determined that there was strong interest and support for the development of an ecotourism adventure project in in TNQ. Following on from the project has been designed taking on board the following: • Best Practice Ecotourism Development Guidelines October 2015 • Input from mountain bike trail designers (World Trail) • The Australian Mountain Bike Trail Guidelines Trail Difficulty Rating System (MBTA TDRS and AWTGS • MNES as identified by environmental assessments completed for the project
Objective 7.2 - To examine the most appropriate use of regulatory measures to ensure tourism development is ecologically sustainable Governments will: • continue work on the effectiveness of applying performance bonds or non-compliance penalties as a means of regulating tourism development • identify further examples of regulatory measures for tourism development, including their possible impacts on industry and seek industry and community input on the acceptability of this range of measures	

Tourism Objectives	Comments
	• Design advice provided by mountain bike designers and builders • Advice from Wet Tropics Management Authority • Advice from the Traditional Owners • The Queensland Parks and Wildlife Service and Partnerships - Site and Facilities Design Manual As part of the construction and operational phases of the project, mitigation measures and management plans have been developed to address potential impacts the project could have on the surrounding environment and these are discussed in more detail in Section 5.2.
Objective 7.3 -To encourage environmentally appropriate tourist behaviour through the production and adoption of codes of environmental behaviour and practice and to improve tourist awareness of ESD principles Governments will: • encourage further work by industry organisations on development of codes of environmentally appropriate tourist behaviour and practice and assist in the wide dissemination of this information • continue to develop programs to provide the community with access to a wide range of environment related tourist information and encourage inclusion of the information on ecologically sustainable tourism in all new interpretive materials and programs	The planning, design, construction and operational phases of the project have considered the principles of ESD and an environmental management framework has been developed in response to this. According to the design philosophy in the Wangetti Trail Construction Methodology for the Wangetti Trail to be a world-class trail, the construction must be of the highest quality, but the end result needs to look like it has been in place for thousands of years, blending into the landscape seamlessly and harmoniously. The trail will be predominantly natural surface, constructed from the natural soil and rock found along the trail (where possible) and local quarries outside the WTWHA. Imported surfacing materials such as fine crushed rock may be used from time to time, but only in high traffic areas or where other requirements dictate its use. Imported materials can be visually unappealing and can introduce weeds and pathogens. Any surfacing materials that are used should be of local provenance and suitable for the intended purpose. The Project has been designed to minimise built structures. Where built structures are required, the design and finish will prioritise the use of local timbers and other materials that will age gracefully with time. Above all, the materials must be durable enough to withstand the harsh tropical climate and natural environment. The following management plans will form part of the environmental management framework for the project: • EMP

Tourism Objectives	Comments
	• CEMP • CESCP • WPDMP • TMP • MNES flora pre-clearance survey methodology. During the operational phase, the shared use trail, service tracks and public camping node will be managed in accordance with the Queensland Parks and Wildlife Service (QPWS) Asset and Infrastructure Management Business Rules (AIM business rules), QPWS operational policies, procedural guides, guidelines, information sheets, technical manuals and checklists. These documents set out standards that Wangetti South Section will need to comply with and provide a structured approach to ensure appropriate environmental management measures and controls are implemented as part of the project. TDPD is working with the Traditional Owners to be able find opportunities to include them in the operation of the project including creating partnerships with established businesses, to create sustainable and long term employment opportunities.
Objective 7.4 - To develop a greater understanding of the economic and environmental impacts of tourism developments, including monitoring of tourism trends, such as eco- tourism, Governments will: • encourage organisations such as the Bureau of Tourism Research and other State and Territory agencies to undertake further strategic and regionally focused research, including monitoring of international information and developments in this area • examine the most cost-effective and appropriate mechanism for undertaking further research into the environmental, social and cultural impacts of tourism, including practical dimensions to theoretical concepts such as carrying capacity, environmental load and limits of acceptable environmental change	A key objective for the project is to encourage growth in regional tourism visitation and economic development in tropical north Queensland. The project is expected to deliver significant flow-on benefits for the tropical north Queensland tropical north Queensland region and Queensland, stimulated by additional visitation and non-local expenditure generated by the new ecotourism and adventure tourism offering and establishment of complementary commercial offerings around it. The project is primed to be a catalyst that stimulates the region's employment and business development opportunities, particularly for the Traditional Owners. There is significant potential to draw on the knowledge, resources and skills of the Traditional Owners, including partnerships with established businesses, to create sustainable and long term employment opportunities. The market sounding confirmed strong support for authentic Traditional Owner engagement in the project through commercial arrangements and meaningful cultural experiences for users.

Based on the assessment above, the planning, design, construction and operation of the project has considered the principles of ESD. In addition, it can be demonstrated that the project can be undertaken in accordance with ESD principles through the application of measures to avoid and mitigate the potential environmental impacts of the project and where relevant adaptive management would be implemented.

10. Environmental record of person proposing to take the action

10.1 Information request

The preliminary documentation must include (if updated from that provided in the referral documentation) details of any proceedings under a Commonwealth, State or Territory law for the protection of the environment or the conservation and sustainable use of natural resources against:

a. the person proposing to take the action

b. for an action for which a person has applied for a permit, the person making the application.

10.2 Response to the information request

DTIS has a sound record of responsible environmental management. A CEMP will be prepared by the nominated contractor for the project. The CEMP will outline and describe how the nominated contractor will, during the construction phase, comply with the relevant environmental obligations and legislative requirements, outlines how the contractor will minimise environmental risks and achieve environmental outcomes on the project by providing a structured approach to ensure appropriate environmental management measures and controls are implemented. During the operational phase, the shared use trail, service tracks and public camping node will be managed in accordance with the QPWS Asset and Infrastructure Management Business Rules (AIM business rules), QPWS operational policies, procedural guides, guidelines, information sheets, technical manuals and checklists.

There are no proceedings against DTIS – TDPD under either Commonwealth or State legislation.

Applications made by other divisions of DTIS:

- 2015/7467 – Department of State Development/Transport - Water/Port of Abbot Point/Queensland/Abbot Point Growth Gateway Project, QLD
- 2014/7189 - Department of State Development, Infrastructure/Transport - Water/Boat Bay, 2 km north of Mission Beach, Queensland /Queensland/Department of State Development, Infrastructure and Planning/Transport - water/Boat Bay, 2 km north of Mission Beach/QLD/Mission Beach Safe Boating Infrastructure Project
- 2013/7100 - Department of State Development, Infrastructure and Planning/Transport - water/Two kilometres north of Mission Beach, Boat Bay, QLD/QLD/Mission Beach Safe Boating Infrastructure Project, Mission Beach, QLD
- 2019/8402 - The Minister for Economic Development Queensland/Water Management and Use/Combination of road reserve and lots. Affected roads and lots listed in answer to question 1.5/Queensland/Willowbank Industrial Park Trunk Water Main, Ipswich, QLD
- 2914/7356 - The Minister for Economic Development Queensland/Transport - water/Abbot Point/QLD/Abbot Point Dredging and onshore placement of dredged material, Abbot Point, QLD
- 2013/6953 - The Minister for Economic Development Queensland/Residential development/Southport, QLD/QLD/Undertake major residential development to construct 2018 Commonwealth Games Village, Southport, QLD

11. Conclusion

A summary of the information requested by DAWE in the request for additional information – assessment by preliminary documentation for Wangetti Trail South, Wangetti to Palm Cove, Queensland (EPBC 2020/8722) is provided in Table 11.1.

Wangetti South Project is considered to be acceptable and justifiable given the extent of impact avoidance, effective impact mitigation, protection of high conservation value areas, lack of significant indirect impacts, provision of an offset to counterbalance significant direct impacts, consistency with Government policies and strategies, consideration of key stakeholder requirements, and net economic and social benefits to the local and wider community.

Table 11.1 Summary of the information requested for the preliminary documentation

Information requested	Summary
2. Impact assessment – listed threatened species and communities	In Section 2.2 further information has been provided about the environmental controls to avoid, mitigate and manage impacts on listed threatened species and communities. In Section 2.2 further information has been provided for the opal cling goby to demonstrate that the operation of the proposed action will not result in ongoing indirect impacts on the species. Maps showing the potential habitat for the opal cling goby in the vicinity of the Wangetti South Section has been developed and included in the response. In Section 2.2 further information has been provided for southern cassowary to demonstrate that the operation of the proposed action will not result in ongoing indirect impacts on the species.
3. Impact assessment – Wet Tropics World Heritage Area and Wet Tropics National Heritage Place	In Section 3.2 information has been provided regarding cultural heritage surveys that have been completed to date for the project and details of how cultural heritage values will be managed for the Project. In Section 3.2, Wangetti South Project has been assessed against the World Heritage Values, The Wet Tropics Strategic Plan, and the World and National Heritage management principles as set out in the *Environment Protection and Biodiversity Conservation Regulations 2000*. The assessment determined that the Wangetti South Project is aligns with the intent and objectives of the above listed documents.
4. Cumulative impacts	In Section 4.2 cumulative impact assessment was completed for the southern cassowary, opal cling goby and the World and National Heritage values of the Wet Tropics of Queensland in the context of considering the impacts of the proposed action and the Wangetti Trail North Section and the construction and operational phases. Overall, it is considered that there will be no significant cumulative impact to the opal cling goby during the construction or operation of the Wangetti North Section and Wangetti South Section. Proposed works associated with Wangetti South Section are not considered to result in the clearing of habitat critical to the survival of the southern cassowary. Whereas, Wangetti North Section is considered to impact on some areas that are considered to be habitat critical to the survival of the southern cassowary.

Information requested	Summary
	While both Wangetti North Section and Wangetti South Section have been assessed as not resulting in a cumulative impact on the Cassowary, as a result of the works exceeding the clearing threshold of 1,500 m^2, the project will provide offsetting. Overall, it is considered that there will be no significant cumulative impact to the WTWHA during the construction or operation of the Wangetti North Section and Wangetti South Section
5. Avoidance, mitigation and management measures	The proponent has developed a number of management plans to be adopted by the nominated contractor to prevent, reduce or control adverse environmental effects on MNES and the surrounding environment during the construction phase and operation phase of the project. The management plans that have been developed for the project include the EMP, CEMP, CESCP, WPDMP, TMP and MNES flora pre-clearance survey methodology. Details about how each of the plans have been structured and how the plans have addressed the information requested by DAWE have been presented in Section 5.2.
6 Rehabilitation requirements	A rehabilitation plan has been developed for Wangetti South Section and has been based on other QPWS projects. The preference for the Wangetti Trail is to minimise impacts to the greatest extent possible and allow any disturbed areas to naturally regenerate as part of the rehabilitation process given that the majority of the proposed works is located within WTWHA. The rehabilitation plan will include the following: • Rehabilitating compacted area through involve light cultivation and the removal of weeds. The methodology will be confirmed with qualified botanists/ecologist during the rehabilitation process. • Weed and pest management Erosion and sediment control measures • Monitoring for erosion, weeds and pest impacts • Implementing the actions in the CMP.
7 Environmental offsets – residual significant impacts	In section 7, an assessment of the likelihood of residual significant impacts occurring on relevant MNES, after avoidance, mitigation and management measures have been presented for residual impacts to the southern cassowary. An offset strategy for the southern cassowary has been included in Section 7.
8 Social and economic matters	In section 8, key findings from the economic assessment of the Wangetti Trail Project has been provided. Information about the projected economic costs and benefits of the project and employment opportunities expected to be generated by the proposed action has been provided. While there are significant CAPEX and OPEX costs associated with developing the Wangetti Trail, there are a number of significant economic benefits that may be realised. The most significant benefit will be the increased visitor expenditure in TNQ, induced by domestic and international tourists travelling to the region specifically to use the

Information requested	Summary
	Wangetti Trail. Given the NPV is positive and the BCR is greater than one, this indicates a strong economic rationale for the Wangetti Trail.
9 Ecologically sustainable development (ESD)	In Section 9.2 Wangetti South Project was assessed against the National Strategy for Ecologically Sustainable Development (NSESD) to demonstrate that the Wangetti South Section conforms to the principles of the ESD. The assessment focused on the core objectives outlined in Part One of the NSED and the tourism objectives in Part 2 Sectoral Issues - Chapter 7.
10 Environmental record of person proposing to take the action	In Section 10.2 information has been provided on the person proposing to take the action. There are no proceedings against Department of State Development, Tourism and Innovation - Tourism Development Projects Division under either Commonwealth or State legislation.

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Appendices

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

Appendix B – Wangetti South Section Preliminary Environmental Management Plan

Appendix C – Potential habitat for the opal cling goby (*Stiphodon semoni*) in the vicinity of the Wangetti South Section Trail

Appendix D – Cassowary Recovery Plan Objectives and Actions

Appendix E - Existing cassowary conservation groups

Appendix F - Community Consultation Summary Report (DTIS, 2021)

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