



Daintree Electricity  
Supply Options  
Natural Heritage  
Constraints Assessment



## Executive Summary

This report details the findings of a desktop assessment of natural heritage values in the Daintree Study Area which includes the local communities of Cape Tribulation, Cow Bay, Diwan and Forest Creek.

Existing data on the natural heritage values within the study area was acquired from a range of authoritative data sources maintained by Commonwealth and Queensland government agencies. All data generated by the information search was analysed to extract records considered of conservation significance. This included records pertaining to flora and fauna of conservation significance (e.g. Endangered, Vulnerable or Near Threatened, endemic, or of evolutionary significance), threatened ecological communities, and 'Endangered or 'Of Concern' Regional Ecosystems.

All records of conservation significant flora and fauna retrieved during the desktop study were assessed on their likelihood of being present in the study area. Three categories of likelihood of presence were determined: Confirmed, Possible and Unlikely.

The flora Likelihood of Occurrence analysis determined that 77 flora species of conservation significance are confirmed to occur within the study area, with a further 12 species possibly occurring in the study area. Thirty-five fauna species of conservation significance are confirmed as having been recorded in the study area, with a further 11 considered to be possibly occurring in the study area.

A number of Regional Ecosystems listed as Of Concern or Endangered (under the *Vegetation Management Act 1999*) occur within the study area. One Regional Ecosystem (RE 7.2.1) which occurs in the study area is also analogous to a Threatened Ecological Community under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

The analysis also identified that the majority of the study area is within the Wet Tropics World Heritage Area and is rich in values for which the Wet Tropics was inscribed on the World Heritage List. This not only includes biodiversity values, but also areas of exceptional natural beauty and aesthetic importance.

### Summary of major findings

In general, the desktop assessment of the natural heritage values confirms that:

- The Daintree Study Area is a biodiversity hotspot. Any electricity supply option will be heavily constrained where it results in disturbance because significant natural heritage values exist across the entire study area.
- The Daintree Study Area exhibits a range of significant biodiversity attributes throughout, including lands both within and outside of the Wet Tropics World Heritage Area.

- The Study Area possesses significant values in terms of exceptional natural beauty and scenic landscapes, which are recognised as part of its World Heritage values and are also acknowledged under the Douglas Shire Council Planning Scheme.
- Any planning for an electricity microgrid (network) in the Study Area will need to take into account these inherent and significant natural heritage values; and recognise that this will impose environmental constraints and associated legislative considerations (assessment and approvals) on development options.

These constraints reinforce that to the greatest possible extent, any microgrid network will need to be contained within existing disturbed areas and buried underground (i.e. undergrounding along existing roads or easements as proposed in the Powering Daintree report (Sunverge 2018).

A provisional assessment of the possible impacts of construction on natural heritage values within the existing footprint of disturbance (e.g. existing roads) would likely include:

- Temporary displacement of a suite of fauna species such as cassowaries, reptiles, amphibians and mammals (and possible mortality in the case of reptiles and amphibians);
- Damage to vegetation from trimming to allow machinery access for cable or pipeline installation and impacts to roots from digging and trenching;
- Possible biosecurity risks if strict biosecurity protocols are not followed – such as the introduction of myrtle rust and other pathogens and vascular weeds;
- Disturbance to soil, which may impact downstream water quality; and
- Disturbance to watercourses and aquatic ecosystems.

#### Legislative considerations and constraints

A high level of regulatory scrutiny under a range of different legislation will be required for any microgrid proposal that involves electrical networks designed to offer connection to the majority of properties within the study area. For example: microgrid infrastructure in the World Heritage Area will require the highest level of regulatory scrutiny and approvals. This would require assessment under the *Wet Tropics Management Plan 1998 (WTMP)* which would, among other aspects, include consideration of prudent and feasible alternatives to those proposed. Construction and installation of such infrastructure in the World Heritage Area might also be deemed a significant action under *the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)*.

A high level of regulatory scrutiny is also likely to be required for microgrid proposals where the proposed infrastructure is situated outside the World Heritage Area. For example, where the proposed microgrid network passes through areas where flora or fauna species listed under the EPBC Act or *Nature Conservation Act 1992 (NC Act)* are known to, or may, occur.

Assessment of the five electricity supply options identified in Sunverge Energy's 2018 Powering Daintree report

The most recent publicly available study on electricity supply options for the Daintree was undertaken by Sunverge Energy Australia Pty Ltd. Sunverge's 'Powering Daintree' report proposed five electricity supply options:

- Option 1: Single microgrid
- Option 2: Three separate microgrids
- Option 3: Numerous small microgrids linked by gas pipelines
- Option 4: Extend three separate microgrids from existing generation assets at Cape Tribulation
- Option 5: Individual Remote Area Power Systems

These options have been assessed against natural heritage considerations and are summarised in **Table 4**. The assessment was carried out on the assumption that design criteria proposed in the Powering Daintree report would be applied. In particular, electricity or gas supply networks would be installed underground within an existing footprint of disturbance (e.g. existing road or easement). Restricting the installation of networks to already disturbed areas supports efforts to avoid or minimise any long-term impacts on natural heritage values.

Given the information provided in the Powering Daintree report:

- **Option 1** and **Option 3** are likely to pose the highest risk of impact given they propose the greatest length of powerlines or gas supply lines that would be passing through the World Heritage Area, where land within the Wet Tropics World Heritage Area generally captures natural heritage values of the highest order (i.e. World Heritage values);
- Alexandra Range is assessed to be the section within the World Heritage Area that presents highest overall risk as it is already highly constrained by steep topography natural heritage values and installation of an electricity or gas supply line is likely to result in major engineering challenges and subsequent environmental impacts.
- **Option 2** is likely to pose some risk of impact on World Heritage values as it still involves some of the powerlines passing through the World Heritage Area. However, it does not require the laying of lines over the Alexandra Range.
- **Option 4** only relates to the Cape Tribulation area and involves only a small length of powerline through the Wet Tropics World Heritage Area north of Cape Tribulation. Risk of impact to significant natural heritage values, including World Heritage values, could potentially be managed through appropriate conditions for construction works.
- **Option 5** essentially involves upgrades to the Remote Area Power Supply (RAPS) scheme currently used by individual properties which typically involves a hybrid system (solar, diesel/gas, battery storage). Where residences or businesses have already been established on these properties, it is anticipated there would be little requirement to further disturb vegetation, other than some vegetation management to improve solar panel efficiency. Most properties of relevance to this option are located outside the

World Heritage Area, although it is noted that significant environmental values (e.g. threatened species) exist in these areas.

In summary, this assessment finds that Options 1, 2 and 3 are highly constrained by the very high natural heritage values that are present, both within and adjacent to the World Heritage Area. Options 1 and 3 pose the highest level of natural heritage and legislative constraints. Option 5 has the lowest level of constraint.

Further detailed assessments of Options 1, 2 and/or 3 would need to demonstrate that infrastructure works would not have a significant impact on the Wet Tropics World Heritage Area, or other significant natural heritage outside of the Area. Should such detailed assessments propose activities or alignments that are likely to impact on the World Heritage values or the integrity of the Wet Tropics World Heritage Area, prudent and feasible alternatives would need to be considered. This may involve amending proposed alignments, design, construction methods, or stronger consideration of options outside the World Heritage Area.

## List of Acronyms

ARENA	Australian Renewable Energy Agency
BAMM	Biodiversity Assessment and Mapping Methodology
BPA	Biodiversity Planning Assessment
DNRME	Department of Natural Resources, Mines and Energy
DES	Department of Environment and Science
EHP	Department of Environment and Heritage Protection
EPBC Act	Commonwealth <i>Environment Protection and Biodiversity Act 1999</i>
EVNT	Endangered, Vulnerable and Near Threatened
LoO	(Species) Likelihood of Occurrence
MNES	Matters of National Environmental Significance
NC Act	<i>Nature Conservation Act 1992</i>
OUV report	A Spatial Representation of Selected Natural Outstanding Universal Values of the Wet Tropics World Heritage Area report
PMR	Protected Matters Report
TEC	Threatened Ecological Community
VMA	<i>Vegetation Management Act 1999</i>
WHA	World Heritage Area
WTMA	Wet Tropics Management Authority
WTMP	<i>Wet Tropics Management Plan 1998</i>

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## 1.0 Introduction

### 1.1 Background

The Department of Natural Resources, Mines and Energy (DNRME) is progressing a feasibility study to develop a more targeted and comprehensive evidence-base to allow the Queensland Government to adequately assess the viability of providing a sustainable electricity supply to the Daintree region at an affordable price to customers, consistent with government policy.

As part of this process, DNRME is considering the feasibility of electricity supply options identified in previous studies. The most recent publicly available study on electricity supply options for the Daintree was undertaken by Sunverge Energy Australia Pty Ltd (Sunverge 2018). Sunverge's Powering Daintree report identified five electricity supply options – refer Section 1.4 below.

DNRME have engaged the Wet Tropics Management Authority (WTMA) to prepare this *Daintree Electricity Options – Natural Heritage Constraints Assessment* report which is intended to assist DNRME and other stakeholders in understanding the natural heritage values of the Daintree region and associated legislative constraints. The report has a specific focus on the Powering Daintree report. A separate complementary report; *Daintree Electricity Options – Aboriginal Cultural Heritage Constraints Assessment* has been prepared by Jabalbina Yalanji Aboriginal Corporation to assist stakeholders in understanding cultural heritage values and constraints.

### 1.2 Aim and Objectives

The aim of this report is to assess the natural heritage values throughout the Daintree Study Area, and determine the constraints that these may impose on the five options presented in the Powering Daintree report. In meeting this aim, the objectives are to:

- Provide a broad assessment of the natural heritage values of the Daintree Study Area;
- Develop a better understanding of constraints to energy supply infrastructure development as a consequence of natural heritage values and existing legislative context; and
- Provide a broad assessment of the five options proposed in Powering Daintree report in light of values present.



### 1.3 Scope

This report is restricted to the Study Area as depicted on **Figure 1**. The Study Area is an adaptation of that provided in the Powering Daintree report. Tenure within the Study Area is depicted in **Figure 2**.

This report relates to natural heritage values and associated legislative considerations in relation to the Daintree Study Area.

The report has a specific focus on the Powering Daintree report, including consideration of natural heritage constraints in relation to installation of the five power supply options. This WTMA report does not deal with other matters that will be considered in progressing the DNRME feasibility study such as:

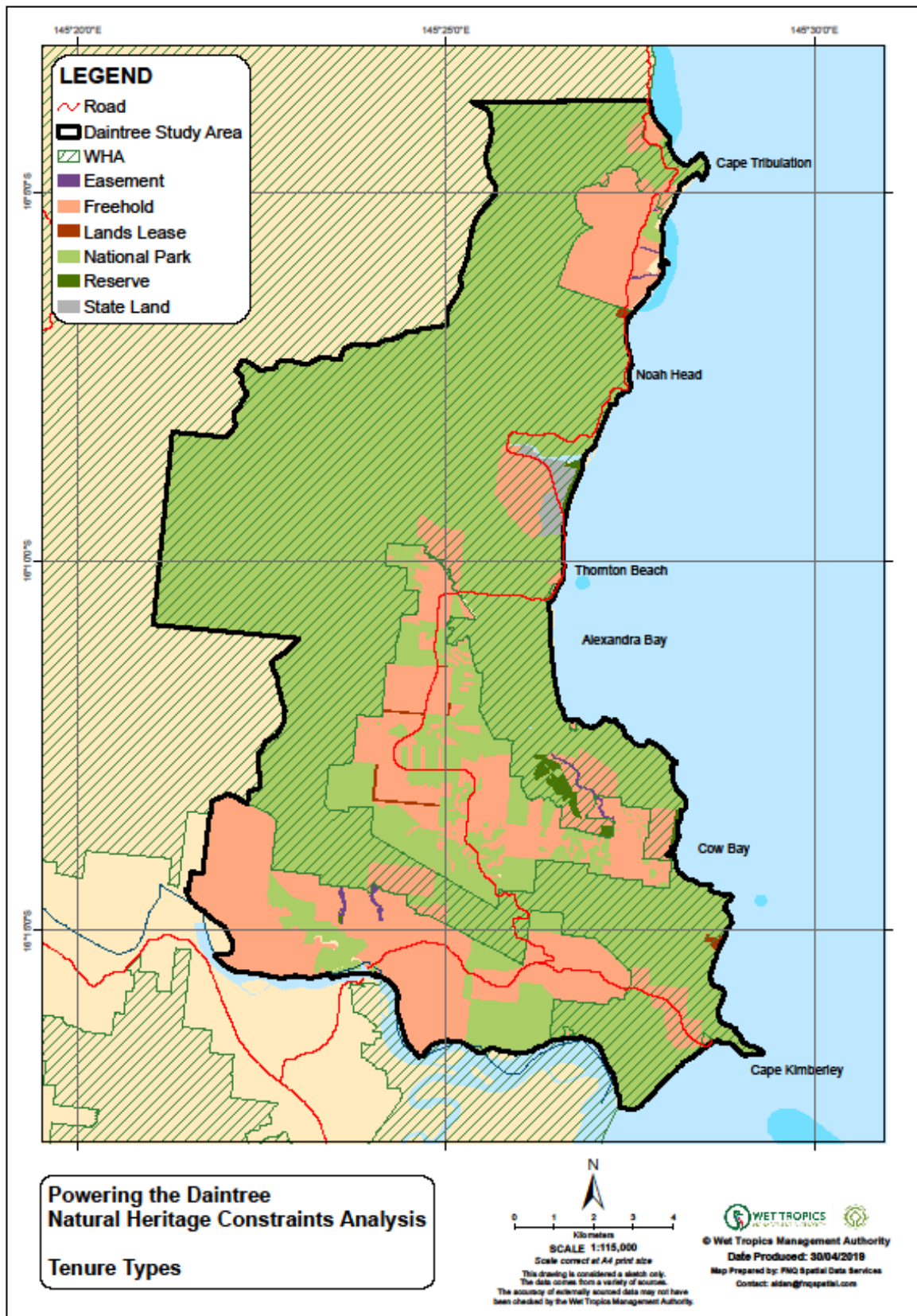
- cultural heritage;
- current technology considerations;
- economic considerations;
- community equity;
- supply reliability; and
- environmental sustainability (including renewable potential).

The assessment undertaken under this scope of work may constitute an initial phase of a two-stage process. A second phase involving more detailed natural heritage assessments (e.g. detailed on-ground ecological surveys) would be required for any preferred electricity supply option.

Figure 1. Study Area



Figure 2. Tenure



## 1.4 Literature Review

This study relied heavily on the review of three key reports:

- Powering Daintree - A study of supply options for the Australian Renewable Energy Agency (Sunverge 2018)
- A Biodiversity Planning Assessment for the Wet Tropics Bioregion – Expert Panel Report Version 1.1 (DES 2018a)
- A Spatial Representation of Selected Natural Outstanding Universal Values of the Wet Tropics World Heritage Area (DES 2018b).

Further information on these reports is provided below.

### **Powering Daintree - A study of supply options for the Australian Renewable Energy Agency**

Sunverge was engaged by the Australian Renewable Energy Agency (ARENA) to:

- Define the challenges faced in supplying energy in the Daintree community;
- Identify options to supply power to residents of the Daintree community, including analysis of current technologies (traditional and renewable) and analysis of system and energy load data;
- Analyse tariff and financial structure options to enable a community-based scheme which rewards efficient behaviours and delivers improved infrastructure; and
- Develop options and recommendations for pilot and broader rollout of energy supply technologies to the Daintree community (Sunverge 2018).

Five power supply options were assessed in the Powering Daintree report:

1. Single Daintree electrical microgrid with a staged pathway for high renewable uptake (synchronous machines co-located at solar farms);
2. Daintree electrical microgrid (broken up into three segments, less PV potential and lower diversity);
3. Daintree gas microgrid high renewable uptake using power to gas and biomethane (spur gas pipeline not shown, all PE pipeline);
4. Cape Tribulation - Leverage off existing generation and load density per km to extend in small LV networks (LPG substitution and some local PV); and
5. Upgrade of individual hybrid supply options.

Maps from the Powering Daintree report depicting Options 1 to 4 are presented at **Figure 3**. The location of microgrid networks depicted on the maps are taken to be the preferred alignments for these power supply options.

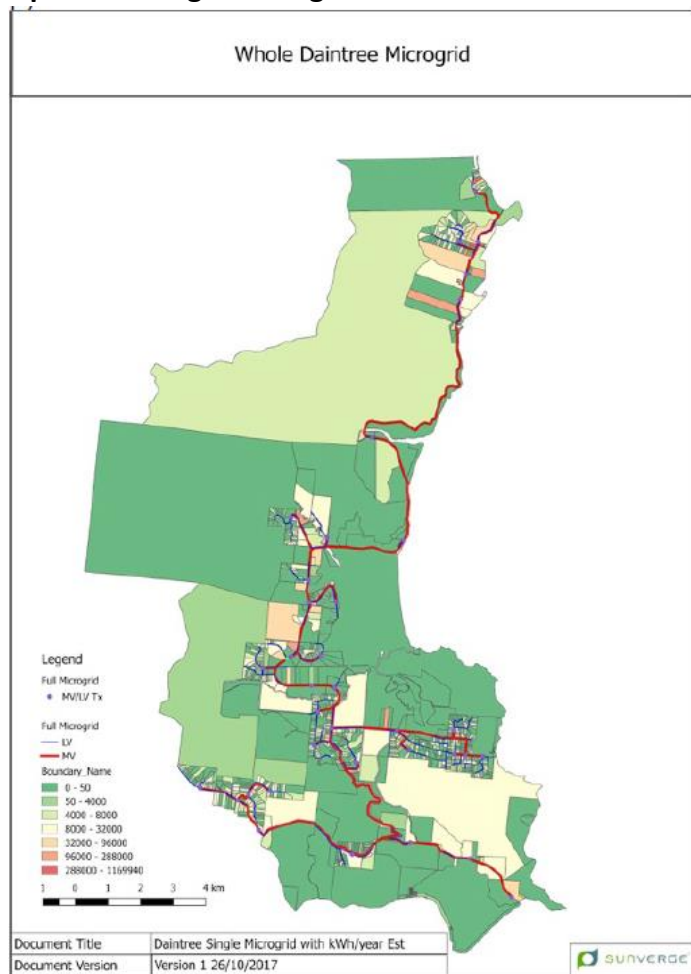


A number of design criteria are proposed in the Powering Daintree report. In particular, WTMA took into account the following factors when undertaking the natural heritage constraints assessment.

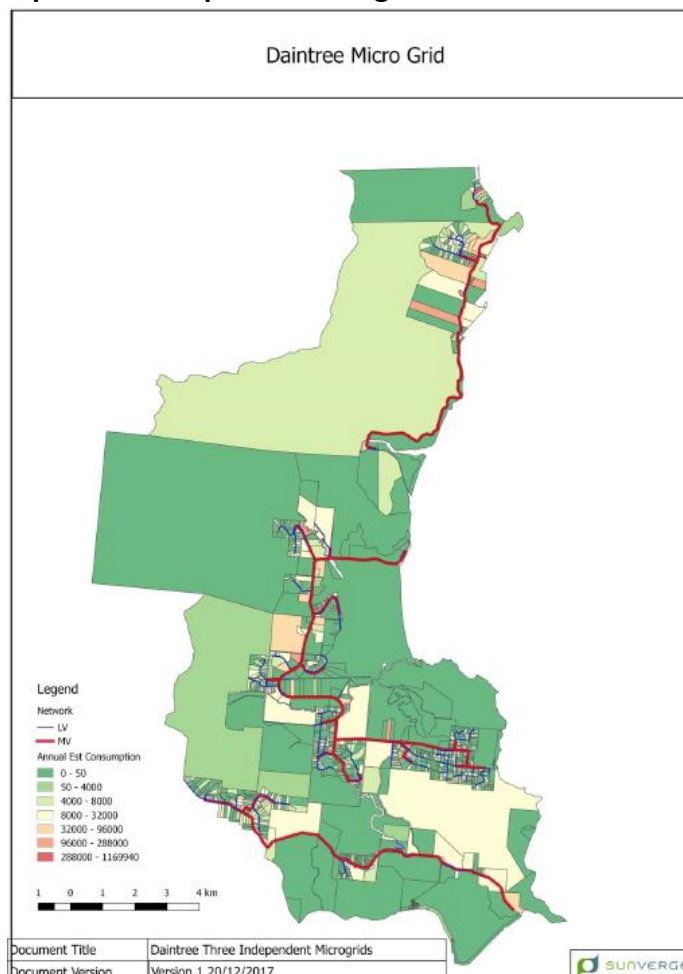
- The rugged and variable landscape present a number of physical challenges for electricity infrastructure, although most of these challenges can be overcome by appropriate underground installation along existing roads or easements and without affecting any additional vegetation.
- Underground installation of cables will require horizontal directional drilling (HDD) in some instances. However, indications are that most locations are favourable and so quicker drilling methods, trenching or possibly even cable ploughing might be feasible.
- Directional drilling would be required through the rocky sections joining Diwan/Cow Bay to Forest Creek and Cape Kimberley and would require many setup pits due to the many switch backs or a very large directional drill bypassing much of the road.

**Figure 3: Microgrid Options – Powering Daintree Report**

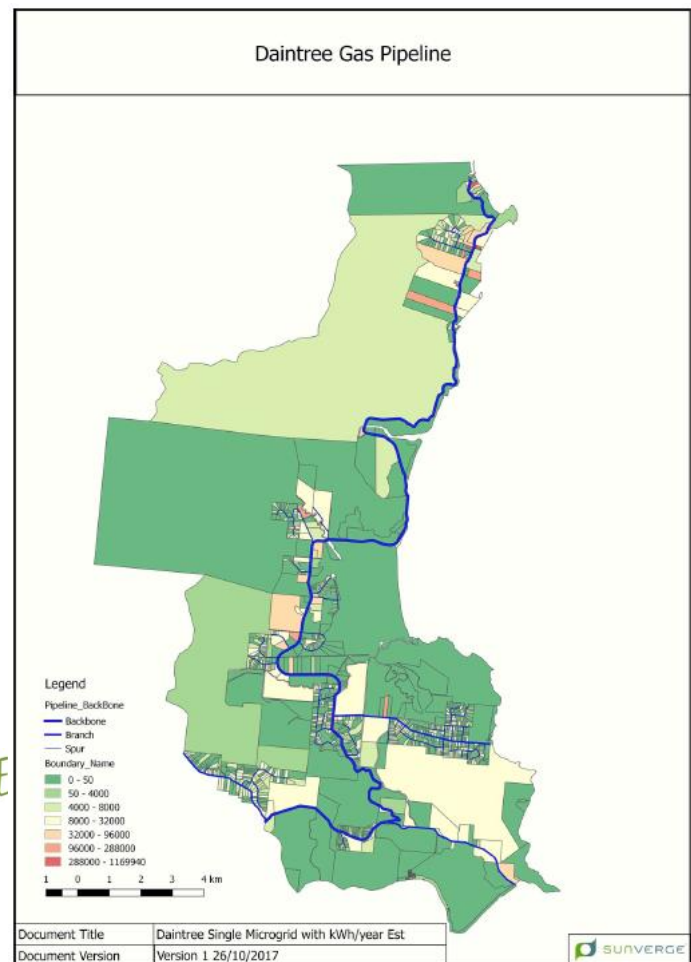
**Option 1: Single microgrid**



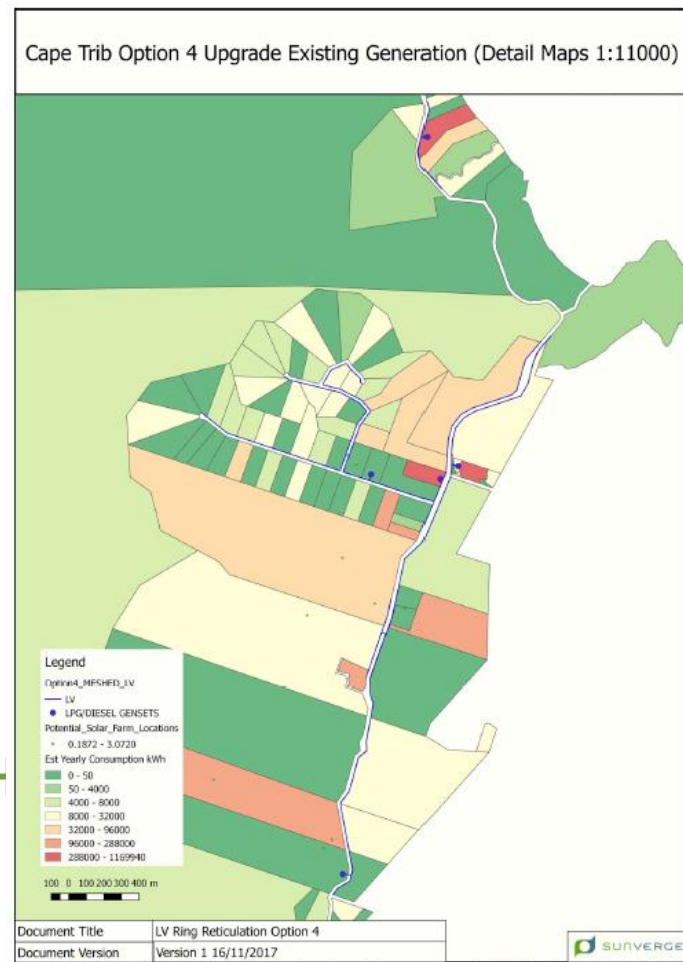
**Option 2: 3 Separate microgrids**



**Option 3: Microgrids linked by gas pipeline**



**Option 4: Extend microgrids at Cape Tribulation**



## A Biodiversity Planning Assessment for the Wet Tropics Bioregion

At the time of writing, a draft Biodiversity Planning Assessment (BPA) report for the Wet Tropics bioregion is being prepared to inform a wide range of internal assessment, planning and referral activities including:

- Regional plans and local planning schemes;
- Government advice under the Queensland planning legislation
- State Government tenure dealings including identification of protected areas; and
- Habitat mapping for threatened species.

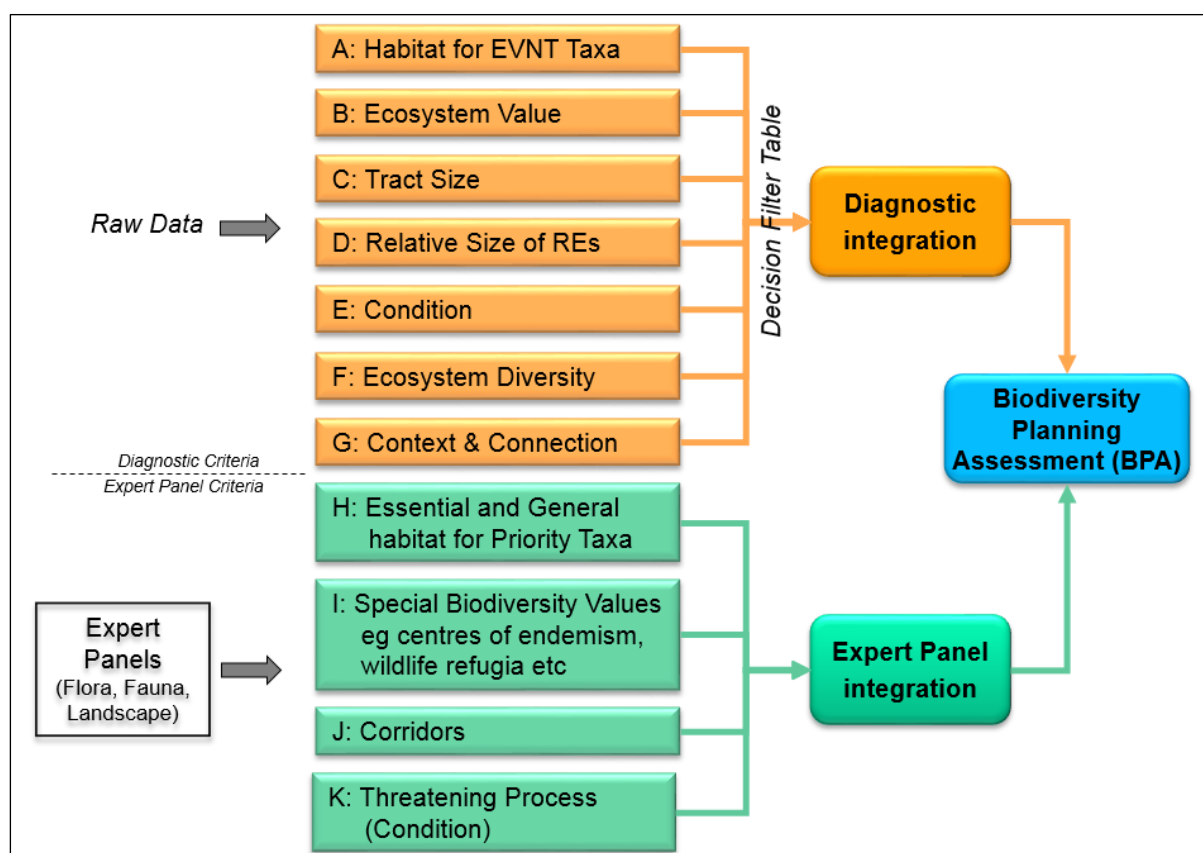
It is being prepared by the Biodiversity Assessment Unit of the Queensland Department of Environment and Science and due for release in 2019. The Biodiversity Assessment Unit provided WTMA with a copy of the draft Expert Panel report as well as other data and maps to assist in the preparation of this constraints assessment.

The BPA report uses the Biodiversity Assessment and Mapping Methodology (BAMM) (EHP 2014) which was developed to provide a consistent approach for assessing biodiversity values at the landscape scale in Queensland using vegetation mapping data generated or approved by the Queensland Herbarium as a fundamental basis (refer **Diagram 1**). The results can be used by agency staff, other government departments, local governments or members of the community to advise on a range of planning or decision-making processes.

In particular, WTMA used elements of BPA data and mapping to:

- Identify habitats having very high threatened species ratings;
- Identify habitats with special attributes related to World Heritage values e.g. rich in endemic species (i.e. species that occur only in the Wet Tropics bioregion); and
- Identify habitats containing species of evolutionary significance.

**Diagram 1.** Biodiversity Assessment and Mapping Methodology (BAMM) process



### A Spatial Representation of Selected Natural Outstanding Universal Value of the Wet Tropics World Heritage Area ('the OUV report')

This report (DES, 2018) was prepared by the Queensland Department of Environment and Science and supports the Biodiversity Planning Assessment report referred to above. It provides a spatial representation of selected natural ecological Outstanding Universal Values (OUV) of the Wet Tropics World Heritage Area, and also across the entire Wet Tropics bioregion.

Outstanding Universal Value means 'natural and/or cultural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity. As such, the permanent protection of this heritage is of the highest importance to the international community as a whole' (UNESCO 2017).

The World Heritage Committee defines the criteria for inscription of properties on the World Heritage List. The OUV report notes that the Wet Tropics is listed for all four natural heritage criteria being:



- Outstanding examples representing the major stages of earth’s evolutionary history;
- Outstanding examples representing significant ongoing ecological and biological processes;
- Superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance; and
- The most important habitats for in situ conservation and biological diversity, including those containing threatened species of plants and animals of outstanding universal value from the point of view of science and conservation.

The OUV report refers to specific Wet Tropics World Heritage values or attributes under each of these four World Heritage criteria. A list of species pertaining to each attribute is also provided in the OUV report. This WTMA Natural Heritage Constraints Assessment report determines the likelihood of occurrence of these species within the Study Area.

## 1.5 Legislative Context

A broad range of legislation is of relevance to the consideration of supplying power to the Daintree area. As most of the Study Area is located within the Wet Tropics World Heritage Area (refer to **Figure 2**) the most pertinent legislation for the study area includes the Commonwealth’s *Environment Protection and Biodiversity Act 1999* (EPBC Act) and Queensland’s *Wet Tropics Management Plan 1998* (WTMP). Other pertinent legislation includes the *Nature Conservation Act 1992* (NC Act) and relevant regulations, the *Vegetation Management Act 1999* (VMA), and the *Douglas Shire Council Planning Scheme 2018*. The relevance of the above legislation and how it may need to be taken into account with respect to natural heritage constraint considerations is described further below.

### 1.5.1 Environment Protection and Biodiversity Conservation Act 1999

Under this Act a person must not, without an approval under the EPBC Act, take an action that is likely to have a significant impact on a matter of national environmental significance (MNES). These include (but are not restricted to):

- World Heritage properties;
- threatened species and ecological community listed under the Act;
- listed migratory species.

The EPBC Act requires that a person proposing to take an action that should impact on MNES should contact the Commonwealth Minister for the Environment for a decision on whether or not the action needs an approval under the Act. The EPBC Act can apply to proposed activities outside the Wet Tropics World Heritage Area that may result in consequential impacts on the Area.

### 1.5.2 Wet Tropics World Heritage Area legislation

The *Wet Tropics World Heritage Protection and Management Act 1993* is the Queensland legislation which establishes the Wet Tropics Management Authority (WTMA) to ensure that Australia's obligation under the World Heritage Convention is met in relation to the Wet Tropics World Heritage Area. The Act also provides the legal basis for the *Wet Tropics Management Plan 1998*.

The *Wet Tropics Management Plan 1998* (the Plan) regulates particular activities that may have a potential impact on the Area's World Heritage values or its integrity. The Plan only applies to activities within the Wet Tropics World Heritage Area.

#### *World Heritage Area Zoning*

The Plan divides the entire World Heritage Area into four zones called A, B, C and D. The zones have different degrees of integrity, different physical and social settings and different management purposes. The zoning scheme allows different types of activities in each zone, in accordance with the management intent and integrity of the zone. The zones are summarised below.

#### Zone A

Land included in zone A has a high degree of integrity and is remote from the disturbances associated with modern technological society. It is in its natural ecological, physical and aesthetic condition and sustaining this condition is the intent of this zoning.

#### Zone B

Like land in zone A, zone B has a high degree of ecological integrity and is in a natural state but is not necessarily remote from disturbance. There is a reasonable expectation that it could be restored to a condition which would qualify for inclusion in Zone A.

#### Zone C

Land in zone C already contains disturbances which are often associated with existing community infrastructure. Visitor facilities may be located in this zone. While there is some disturbance in this zone, the land is in a mostly natural state and will be managed to minimise any adverse impact of these facilities and associated activities, while protecting the integrity of the land.

#### Zone D

Zone D contains lands where there are, or may be, visitor facilities of a well-developed type. Visitors and visitor facilities will not be confined to this zone, but it is intended that the more intensive, organised visitor activities and associated facilities would be focused here. Facilities may include picnic shelters, barbecues, interpretive facilities and car parks. Lands in zone D will still be in a mostly natural state.

The current zoning is depicted on **Figure 4**.

### *Review of the Wet Tropics Management Plan 1998*

The Plan is currently under review. WTMA anticipates an amended Plan will be in force by late 2019 pending approval by Queensland and Commonwealth Governments. As part of the review, the Authority proposes to amend the zoning system to better reflect the management intent for each zone. More specifically:

- Large areas of zone B, described in 1998 as land mostly of high integrity but still recovering from past disturbances, are proposed to be reclassified as zone A. This proposed reclassification is in keeping with current Plan requirements that zone B land be reclassified to zone A once it has been sufficiently recovered or rehabilitated.
- It is proposed Zone B be retained adjacent to designated community services infrastructure such as roads and powerlines. The zone would generally extend 500 m from the centreline of the linear infrastructure. Retaining zone B will allow local governments to seek a rezoning to zone C for provision of essential community services infrastructure.
- Zone C would generally comprise of lands within 50 m of linear infrastructure such as powerlines, roads and railways, and some major infrastructure sites such as dams and towers. It is also proposed that zone C would include selected areas of cleared land which have existing use rights or clearings identified as potential sites for community services infrastructure, tourism facilities or other activities.
- Zone D visitor sites are incorporated into Zone C. Zone D is removed from the zoning scheme.

The proposed zoning is depicted on **Figure 5**.

Figure 4. Current Wet Tropics Management Plan Zoning

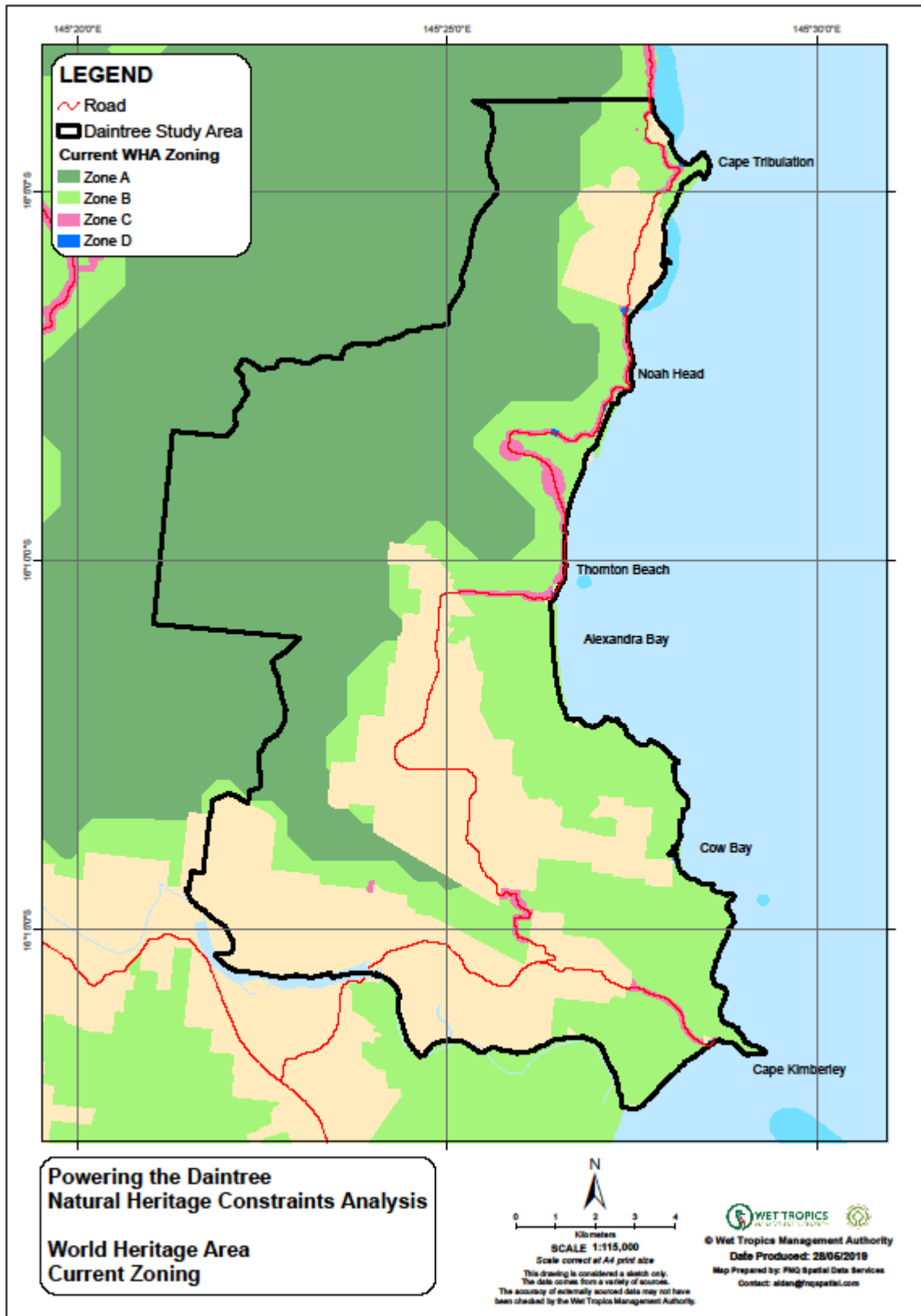
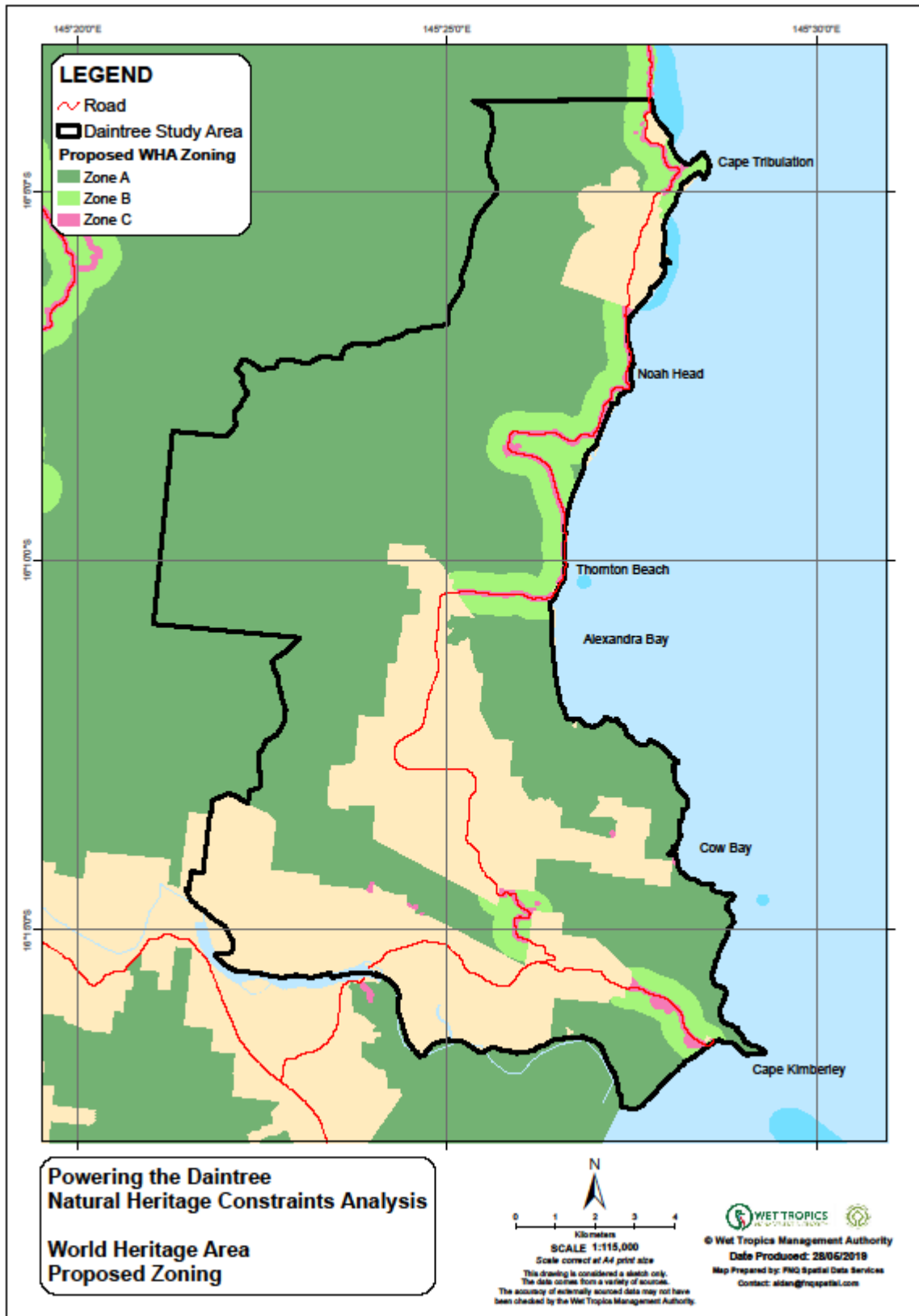




Figure 5. Proposed Wet Tropics Management Plan Zoning



## Nature Conservation Act 1992 and regulations

### Nature Conservation Act

The Nature Conservation Act 1992 (NC Act) provides for the legislative protection of Queensland native fauna and flora. All native plants and animals are protected, irrespective of their listing status (Endangered, Vulnerable, Near Threatened, Special Least Concern or Least Concern).

The NC Act is relevant to the project where works may be undertaken on national park or where Endangered, Vulnerable or Near Threatened (EVNT) plants may be impacted.

Section 35 of the NC Act provides a means whereby a lease or licence may be issued for a service facility in a national park where it is in the public interest e.g. a community electricity supply. It should be noted that some of the five options considered in the Powering Daintree report include sections of the network that appear to bisect national park. However, the infrastructure itself is likely to be within the footprint of existing road reserves, which are not part of the National Park.

A provision within the NC Act allows for a clearing permit to be issued for new infrastructure projects with an overriding public interest for the supply of electricity to proceed even where impacts on the sustainability of an EVNT species cannot be guaranteed. This applies where an easement has been approved to construct this infrastructure. This provides the electricity sector with greater certainty that a particular project can proceed<sup>1</sup>.

However, in circumstances where a Protected Flora Survey Trigger Map identifies that the land is determined to be in a 'high risk area' and neither a general exemption nor the trigger map exemption applies, a flora survey of the area would need to be conducted prior to any potential clearing, in order to determine the presence or absence of EVNT plants<sup>2</sup>. High risk areas are where plants classed as Endangered, Vulnerable or Near Threatened are present or are likely to be present. The Protected Flora Survey Trigger Map (**Figure 8**) shows that the Daintree area is dominated by 'high risk' areas.

## Vegetation Management Act 1999

The clearing of native vegetation in Queensland is regulated by the Queensland government under the *Vegetation Management Act 1999* (VMA). The requirements under the VMA depend on the VMA Class and area of vegetation to be cleared. However, exemptions may apply. For example, for regional ecosystems classified as 'Least Concern', clearing to

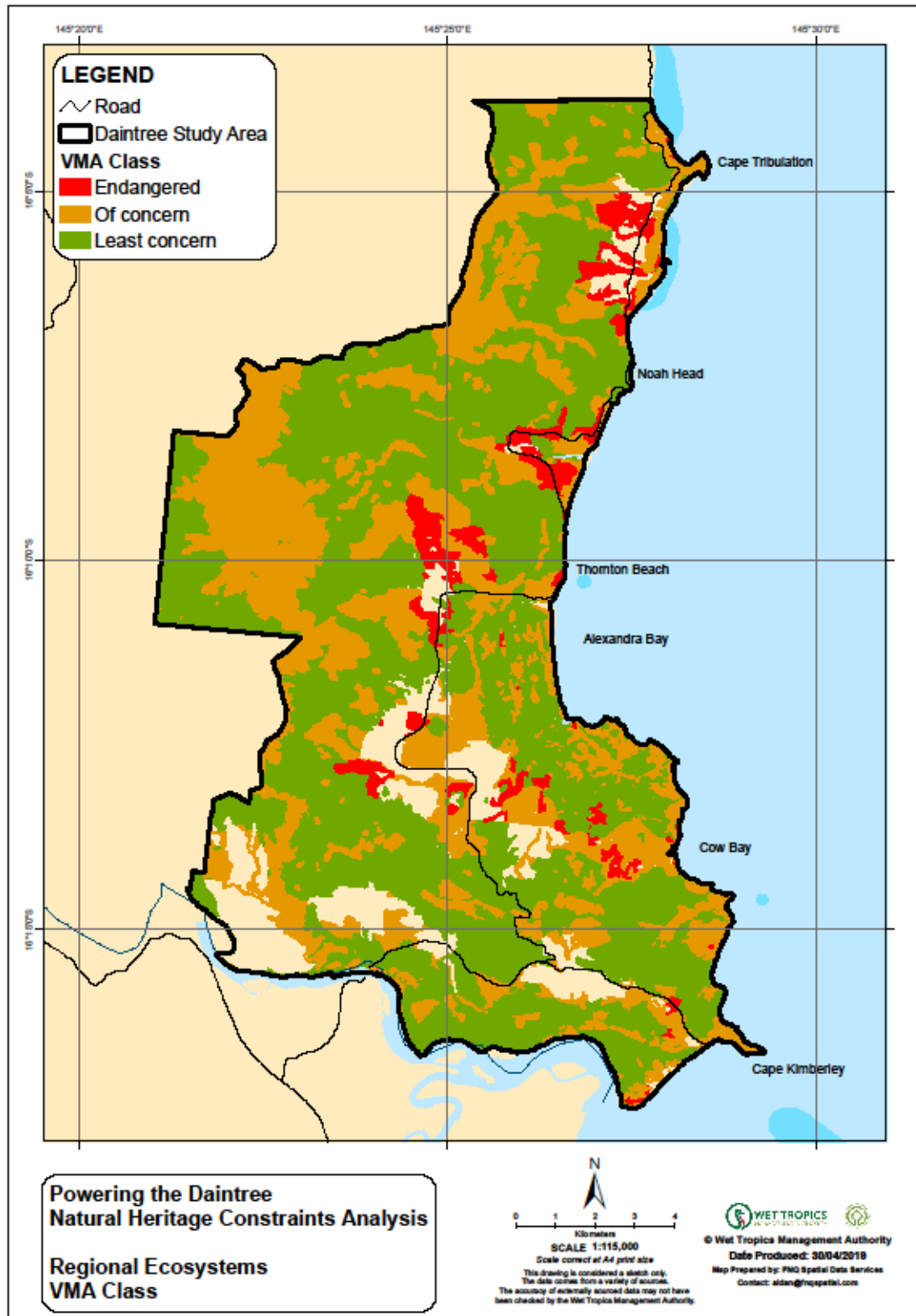
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<sup>1</sup> Refer <https://environment.des.qld.gov.au/licences-permits/plants-animals/protected-plants/clearing/electricity-sector/>

<sup>2</sup> Refer [https://environment.des.qld.gov.au/licences-permits/plants-animals/protected-plants/clearing/index.html#when\\_is\\_clearing\\_exempt.](https://environment.des.qld.gov.au/licences-permits/plants-animals/protected-plants/clearing/index.html#when_is_clearing_exempt.)

construct necessary built infrastructure is exempt from the VMA (Qld Government, 2019) where the total clearing extent and the extent of the infrastructure does not exceed 2 hectares. Refer **Figure 6** for VMA Classes within the Study Area.

**Figure 6 - VMA Classes within the Study Area**



## Douglas Shire Council Planning Scheme 2018

The Douglas Shire Planning Scheme (planning scheme) has been prepared in accordance with the *Sustainable Planning Act 2009* (SP Act) as a framework for managing development in a way that advances the purpose of the SP Act. In seeking to achieve this purpose, the planning scheme sets out Douglas Shire Council's intention for the future development in the planning scheme area, over the next 20 years (DSC 2018).

The planning scheme's Strategic Framework acknowledges the significant environmental values present:

*The Wet Tropics also presents an unparalleled record of the ecological and evolutionary processes that shaped the flora and fauna of Australia, containing the relics of the great Gondwanan forest that covered Australia and part of Antarctica, 50 to 100 million years ago. This area is mostly tropical rainforest and is extremely important for its rich and unique biodiversity.*

*Douglas Shire is home to a diverse range of native and endemic plants and animals, including habitat for rare and endangered species, some of which are found nowhere else on the planet. The Shire's high biodiversity values are reflected in its natural environments, ranging from rainforest and wet sclerophyll woodlands to mangrove forests and wetlands, to vegetated sand dunes/swale systems, reefs, foreshore areas, intertidal seagrass beds and estuarine creek and river systems. Some of these areas are located outside the World Heritage Areas and are exposed to development pressure (DSC 2018).*

Section 3.9.2 (Element-Energy) of the Strategic Framework sets strategic outcomes such that:

1. Reticulated energy supplies are provided to all urban communities within the Shire.
2. Elsewhere, alternative energy as a source of electricity for dwellings can present significant environmental benefits. The use of alternative, renewable energy sources such as solar and wind power is a small, yet significant method by which the community can address the global issue of climate change through local actions. However, a balance between the potential benefits and negative impacts of using alternative energy technologies is needed.

Further, the Cape Tribulation and Daintree Coast local plan sets a performance outcome that Development provides a suitable standard of self-sufficient service for:

- a. potable water;
- b. water for firefighting purposes;
- c. electricity supply.



The acceptable outcome for electricity supply is that “An environmentally acceptable and energy efficient power supply is constructed, installed and connected prior to occupation and sited so as to be screened from the road” (DSC 2018).

## 2.0 Methods

This natural heritage constraints assessment comprises two elements:

1. Part A: Data from a suite of ecological databases and other data sources were analysed to identify the potential presence of conservation significant fauna and flora species and vegetation communities; and
2. Part B: Outputs from the Biodiversity Planning Assessment (BPA) for the Wet Tropics Bioregion were analysed for suitability for inclusion into this report. Some criteria and associated maps are considered particularly relevant in reinforcing and substantiating the considerable natural heritage values within the Study Area.

### 2.1 Part A

#### 2.1.1 Review of Existing Information

To gain an appreciation of the natural heritage values of the Study Area, a range of data sources were utilised. The data acquired from each source allows conclusions to be drawn regarding the potential natural heritage values within the Study Area. For example, fauna and flora records sourced from the Department of Environment and Science (DES, 2018) show that the Study Area is a biodiversity hotspot. Likewise, data from other data sources can illustrate other values *e.g.* vegetation communities or wetlands present.

Existing data on the natural heritage values of the Study Area was acquired from a range of data sources, including:

- *A Spatial Representation of Selected Natural Outstanding Universal Values of the Wet Tropics World Heritage Area* (DES 2018);
- Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Protected Matters Report (DoEE 2019a);
- Queensland Regional Ecosystem mapping V 10.1 (NRME 2018);
- Protected Flora Survey Trigger Maps (DES 2019a); and
- Wetland Protection Maps (DES 2019b).

Background on each of these data sources and how they were used to gain an appreciation of natural heritage values of the Study Area is presented below.

#### *A Spatial Representation of Selected Natural Outstanding Universal Value of the Wet Tropics World Heritage Area* (OUV report)

The OUV report was undertaken to support development of the Wet Tropics Biodiversity Planning Assessment by the Department of Environment and Science.

Fauna and flora records used in the preparation of the OUV report were compiled from a number of Queensland Department of Environment and Science sources including:

- the Queensland Historical Fauna Database;
- the Queensland Herbarium's HerbreCs and Corveg databases;
- the WildNet Database; and

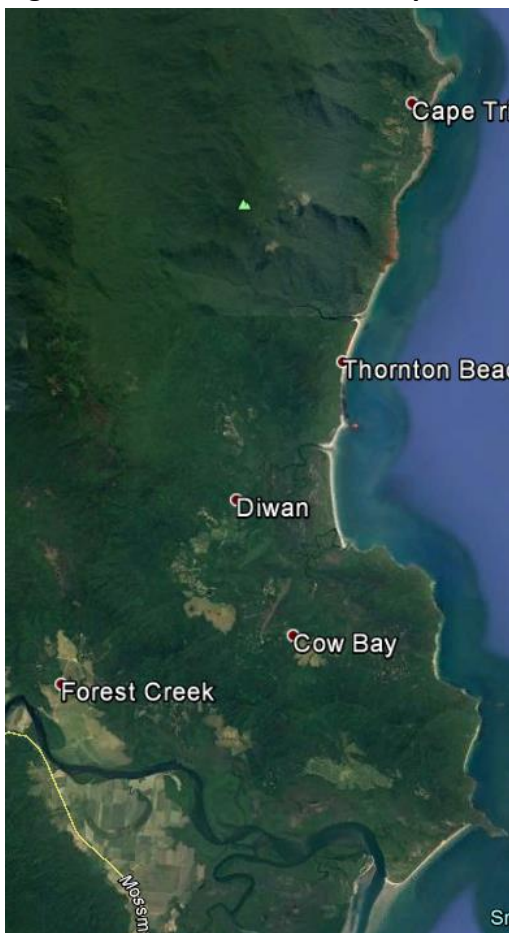
- the Australian Tropical Herbarium's flora database.

The species records used in the preparation of the OUV report were used in preparation of WTMA's desktop analysis. Detail on the analysis of the data is presented in Section 2.1.2 below.

*Protected Matters Report – Commonwealth Environment Protection and Biodiversity Conservation Act 1999*

WTMA generated a Protected Matters Report that slightly exceeds the boundaries of the Study Area, to ensure all known values are captured in the analysis. This slightly larger area is indicated in **Figure 7**.

**Figure 7. Protected Matters Report search area**



The EPBC Act Protected Matters database generates a list of protected matters (as per the EPBC Act) that may potentially occur in or near the Project Area. The database incorporates information from a range of sources including government, research and community organisations.

The Protected Matters database has some limitations based on the accuracy of spatial data for some matters. In particular, confirmation of the presence of threatened or migratory species at a given site is not possible from the database, as data presented are for potential

occurrences of species within a general area, rather than for known occurrences at a specific site.

The relative reliability of this database must be borne in mind, as species highlighted by this search do not necessarily correlate with an actual observation. Species are highlighted by the database if their currently known distribution overlaps with the search area by one degree of latitude or longitude (approximately 100 km). This indication of potential presence does not consider if suitable vegetation, geology, soil, climate or habitat types are actually present to support the occurrence of a significant species or ecological community.

#### *Queensland Regional Ecosystems Map V 10.1*

Vegetation communities within Queensland are categorised and mapped by a system known as 'Regional Ecosystems'. A Regional Ecosystem (RE) is a vegetation community that occurs in association with a particular combination of geology, soil and landform in a specific bioregion in Queensland. Regional ecosystems provides information and maps to support biodiversity planning and management by State and local government, natural resource management agencies, business and landholders.

Regional Ecosystems within the Study Area that had a Vegetation Management Act (VMA) Class of Endangered or Of Concern were included in the assessment.

#### *EPBC Act Threatened Ecological Communities (TECs)*

Threatened Ecological Communities are vegetation communities listed by the Commonwealth Government under the EPBC Act as Critically Endangered, Endangered or Vulnerable if they meet the criteria for listing.

The EPBC Act Species Profile and Threats Database was used to determine if Queensland Regional Ecosystems mapped as being present were analogous with EPBC Act TECs, thus indicating the potential presence of TECs as an additional natural heritage value.

#### *Protected Flora Survey Trigger Maps*

The Nature Conservation Act protected plants flora survey trigger map spatial layer was downloaded from the Queensland Spatial Catalogue. The protected plants survey trigger map shows 'high risk' areas for protected plants and is used to help determine flora survey and clearing permit requirements for a particular location.

#### *Wetland Protection Maps*

The Wetland Protection Series was downloaded from the Queensland Spatial Catalogue. The *Wetland protection area - high ecological significance wetland* and *Wetland protection area - trigger area* datasets were displayed for occurrences within the Study Area. Wetlands are an important ecological and landscape feature and provide habitat for a significant range of native fauna and flora.

### 2.1.2 Analysis of data

Data generated by the information search was analysed to extract records of fauna, flora and vegetation communities within the Study Area considered of conservation significance. This includes:

- Fauna and flora listed as Endangered, Vulnerable or Near Threatened under the *Nature Conservation (Wildlife) Regulation 2006*;
- Matters of National Environmental Significance relevant to the Study Area listed under the *Environment Protection and Biodiversity Conservation Act 1999*; including:
  - Listed Threatened Ecological Communities (TECs);
  - Listed Threatened Species; and
  - Listed Migratory Species.
- Regional Ecosystems listed as Of Concern or Endangered (VMA class under the *Queensland Vegetation Management Act 1999*.

### 2.1.3 Species' Likelihood of Occurrence

All records of conservation significant fauna and flora retrieved during the desktop study were assessed on their likelihood of occurring within the Study Area.

The fauna analysis excluded:

- marine species including seasnakes, sea turtles, cetaceans, mammals and fish that are restricted to open waters as they will not be impacted by the proposal. However, stream and estuarine species such as cling gobies and the Saltwater Crocodile that have the potential to be impacted have been retained in the analysis.
- migratory shorebirds and seabirds as they will not be impacted by the proposal.

The likelihood of occurrence (LoO) assessment was based upon information in available literature. The Atlas of Living Australia (<https://www.ala.org.au/>) was a key reference in assessing the LoO. Atlas of Living Australia searches for individual species' occurrence records were conducted using the interactive map function to determine distribution information as a guide to potential presence. Three categories of likelihood of presence were determined; Confirmed, Possible and Unlikely. The likelihood of occurrence analysis is provided as a guide to potential presence within the Study Area.

Other sources used to inform the LoO include:

#### *Fauna*

- the International Union for Conservation of Nature's (IUCN) Red List of Threatened Species (<https://www.iucnredlist.org/>)
- Commonwealth Department of the Environment and Energy Species Profile and Threats Database (<http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>)
- Queensland Department of Environment and Science threatened species information (<https://environment.des.qld.gov.au/wildlife/threatened-species/>)



## Flora

- Commonwealth Department of the Environment and Energy Species Profile and Threats Database (<http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>)
- Australian Tropical Rainforest Plants (<http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/index.html>)
- Australian Tropical Rainforest Orchids (<http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/index.htm>)
- Queensland Department of Environment and Science threatened species information (<https://environment.des.qld.gov.au/wildlife/threatened-species/>)
- Flora of Australia Online (<http://www.environment.gov.au/science/abrs/online-resources/flora-of-australia-online>)

## 2.2 Part B

### 2.2.1 Review of existing information

Outputs from the Biodiversity Planning Assessment (BPA) for the Wet Tropics Bioregion were analysed for suitability for inclusion into this report. Some BPA criteria and associated maps are considered particularly relevant in reinforcing and substantiating the considerable natural heritage values within the Study Area and also assist in consideration of the five options proposed in the Powering Daintree report. The relevant criteria are:

#### Criterion A: Threatened Species Rating Map

Criterion A classifies areas according to their significance based on the presence of Endangered, Vulnerable and/or Near Threatened (EVNT) taxa. EVNT taxa are those scheduled under the *Nature Conservation Act 1992* and/or the *Environmental Protection and Biodiversity Conservation Act 1999*.

Rare and threatened species are also one of the attributes for which the Wet Tropics is inscribed on the World Heritage List.

#### Criteria I: Special Biodiversity Values including:

- *Endemic Richness mapping*

Endemic species are defined as those taxa which have at least 75% of their geographical range within one bioregion or which have a total range of 100,000 sq. km or less.

Endemic taxa can be identified through the GIS analysis of flora and fauna records stored in WildNet<sup>3</sup>. GIS can also be used to analyse the distribution of all endemic taxa defined for a bioregion and rank areas on the basis of the relative number of endemic taxa they contain. This approach needs to acknowledge data gaps that need to be addressed through expert review.

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<sup>3</sup> The WildNet database contains records of wildlife sightings and listings of plants (including fungi and protists), mammals, birds, amphibians, reptiles, freshwater fish, sharks and rays, butterflies and other priority invertebrates in Queensland.

As a short-term alternative to the automated approach, which is resource-intensive, expert knowledge can be used to define an interim set of endemic taxa for a bioregion and to identify areas considered to contain high numbers of endemic taxa.

High levels of endemism is also one of the attributes for which the Wet Tropics is inscribed on the World Heritage List.

- *Relictual and important evolutionary areas mapping*

Some flora and fauna taxa that occur in the Wet Tropics World Heritage Area represent relics of major stages in the earth's evolutionary history (e.g. The Age of conifers, cycads and angiosperms, the final break-up of Gondwana or the origins of Australia's sclerophyll flora and marsupials).

Such outstanding examples representing major stages in the earth's evolutionary history is also one of the attributes for which the Wet Tropics is inscribed on the World Heritage List.

These two special biodiversity values are of particular relevance with respect to consideration of World Heritage values under the EPBC Act and the Wet Tropics Management Plan.

### **2.2.2 Analysis of data**

Mapping for the above Biodiversity Planning and Assessment criteria was analysed against the alignment of Option 1 and Option 2 of the Powering Daintree report. While WTMA did not map Option 3, it is very similar to Option 1 from an infrastructure and disturbance perspective, and on this basis the analysis undertaken for Option 1 also relates to Option 3.

## 3.0 Results

### 3.1 Part A

#### 3.1.1 Flora

The study generated 97 flora species of conservation significance (listed under the NC Act and/or EPBC Act) for the Study Area. Of these,

- 77 are confirmed to be present;
- 12 are possibly present;
- 7 are unlikely to be present; and
- 1 is recognised as previously present but now extinct.

As most of these records have been vetted through the OUV report process, there is a high degree of confidence in their presence. The records include a large number of species found in upland or montane environments. These have been included in the assessment despite a lower probability of being encountered during project activities.

The full flora likelihood of occurrence analysis is presented in **Appendix A**.

#### 3.1.2 Fauna

The study generated 53 fauna species of conservation significance (listed under the NC Act and/or EPBC Act) for the Study Area. Of these, 13 are mammals, 12 are amphibians, 22 are birds, three are reptiles and three are fish. Of the 53 fauna species generated:

- 35 are confirmed to be present;
- 11 are possibly present; and
- 7 are unlikely to be present.

The full fauna likelihood of occurrence analysis is presented in **Appendix B**.

Due to the high density of fauna and flora species records within the Study Area, these have not been presented pictorially. However, these results confirm that the Study Area is of considerable importance as habitat for a significant suite of threatened fauna and flora.

### 3.1.3 Regional Ecosystems and Threatened Ecological Communities

The intersection of Regional Ecosystems and Threatened Ecological Communities with the five electricity supply options outlined in the Powering Daintree report are as follows:

#### *Options 1 and 2*

Both Option 1 and 2 intersected with the same 23 Regional Ecosystems. Of these 23 Regional Ecosystems, six are listed as Endangered and 17 Of Concern under the VMA. One RE, 7.2.1 (*Mesophyll vine forest on beach ridges and sand plains of beach origin*), is analogous with the EPBC TEC *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia*.

Any works that impact upon Regional Ecosystems or Threatened Ecological Communities may require approvals under the VMA or EPBC Act respectively.

#### *Option 3*

Option 3 intersected with 22 REs, of which five are listed as Endangered and 17 Of Concern under the *Vegetation Management Act 1999*. Again, RE 7.2.1 is analogous with the EPBC TEC *Littoral Rainforest and Coastal Vine Thickets of Eastern Australia*.

Any works that impact upon Regional Ecosystems or Threatened Ecological Communities may require approvals under the VMA or EPBC Act respectively.

#### *Option 4*

Option 4 intersected with 6 REs, of which one is listed as Endangered and five Of Concern under the *Vegetation Management Act 1999*. None of these REs are analogous with EPBC TECs.

Any works that impact upon Regional Ecosystems may require approvals under the VMA.

#### *Option 5*

This option does not intersect with REs.

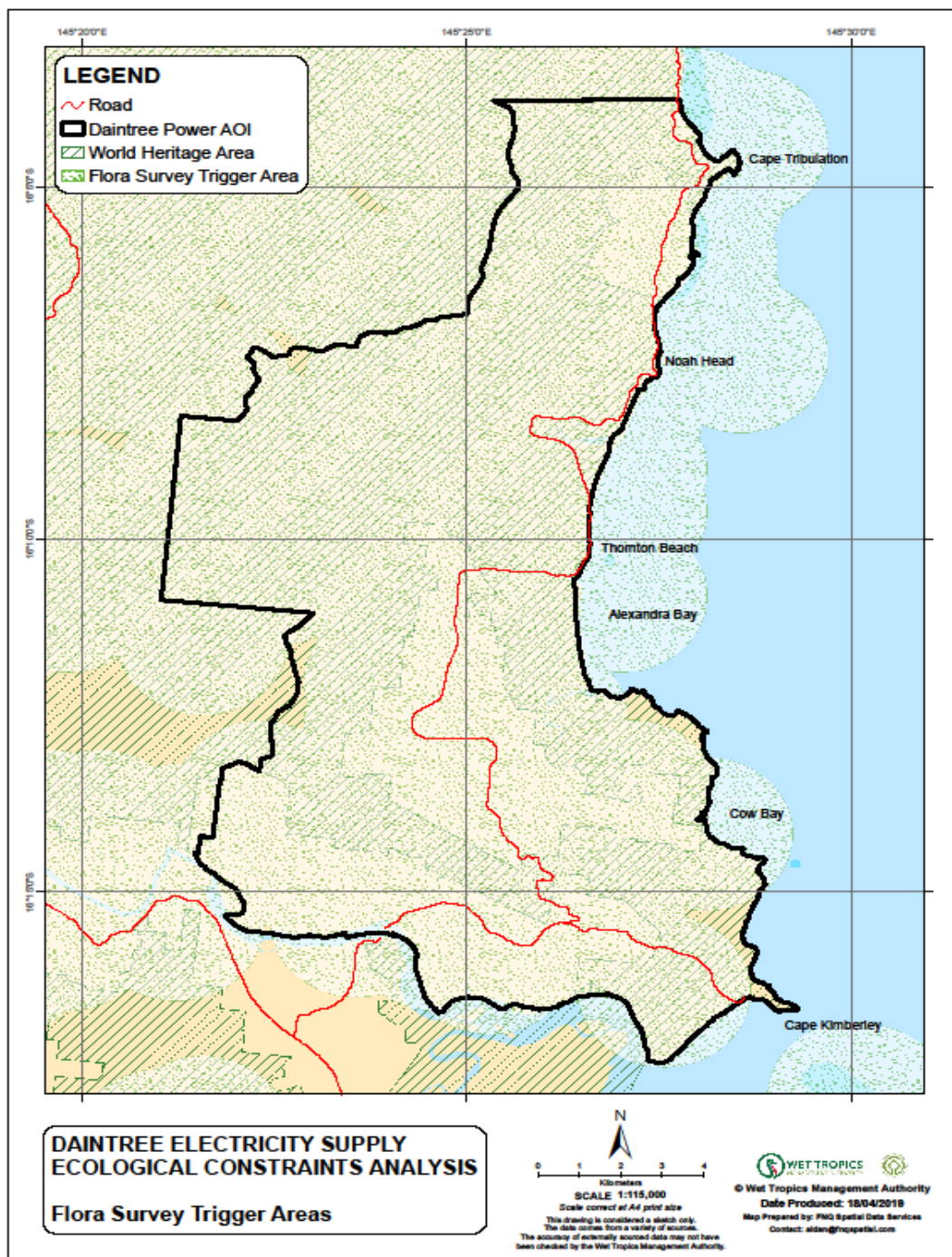
A Regional Ecosystem summary table is presented in **Appendix C**.

### 3.1.4 Protected Flora Survey Trigger Map

Areas identified as 'high risk' (Flora Survey Trigger Area) on the Protected Flora Survey Trigger Map almost completely cover the Study Area. This highlights the abundance of Endangered, Vulnerable and Near Threatened (EVNT) plants listed under the *Nature Conservation Act* 1992 within the Study Area. This data is presented on **Figure 8**.

Works that are conducted within areas identified as 'High Risk' may require the completion of a flora survey and acquisition of approvals under the NC Act.

**Figure 8. Protected Flora Survey Trigger Map**





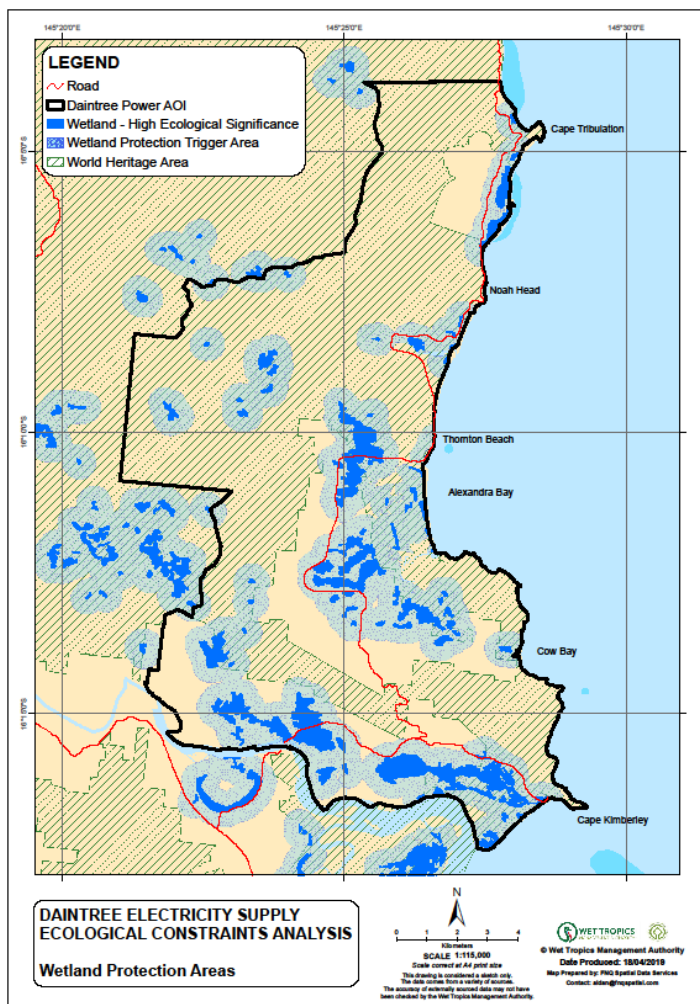
### 3.1.5 Wetlands

The map of referable wetlands is a state-wide regulatory map under the *Environmental Protection Regulation 2008*. It identifies the location of wetland protection areas (WPA) in Great Barrier Reef (GBR) catchments which applies to State Development Assessment Provisions (SDAP) State code 9: Great Barrier Reef Wetland Protection Areas.

The map of referable wetlands also identifies wetlands of high ecological significance (HES) and general ecological significance (GES) across the state. HES wetlands on the map are identified as 'matters of state environmental significance' (MSES) under the Planning and Environmental Offsets legislation.

Wetlands identified as wetland protection areas are mapped in low-lying, riparian and coastal areas within the Study Area (**Figure 9**).

**Figure 9. Wetlands**



## 3.2 Part B

This report utilises selected Biodiversity Planning and Assessment data and maps to further demonstrate the significant natural heritage values present in the Study Area. This information is also used to enable an analysis of potential impacts on natural heritage values, including consideration of the Powering the Daintree options. Three biodiversity criteria were selected. All three criteria are also recognised as World Heritage (OUV) attributes for which the Wet Tropics is inscribed on the World Heritage List. They are:

- Threatened Species Rating (Criterion A);
- Endemic Richness (Criterion Ia); and
- Relictual and important evolutionary areas (Criterion If).

### 3.2.1 Threatened Species Rating

The Threatened Species Rating classifies areas according to their significance based on the presence of Endangered, Vulnerable and/or Near Threatened (EVNT) taxa. EVNT taxa are those scheduled under the NC Act and/or the EPBC Act.

Almost all vegetated areas (including regrowth vegetation) in the Study Area supports EVNT flora and/or fauna. This is reflected in **Figure 10** which shows almost the entirety of the Study Area rating very high for threatened species. This reinforces the fact that remaining within disturbed areas is the best way of mitigating potential impacts to threatened species.

### 3.2.2 Endemic Richness

Endemic species are defined as those taxa which have at least 75% of their geographical range within one bioregion or which have a total range of 100,000 sq. km or less. As depicted on **Figure 11**, the Daintree area possesses very high endemism, meaning that many of the species are found only in that area. This has implications for conservation in that unmanaged development may lead to impacts on geographically constrained species of flora and fauna.

### 3.2.3 Relictual and Important Evolutionary Areas

The rainforests and associated communities in the Daintree area contain remnants of the rainforest flora and fauna of the ancient southern super-continent Gondwana. There are many plants and animals whose form today remains relatively unchanged from that of their ancestors in the fossil record. There is a concentration of primitive plant families that are directly linked with the birth and spread of flowering plants over 100 million years ago, as well as some of the oldest elements of the world's ferns and conifers. This again assists in highlighting the importance of the Study Area and the requirement to manage development appropriately. Refer to **Figure 12**.

It should be noted that the values depicted on the following figures extend beyond the Study Area boundary but the full extent has not been shown.

The analysis of selected BPA data illustrates that the Study Area supports significant natural heritage values. Some of the values, such as relictual and important evolutionary areas, show that the natural heritage importance is much deeper than simply records of threatened flora and fauna, and relate to evolutionary and geological processes over millions of years.

A more detailed analysis of the results as they relate to the supply options outlined in Powering the Daintree are included in **Table 4** (Discussion and Findings).

Figure 10. Threatened Species Rating maps – Options 1 and 2.

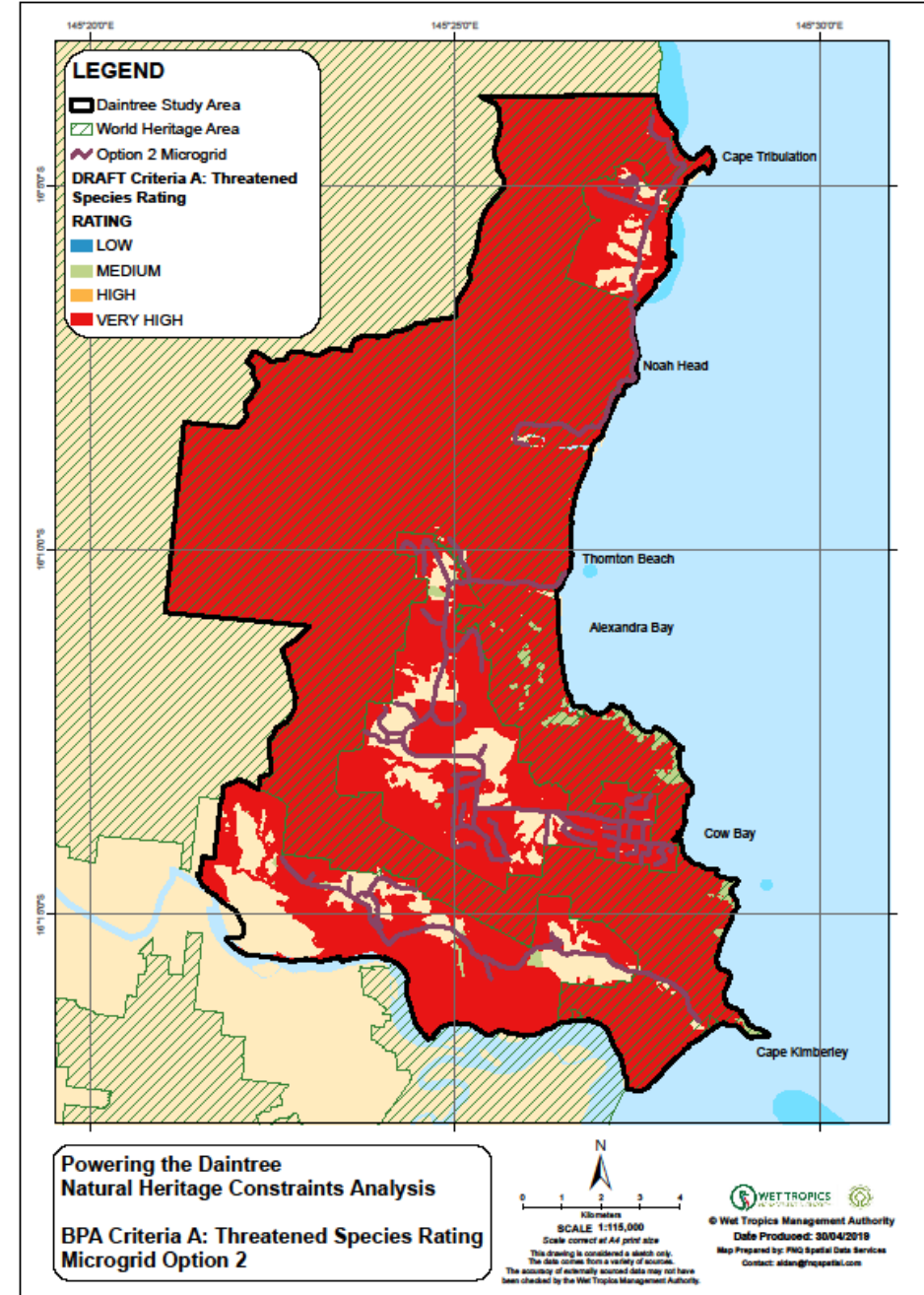
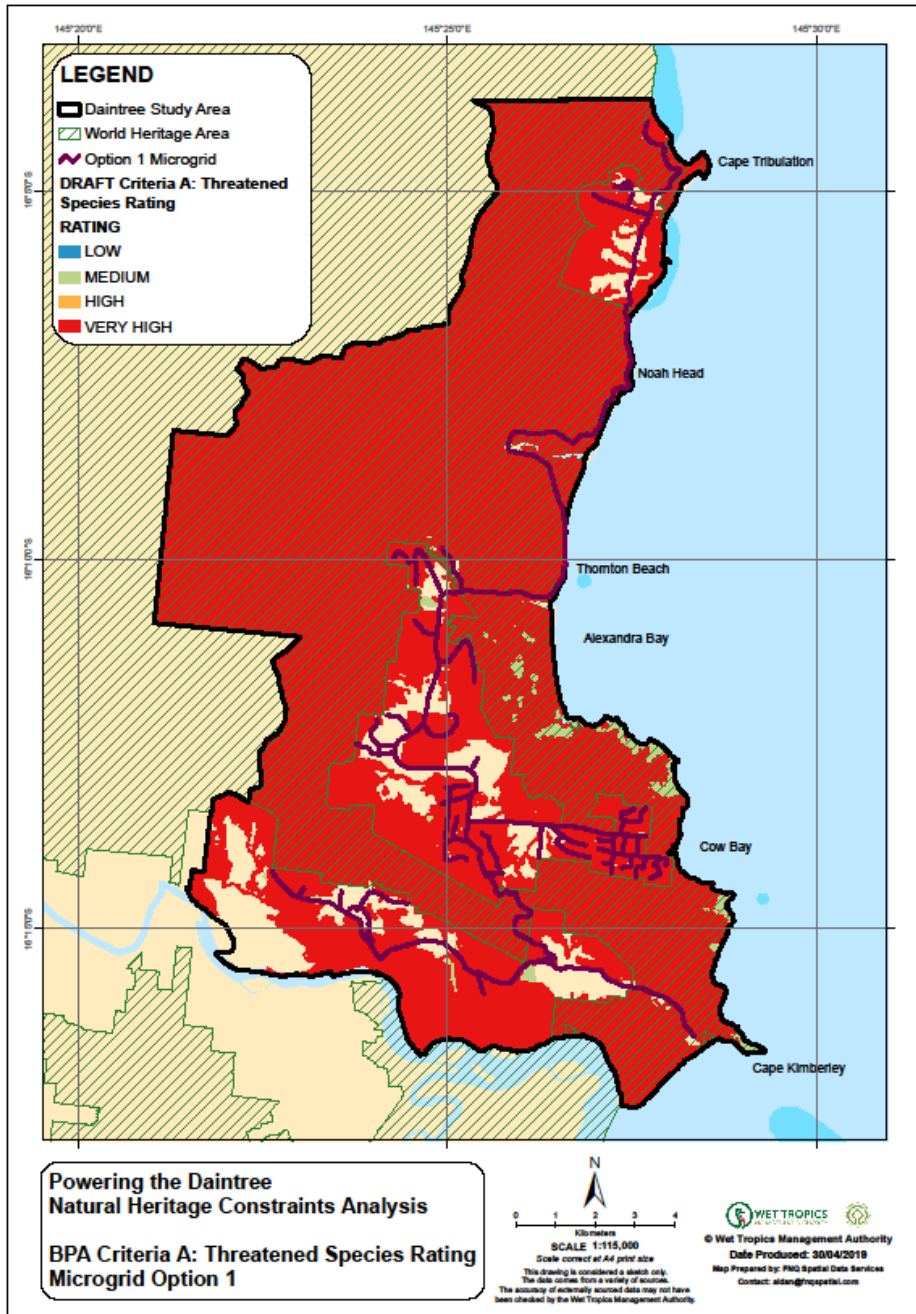




Figure 11. Endemic Richness map – Options 1 and 2.

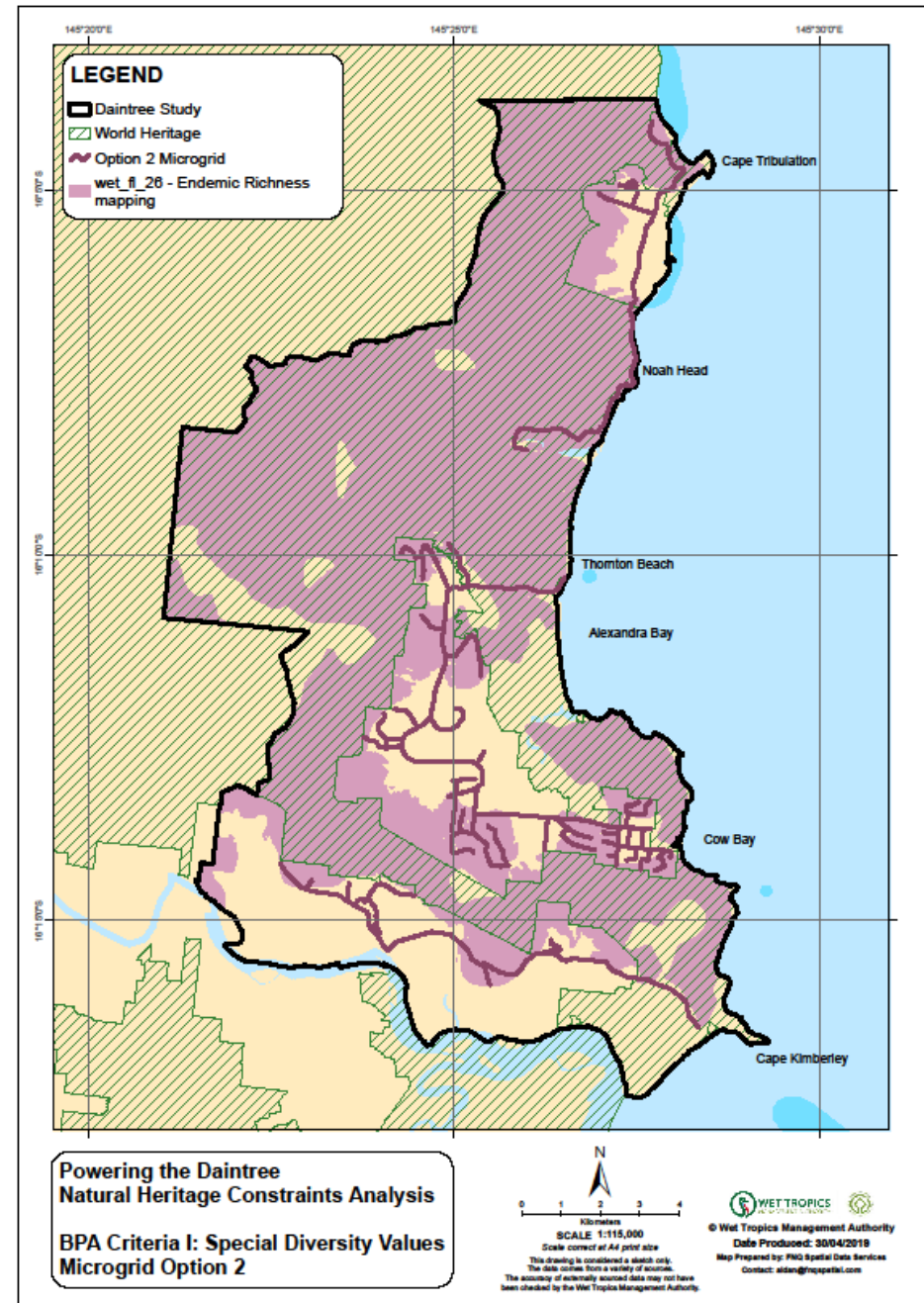
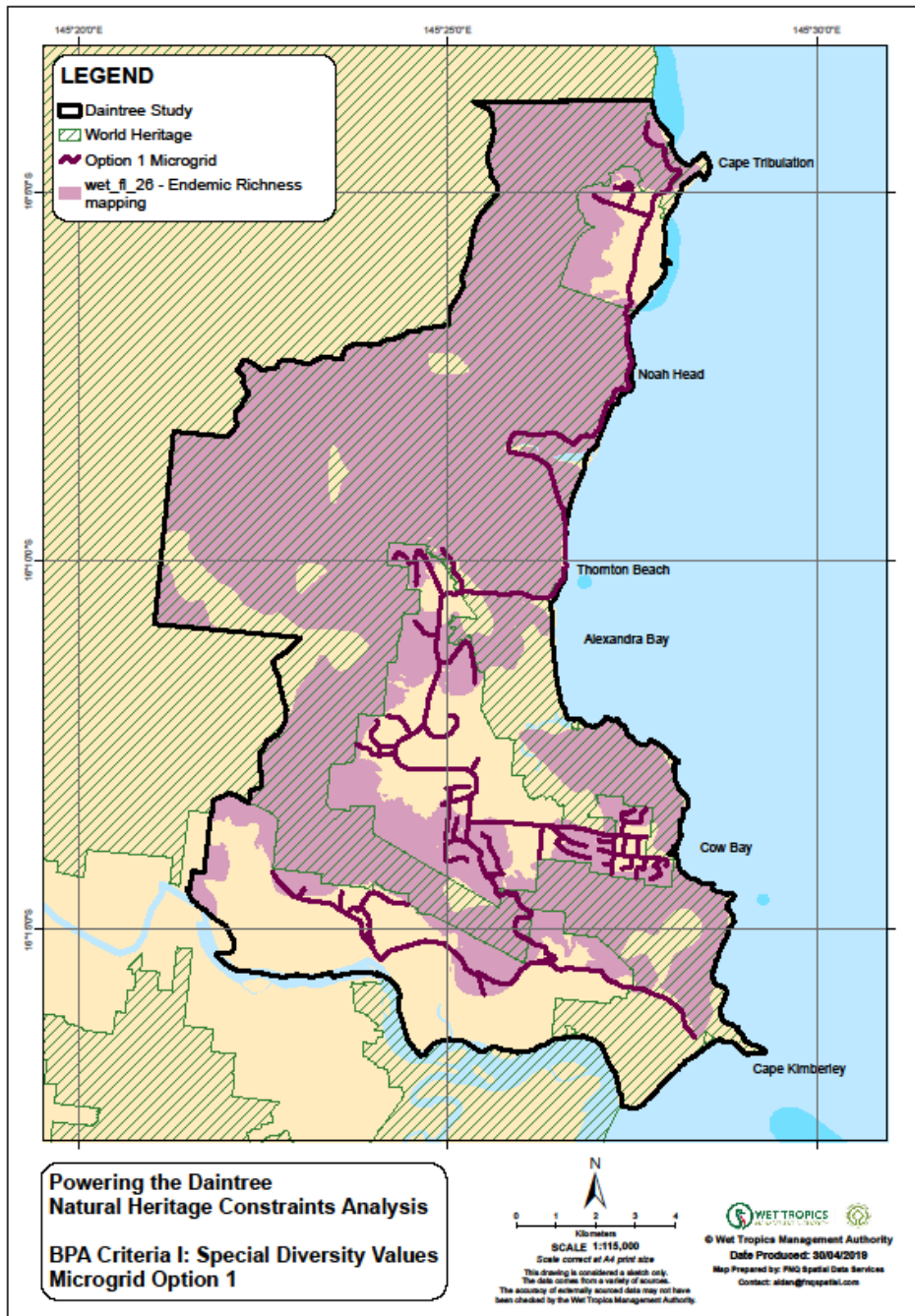
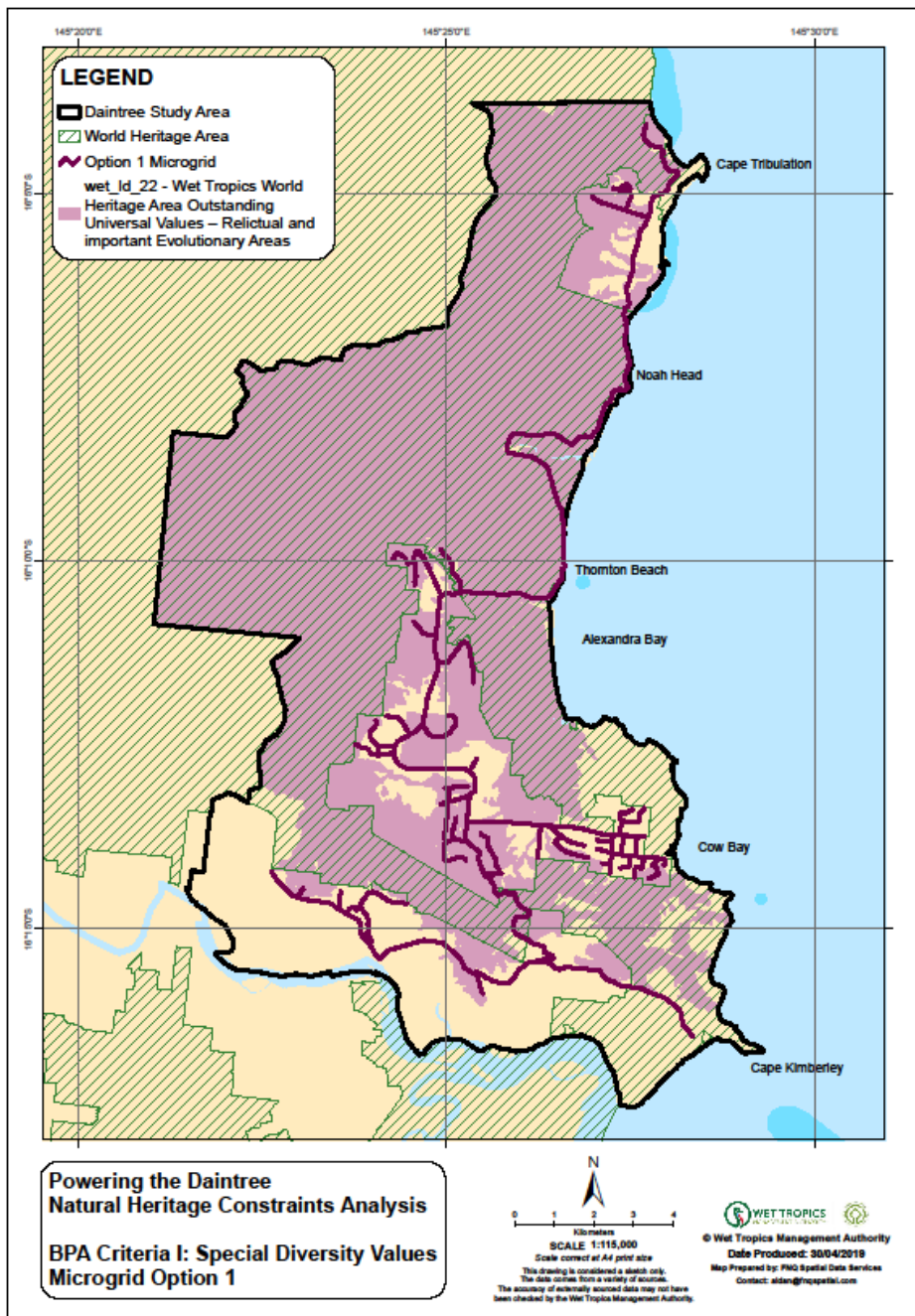
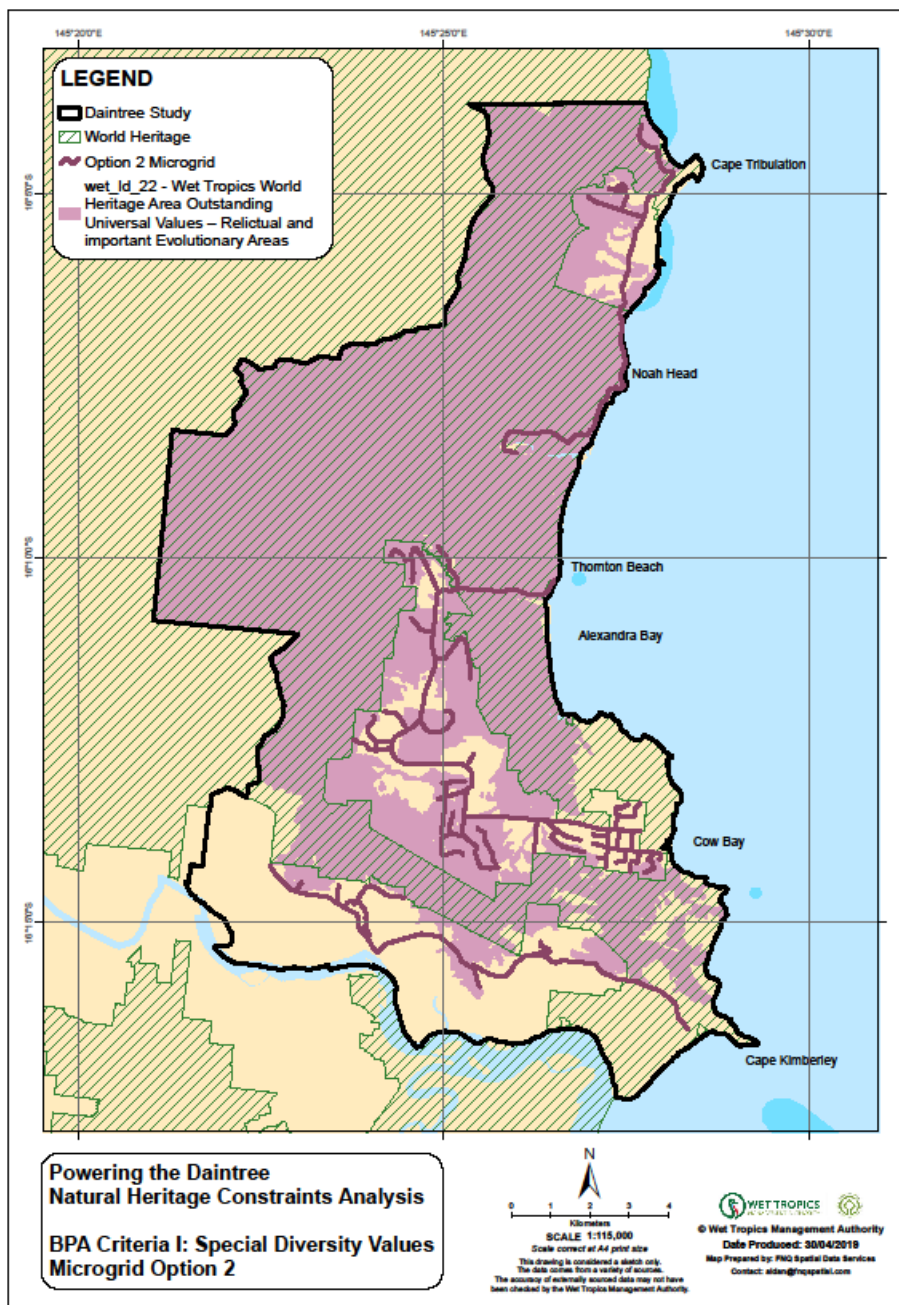




Figure 12 Relictual and important evolutionary areas map – Options 1 and 2.



WORLD



## 4.0 Discussion and Findings

The Results section (3.0) illustrates that Powering the Daintree electricity supply options 1 to 4 are highly constrained outside the existing footprint of disturbance due to values related to flora and fauna, regional ecosystems, threatened ecological communities, and scenic landscapes or aesthetic natural features. Option 5 does not propose significant change from the electricity infrastructure currently in place. Any infrastructure works that occur outside the existing footprint of disturbance, except in the few areas that are currently in a highly disturbed state (e.g. existing cleared areas at Forest Creek, and cleared or modified leasehold blocks) would be heavily constrained and likely to have significant impacts on natural heritage values, including Matters of National Environmental Significance (MNES).

The roads within the Wet Tropics World Heritage Area that provide access to the communities of Forest Creek, Cow Bay, Diwan and Cape Tribulation are located within zone C, the boundary of which is generally 50 m either side of the centreline of the road. Under the Plan, WTMA can consider permit applications for the installation of infrastructure such as a power or gas supply within zone C. However, should the infrastructure be proposed outside of zone C (i.e. within zone A or B) WTMA is not able to issue a permit. Under the Wet Tropics Management Plan (Schedule 1 which relates to essential community services infrastructure) Local Government can apply for a rezoning from zone B, to zone C. However, as this is a change to the Wet Tropics Management Plan, it requires a public notification process, approval by WTMA, and endorsement by Queensland and Commonwealth Ministers for the Environment.

There are currently no detailed plans about the precise alignment, nor the construction process and design, for any of the five electricity supply options considered in Powering the Daintree. However, WTMA have undertaken a provisional assessment of possible impacts from construction on natural heritage values within the existing footprint of disturbance (i.e. the road verge) which could include:

- temporary displacement or possible mortality of a suite of fauna species such as Cassowaries, reptiles, amphibians and mammals (e.g. tree kangaroos);
- damage to vegetation from trimming to allow machinery access for cable or pipeline installation and impacts to roots from digging and trenching;
- possible biosecurity risks if strict biosecurity protocols are not followed – such as the introduction of myrtle rust and other pathogens and vascular weeds;
- disturbance to soil, which may impact downstream water quality; and
- Disturbance to watercourses and aquatic ecosystems.

#### 4.1 Assessment against the five electricity supply options

**Table 4** below provides a more detailed analysis of potential impacts and regulatory considerations for each of the five supply options outlined in the Powering Daintree report.

**Table 4: Key findings regarding the five electricity supply options outlined in the Powering Daintree report based on consideration of natural heritage values and associated legislative considerations**

The following table is based on an assumption (as proposed in the Powering Daintree report) that installation of any of the options would involve underground installation of electricity cables or gas pipelines; and that such installations would only be within the disturbance footprint of existing roads or other already disturbed easements; and without affecting any additional vegetation. If this approach is followed then natural heritage values are less likely to be significantly impacted than installation and construction outside of already disturbed areas.

Electricity supply option	Natural Heritage considerations	Regulatory considerations
<p><b>Option 1:</b> Single Daintree electrical microgrid powered by gas and centralised solar</p>	<ul style="list-style-type: none"> <li>• This option involves laying of underground powerlines through three sections of the Wet Tropics World Heritage Area:               <ul style="list-style-type: none"> <li>○ Alexander Range between Forest Creek and Cow Bay</li> <li>○ Thornton Beach / Noah Creek north of Cow Bay</li> <li>○ Properties north of Cape Tribulation</li> </ul> </li> <li>• If proposed setup pits on Alexandra Range are constructed outside the existing road footprint, it may result in disturbance to remnant vegetation and impact on the scenic amenity of the area.</li> <li>• The suggested location for gas and solar generation facilities on cleared farmland around Forest Creek does not appear to have high natural heritage values. However, consideration of potential future restoration of wildlife corridors connecting to the Daintree River should be taken into account.</li> </ul>	<p>Likely to require consideration under:</p> <ul style="list-style-type: none"> <li>• Wet Tropics Management Plan - given network would pass through the Wet Tropics World Heritage Area.</li> <li>• EPBC Act - given the network would pass through lands containing MNES (e.g. World Heritage area, threatened species).</li> <li>• <i>Nature Conservation Act</i> - given proposed development through some threatened species habitat.</li> <li>• Douglas Shire Planning Scheme (e.g. potential impacts on scenic amenity).</li> <li>• Vegetation Management Act (given some of the network would pass through ‘threatened’ and ‘of concern’ Regional Ecosystem classes).</li> </ul> <p>This option is likely to be assessed to pose the highest risk of impact on World Heritage values given:</p> <ul style="list-style-type: none"> <li>• It involves installing underground cables through more of the Wet Tropics World Heritage Area than any other option, other than Option 3.</li> </ul>

Electricity supply option	Natural Heritage considerations	Regulatory considerations
		<ul style="list-style-type: none"> <li>• If set up pits are required to install underground electricity across Alexandra Range it is likely to involve disturbance to remnant vegetation and could potentially result in impacts on World Heritage scenic and aesthetic values. This may also be inconsistent with Douglas Shire Planning Scheme Desired Outcomes.</li> <li>• Under the Wet Topics Management Plan, the Authority must consider prudent and feasible alternatives when considering permit applications.</li> </ul>
<p><b>Option 1 Conclusion</b> - this option is equally (with Option 3) the most highly constrained of all options due to very high natural heritage values, significant works required in the World Heritage Area, and associated complex regulatory considerations.</p>		
<p><b>Option 2</b> Three independent electrical microgrids around load centres</p>	<ul style="list-style-type: none"> <li>• This option involves reduced length of power or gas cables through the WHA than Option 1 or 3, however still involves laying underground powerlines through the Wet Tropics World Heritage Area to the outlying properties of: Thornton Beach north of Cow Bay; Noah Creek south of Cape Tribulation; and properties north of Cape Tribulation</li> <li>• While Option 2 also involves less cables running through areas rated as of 'very high significance' for threatened species (relative to Options 1 or 3), a considerable length of the cable network would still be required to run through habitat exhibiting a 'very high' threatened species rating, including lands that fall outside of the Wet Tropics World Heritage Area.</li> <li>• Similarly, while to a lesser extent than Options 1 and 3, Option 2 will still involve running cable through habitat which relate to relevant to OUV attributes i.e. <ul style="list-style-type: none"> <li>○ high endemic species richness (OUV attribute)</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• This option is likely to have a lesser impact on the World Heritage area than Options 1 or 3, but would be similarly constrained in terms of high level of assessment under the WTMP and EPBC Act, including the requirement to demonstrate that there are no prudent and feasible alternatives to construction within the WHA.</li> </ul>



Electricity supply option	Natural Heritage considerations	Regulatory considerations
	<ul style="list-style-type: none"> <li>○ important evolutionary areas (OUV attribute)</li> <li>● The terrain to such properties has not being assessed as part of this study, and the potential to install underground electricity lines within the existing road footprint requires further investigation</li> </ul>	
<p><b>Option 2 Conclusion</b> - this option is the next most constrained after options 1 and 3, mainly because the length of network required in the World Heritage Area for this option is significantly less. Natural heritage values are very high. The complexity of regulatory considerations for this option are likely to be similar to options 1 and 3.</p>		
<p><b>OPTION 3</b> Three or more electrical microgrids linked by gas pipeline</p>	<ul style="list-style-type: none"> <li>● Option 3 involves the laying of a gas pipeline ‘backbone’ joining Forest Creek with Cow Bay with Cape Tribulation (from an infrastructure alignment perspective and disturbance perspective, it could be considered very similar to Option 1).</li> <li>● The Powering Daintree report refers to this option being ‘initially appealing due to the low cost, high reliability and simplicity of installing underground PE (polyethylene) gas networks’.</li> <li>● It is unclear if this means that such ‘simplicity of installation’ would mean that setup pits would not be required to cross the Alexandra Range as in Option 1.</li> <li>● If this is the case, this study makes an assumption that Option 3 would allow for more of the network to be constrained within the existing road footprint.</li> </ul>	<ul style="list-style-type: none"> <li>● See analysis for Option 1 (refer above)</li> </ul>
<p><b>Option 3 Conclusion</b> - this option is equally (with Option 1) the most highly constrained of all options due to very high natural heritage values, significant works required in the World Heritage Area, and complex regulatory considerations.</p>		
<p><b>OPTION 4</b></p>	<ul style="list-style-type: none"> <li>● Option 4 does not appear to involve installation of any electricity networks or infrastructure within the Wet Tropics WHA.</li> </ul>	<ul style="list-style-type: none"> <li>● WTMP does not apply.</li> <li>● This option is less likely to be assessed as having a risk of significant impacts on MNES and therefore the EPBC Act</li> </ul>

Electricity supply option	Natural Heritage considerations	Regulatory considerations
Cape Tribulation only – existing diesel generators leveraged to power adjacent large consumers	<ul style="list-style-type: none"> <li>• The Option is restricted to the Cape Tribulation area and therefore involves less area and less potential development impact on natural heritage values than any of Options 1, 2 or 3.</li> <li>• It appears however, that extension of the proposed network leveraged to power adjacent large consumers may involve passing through land containing:               <ul style="list-style-type: none"> <li>○ endangered Regional Ecosystems</li> <li>○ habitat of threatened species (especially for properties to the west)</li> </ul> </li> </ul>	<p>is less likely to be triggered, subject to development activities being:</p> <ul style="list-style-type: none"> <li>○ restricted to already disturbed areas; and</li> <li>○ appropriate environmental impact mitigation measures being adopted during the construction phase</li> </ul> <ul style="list-style-type: none"> <li>• VMA may apply</li> </ul>
<p><b>Option 4 Conclusion</b> - this option is less constrained than Option 2, as it requires no works within the World Heritage Area. However, natural heritage values remain very high – particularly consideration of threatened and endangered species and ecosystems. Regulatory considerations may be slightly less than Option 2; if this option is found to have no impact upon the World Heritage area, the WTMP does not apply.</p>		

Electricity supply option	Natural Heritage considerations	Regulatory considerations
<p><b>OPTION 5</b> Remote Area Power Supplies (RAPS) – subsidised upgrade to existing supply model i.e. individual property hybrid RAPS scheme</p>	<ul style="list-style-type: none"> <li>• The most likely impacts on natural heritage values resulting from this option would be lopping of overhanging vegetation on properties to allow PV solar panels to operate effectively and to supply power from property generators / gas supplies to the residents.</li> <li>• However, it should be noted that such lopping of vegetation would likely be required as part of pre-cyclone preparatory works.</li> <li>• Most powerlines from generators or gas tanks are likely to have already been installed on most properties</li> </ul>	<ul style="list-style-type: none"> <li>• WTMP does not apply.</li> <li>• EPBC Act unlikely to apply</li> <li>• VMA unlikely to apply</li> <li>• <i>Douglas Shire Planning Scheme 2018</i> applies. In particular, <i>Cape Tribulation and Daintree Coast Local Plan</i> sets codes for electricity supply with an acceptable outcome for electricity supply being ‘An environmentally acceptable and energy efficient power supply is constructed, installed and connected prior to occupation and sited so as to be screened from the road’ (DSC 2018).</li> </ul>
<p><b>Option 5 Conclusion</b> – this option is the least constrained of all options considered, given the minimal changes to the existing power supplies in the area.</p>		

## 5.0 Conclusions

This study has undertaken a desktop assessment to identify natural heritage values and associated legislative constraints for the five electricity supply options outlined in the Powering Daintree study.

The assessment is based on the assumption that any electricity supply option would be constructed based on the design principles as outlined in Section 1.4.

This WTMA study has not included an on-ground assessment component, and a caveat is that conclusions from this assessment could change following detailed on-going ecological assessments and any technical design amendments (i.e. changed alignment or construction methods that may arise from other studies).

This study concludes that:

- Powering Daintree Options 1 to 3 (and to some degree Option 4) are highly constrained by the very high natural heritage values that are present across the entire Study Area.
- Should any of the Powering Daintree Options 1 to 3 propose construction work to occur outside of the existing footprint of disturbance, this would likely have very significant impacts on natural heritage values (including World Heritage values) in the Daintree Study Area.
- Options 1 and 3 pose the highest level of natural heritage constraints and most complex legislative considerations.
- Option 2 also poses natural heritage constraints, but to a lesser degree than Options 1 and 3. Option 2 does involve installation of some underground power within the World Heritage Area, but not to the extent of Option 1 and 3.
- Any installation of underground power supplies would require significant measures to be put in place during construction to ensure no damage occurred to natural heritage values (particularly across the Alexandra Range or other areas with higher populations of mobile fauna, such as cassowaries).
- Further detailed assessments of options 1 and 3 (and possibly the sections traversing the Wet Tropics World Heritage Area in Option 2) would need to demonstrate that infrastructure works would not have a significant impact on the Wet Tropics World Heritage Area, or other significant natural heritage outside of the Area.
- Should such detailed assessments propose activities or alignments that are likely to impact on the World Heritage values or the integrity of the Wet Tropics World Heritage Area, prudent and feasible alternatives would need to be considered. This may involve amending proposed alignments, design, construction methods, or stronger consideration of options outside the World Heritage Area.

## 6.0 References

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# Appendices

Appendix A. Fauna Likelihood of Occurrence Assessment

Fauna Group	Scientific Name	Common Name	NC Act Status	EPBC Act Status	Relevant OUV Category	Source	Likelihood of Occurrence	Habitat
<b>Mammals</b>								
	<i>Dasyurus hallucatus</i>	Northern Quoll	-	E	1e(iv)	OUV, PMR	Confirmed	The Northern Quoll occupies a diversity of habitats across its range which includes rocky areas, eucalypt forest and woodlands, rainforests, sandy lowlands and beaches, shrubland, grasslands and desert. Recent surveys throughout Queensland have suggested Northern Quolls are more likely to be present in high relief areas that have shallower soils, greater cover of boulders, less fire impact and were closer to permanent water. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=331">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=331</a>
	<i>Dasyurus maculatus gracilis</i>	Spotted-tailed Quoll (northern subsp.)	E	E	1e(iv)	OUV, PMR	Confirmed	Mostly confined to the relatively cool, wet and climatically equable upland closed-forests (mostly above 900 m altitude) that occur in the upper catchments of rivers draining east and west of the Eastern Escarpment in the Wet Tropics bioregion of north-eastern Queensland. Also suggested that the species occurs in lower altitude notophyll, mesophyll and wet sclerophyll forests in lesser numbers. Vegetation types typical of this habitat are simple and complex notophyll vine forest, simple microphyll vine-fern forest and simple microphyll vine-fern thicket. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64475">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=64475</a>
	<i>Dendrolagus bennettianus</i>	Bennett's Tree-kangaroo	NT	-	2a(i)	OUV	Confirmed	An arboreal species of closed tropical moist forests, including tropical vine and gallery forest. <a href="https://www.iucnredlist.org/species/6426/12759345">https://www.iucnredlist.org/species/6426/12759345</a>
	<i>Hipposideros diadema reginae</i>	Diadem Leaf-nosed Bat	NT	-	-	OUV	Confirmed	<i>Hipposideros d. reginae</i> roosts throughout the year in caves and disused mines, preferring those with large chambers, high domed ceilings and multiple entrances. They have also been recorded roosting in buildings and culverts. This species occurs in a variety of habitat types including lowland rainforest, Melaleuca forests, eucalypt woodland, deciduous vine thickets, and open woodland; where suitable roosts are available throughout its range. <a href="https://www.qld.gov.au/data/assets/pdf_file/0038/67988/diadem-leafnosed-bat.pdf">https://www.qld.gov.au/data/assets/pdf_file/0038/67988/diadem-leafnosed-bat.pdf</a>
	<i>Hipposideros semoni</i>	Semon's Leaf-nosed Bat	E	V	-	PMR	Possible	Semon's Leaf-nosed Bat is found in tropical rainforest, monsoon forest, wet sclerophyll forest and open savannah woodland. This species does not have an obligatory requirement for cave roosts. Daytime roost sites include tree hollows, deserted buildings in rainforest, road culverts and shallow caves amongst granite boulders or in fissures. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=180">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=180</a>  ALA records from north of the Study Area. Within the EPBC Expert Distribution (maybe) for the species.
	<i>Macroderma gigas</i>	Ghost Bat	E	V	-	PMR	Unlikely	Ghost bats currently occupy habitats ranging from the arid Pilbara to tropical savannah woodlands and rainforests. During the daytime they roost in caves, rock crevices and old mines. <a href="http://www.environment.gov.au/biodiversity/threatened/species/pubs/174-conservation-advice-05052016.pdf">http://www.environment.gov.au/biodiversity/threatened/species/pubs/174-conservation-advice-05052016.pdf</a>  ALA records from north-west of the Study Area.
	<i>Mesembriomys gouldii rattoides</i>	Black-footed Tree-rat (north Queensland)	-	V	-	PMR	Unlikely	In north Queensland, this species mostly occurs in eucalypt forests and woodlands, especially where hollows are relatively plentiful. The distribution of the black-footed tree rat (north Queensland) is poorly known. It has been recorded mostly from eucalypt forests and woodlands (but not rainforests) around Mareeba, but there are records sparsely across Cape York Peninsula, including recent records from Mungkan Kandju National Park and the Australian Wildlife Conservancy's Piccaninny Plains and Brooklyn wildlife sanctuaries. <a href="http://www.environment.gov.au/biodiversity/threatened/species/pubs/87620-conservation-advice.pdf">http://www.environment.gov.au/biodiversity/threatened/species/pubs/87620-conservation-advice.pdf</a>  No ALA records from the Study Area or surrounds.
	<i>Petauroides volans</i>	Greater Glider	V	V	1e(iv)	PMR	Unlikely	The greater glider is largely restricted to eucalypt forests and woodlands. It is primarily folivorous, with a diet mostly comprising eucalypt leaves, and occasionally flowers. It is typically found in highest abundance in taller, montane, moist eucalypt forests with relatively old trees and abundant hollows. The distribution may be patchy even in suitable habitat. The greater glider favours forests with a diversity of eucalypt species, due to seasonal variation in its preferred tree species. <a href="http://www.environment.gov.au/biodiversity/threatened/species/pubs/254-conservation-advice-20160525.pdf">http://www.environment.gov.au/biodiversity/threatened/species/pubs/254-conservation-advice-20160525.pdf</a>  No ALA records from eastern lowland habitat.
	<i>Phascolarctos cinereus</i>	Koala	V	V	2a(iii)	PMR	Unlikely	Koalas naturally inhabit a range of temperate, sub-tropical and tropical forest, woodland and semi-arid communities dominated by Eucalyptus species. There are no published estimates of Koala population size or density in the far northern

Fauna Group	Scientific Name	Common Name	NC Act Status	EPBC Act Status	Relevant OUV Category	Source	Likelihood of Occurrence	Habitat
								part of the Koala's range in the Wet Tropics and Einasleigh Uplands bioregions. There are some anecdotal reports of Koala sightings but these are uncommon and suggestive of very low densities. The northern limit of the distribution of the Koala in Queensland has contracted to the south, from approximately Cooktown to inland of Cairns, since the late 1960s. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=85104">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=85104</a>  No ALA records north of Port Douglas.
	<i>Pteropus conspicillatus</i>	Spectacled Flying-fox	V	V	-	OUV, PMR	Confirmed	The largest population of the Spectacled Flying-fox is known from the Wet Tropics of Queensland World Heritage Area between Townsville and Cooktown. One study showed that the Spectacled Flying-fox roosts within 6.5 km of rainforest, although a roost 16 km from rainforest has also been observed. The species was long assumed to feed primarily on rainforest species but individuals regularly feed on a wide variety of non-rainforest species, including eucalypts ( <i>Eucalyptus</i> spp., <i>Corymbia</i> spp.) in tall open forests adjoining rainforest communities and in tropical woodland and savanna ecosystems. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=185">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=185</a>
	<i>Rhinolophus robertsi</i> syn. <i>Rhinolophus philippinensis</i>	Large-eared Horseshoe Bat	E	V	-	PMR	Possible	The Greater Large-eared Horseshoe Bat is known from a relatively small number of locations, as detected at roosts or in flight. These locations include several national parks, some of which are in the Wet Tropics World Heritage Area. The bat is found in lowland rainforest, along gallery forest-lined creeks within open eucalypt forest, Melaleuca forest with rainforest understorey, open savannah woodland and tall riparian woodland of <i>Melaleuca</i> , Forest Red Gum ( <i>E. tereticornis</i> ) and Moreton Bay Ash ( <i>C. tessellaris</i> ). <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=87639">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=87639</a>  ALA records from the Rossville area to the north of the Study Area.
	<i>Saccolaimus saccolaimus nudicluniatus</i>	Bare-rumped Sheath-tailed Bat	E	V	-	PMR	Possible	The Bare-rumped Sheath-tailed Bat occurs mostly in lowland areas, typically in a range of woodland, forest and open environments. In Queensland, it is known to be associated with coastal lowland rainforests, and more open forests dominated by <i>Eucalyptus</i> or <i>Corymbia</i> species interspersed with coastal lowland rainforest. It is known to occur in north-eastern Queensland and the monsoonal tropics of the Northern Territory. <a href="http://www.environment.gov.au/biodiversity/threatened/species/pubs/66889-conservation-advice-07122016.pdf">http://www.environment.gov.au/biodiversity/threatened/species/pubs/66889-conservation-advice-07122016.pdf</a>  ALA records from the Rossville area to the north of the Study Area. Within the EPBC Expert Distribution (maybe) for the species.
	<i>Xeromys myoides</i>	Water Mouse	V	V	-	PMR	Possible	Utilises habitat including mangroves and the associated saltmarsh, sedgelands, clay pans, heathlands and freshwater wetlands. The habitat composition (littoral, supralittoral and terrestrial vegetation) dictate the species' nesting behaviour. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=66</a>  Recently discovered in Cairns and may be present in suitable habitat north of the Daintree River.
<b>Amphibians</b>								
	<i>Cophixalus aenigma</i>	Tapping Nurseryfrog	NT	-	1g(ii); 2a(i)	OUV	Confirmed	The Tapping NurseryFrog occurs in vine-fern forest and vine-fern thicket. Males generally call from concealed sites among leaf litter, exposed roots, rocks and fallen debris on the forest floor. <a href="https://www.environment.gov.au/biodiversity/threatened/nominations/comment/cophixalus-aenigma">https://www.environment.gov.au/biodiversity/threatened/nominations/comment/cophixalus-aenigma</a>
	<i>Cophixalus concinnus</i>	Beautiful Nurseryfrog	V	-	1g(ii); 2a(i)	OUV	Confirmed	Found only on Thornton's Peak, within the Daintree National Park in the Wet Tropics of northern Queensland, in the 718 ha that occurs over 1100 m above sea level. It is particularly common in areas where vegetation grows amongst large jumbled boulders. <a href="https://www.environment.gov.au/biodiversity/threatened/nominations/comment/cophixalus-concinnus">https://www.environment.gov.au/biodiversity/threatened/nominations/comment/cophixalus-concinnus</a>
	<i>Cophixalus hosmeri</i>	Rattling Nurseryfrog	NT	-	1g(ii); 2a(i)	OUV	Confirmed	The Rattling Nursery Frog occurs in simple microphyll vine-fern forest in areas of continuous rainforest habitat. Breeding males form small, discrete calling aggregations. <a href="https://www.environment.gov.au/biodiversity/threatened/nominations/comment/cophixalus-hosmeri">https://www.environment.gov.au/biodiversity/threatened/nominations/comment/cophixalus-hosmeri</a>
	<i>Cophixalus neglectus</i>	Bellenden Ker Nurseryfrog	V	-	1g(ii); 2a(i)	OUV	Unlikely	The Neglected Nursery Frog is a high altitude rainforest specialist. This species is found only on the two highest mountain tops in North Queensland, Mt Bellenden Ker and Mt Bartle Frere. <a href="https://www.environment.gov.au/biodiversity/threatened/nominations/comment/cophixalus-neglectus">https://www.environment.gov.au/biodiversity/threatened/nominations/comment/cophixalus-neglectus</a>  It is suspected that records from within the Study Area are erroneous.

Fauna Group	Scientific Name	Common Name	NC Act Status	EPBC Act Status	Relevant OUV Category	Source	Likelihood of Occurrence	Habitat
	<i>Litoria dayi</i>	Australian Lacelid	E	E	2a(i); 4a(v)	OUV, PMR	Confirmed	This frog is a rainforest species, endemic to the Wet Tropics Bioregion. It is associated with rainforests and rainforest margins. In montane areas the species prefers fast-flowing rocky streams although they also frequent slower watercourses where ample vegetation exists along the margins. At low elevations, the Lace-eyed Tree Frog favours rock soaks, narrow ephemeral streams and rock outcrops in larger watercourses. It may also be found on rocks, boulders and vegetation in or adjacent to streams. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=86707">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=86707</a>
	<i>Litoria lorica</i>	Armoured Mistfrog	E	CE	2a(i); 4a(v)	PMR	Unlikely	The little waterfall frog is found on boulders in the splash zone near turbulent, fast-flowing water in upland rainforest and adjacent sclerophyll forest. This species is only known from five localities in north-east Queensland: Thornton Peak, Mt Pieter Botte, Mossman Gorge and Carbine Tableland. Only the recently discovered Carbine Tableland population is still extant. The species has not been found at the remaining four sites since 1991, despite ongoing survey efforts. <a href="https://environment.des.qld.gov.au/wildlife/threatened-species/conservation/conservation-animals/armoured_mistfrog.html">https://environment.des.qld.gov.au/wildlife/threatened-species/conservation/conservation-animals/armoured_mistfrog.html</a>
	<i>Litoria nannotis</i>	Waterfall Frog	E	E	2a(i); 4a(v)	OUV, PMR	Confirmed	The Waterfall Frog is a stream dwelling species that is endemic to the Wet Tropics Bioregion. It is restricted to rocky stream habitats in rainforest or wet sclerophyll forest where there is fast flowing water, waterfalls and cascades. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1817">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1817</a>
	<i>Litoria nyakalensis</i>	Mountain Mistfrog	E	CE	2a(i); 4a(v)	PMR	Unlikely	This frog formerly occurred across two-thirds of the Wet Tropics from Douglas Creek near Cardwell to Alexandra Creek, Thornton Peak. This species underwent a rapid range contraction in the late 1980s, and has not been recorded since November 1990. It is most likely extinct. The species inhabited fast-flowing streams near riffles (ripples) and cascades in upland rainforest, and were usually found perched on rocks or overhanging vegetation adjacent to the water. <a href="https://environment.des.qld.gov.au/wildlife/threatened-species/conservation/conservation-animals/mountain_mistfrog.html">https://environment.des.qld.gov.au/wildlife/threatened-species/conservation/conservation-animals/mountain_mistfrog.html</a>
	<i>Litoria rheocola</i>	Common Mistfrog	E	E	2a(i); 4a(v)	OUV, PMR	Confirmed	The Common Mistfrog is a rainforest specialist, endemic to the Wet Tropics Bioregion. The species is restricted to fast flowing rocky creeks and streams in rainforest as well as wet sclerophyll forest. Within these streams this species are often found in the slower more open sections, away from waterfalls. Individuals can be found on rocks, logs and vegetation in or adjacent to streams. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1802">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1802</a>
	<i>Litoria serrata</i>	Tapping Green-eyed Treefrog	V	-	2a(i)	OUV	Confirmed	The Tapping Green-eyed Treefrog's natural habitats are mainly subtropical, but can also include tropical lowland forests, as well as rivers and freshwater marshes. <a href="https://en.wikipedia.org/wiki/Green-eyed_tree_frog">https://en.wikipedia.org/wiki/Green-eyed_tree_frog</a>
	<i>Taudactylus acutirostris</i>	Sharp Snouted Dayfrog	PE	EX	4a(v)	OUV	Confirmed	The Sharp-snouted Day Frog was a habitat specialist, endemic to montane forests in the Wet Tropics Bioregion. The species occurred along small mountain streams in rainforest and wet sclerophyll forest above 300 m altitude. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1911">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1911</a>
	<i>Taudactylus rheophilus</i>	Northern Tinkerfrog	E	E	2a(i); 4a(v)	OUV, PMR	Confirmed	The Northern Tinker Frog is a montane specialist, endemic to the Wet Tropics Bioregion occurring along rocky streams in upland rainforest. It is usually found under rocks and logs beside fast-flowing streams and prefers seepage and trickle areas near streams. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1890">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1890</a>
<b>Birds</b>								
	<i>Anseranas semipalmata</i>	Magpie Goose	-	Ma	-	PMR	Confirmed	Mainly found in shallow wetlands (less than 1 m deep) with dense growth of rushes or sedges. Equally at home in aquatic or terrestrial habitats; often seen walking and grazing on land; feeds on grasses, bulbs and rhizomes. Potentially utilises wetlands within the study area. ALA records exist. <a href="https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10056">https://www.environment.nsw.gov.au/threatenedSpeciesApp/profile.aspx?id=10056</a>
	<i>Apus pacificus</i>	Fork-tailed Swift	SL	Mi, Ma	-	OUV, PMR	Confirmed	The Fork-tailed Swift is almost exclusively aerial, flying from less than 1 m to at least 300 m above ground and probably much higher. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=678">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=678</a>
	<i>Ardea alba</i>	Great Egret	-	Ma	-	PMR	Confirmed	The Eastern Great Egret has been reported in a wide range of wetland habitats (for example inland and coastal, freshwater and saline, permanent and ephemeral, open and vegetated, large and small, natural and artificial). Potentially utilises wetlands within the study area. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=82410">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=82410</a>

Fauna Group	Scientific Name	Common Name	NC Act Status	EPBC Act Status	Relevant OUV Category	Source	Likelihood of Occurrence	Habitat
								ALA records exist within the Study Area.
	<i>Ardea ibis</i>	Cattle Egret	-	Ma	-	PMR	Confirmed	The Cattle Egret occurs in tropical and temperate grasslands, wooded lands and terrestrial wetlands. It has occasionally been seen in arid and semi-arid regions however this is extremely rare. High numbers have been observed in moist, low-lying poorly drained pastures with an abundance of high grass. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=59542">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=59542</a>  ALA records from the Study Area and surrounds.
	<i>Casuarus casuaris</i> (sth pop.)	Southern Cassowary (southern pop.)	E	E	1d(iii); 4a(v)	OUV, PMR	Confirmed	While cassowaries live in and depend on tropical rainforest they will also utilise a mosaic of associated habitats when these are available. Associated habitats utilised include mangroves, melaleuca, eucalypt woodlands, swamps and swamp forests. <a href="http://www.environment.gov.au/resource/significant-impact-guidelines-endangered-southern-cassowary-casuarus-casuaris-johnsonii">http://www.environment.gov.au/resource/significant-impact-guidelines-endangered-southern-cassowary-casuarus-casuaris-johnsonii</a>
	<i>Cecropis daurica</i> syn. <i>Hirundo daurica</i>	Red-rumped Swallow	SL	Mi, Ma	-	PMR	Confirmed	The Red-rumped Swallow is widespread across the Northern Hemisphere where it breeds. Records in Australia are of non-breeding migrants (December - February) and confined to the north of the country, particularly around Cairns, Gulf of Carpentaria, Darwin and Broome. Predominately forages over wetlands: e.g. swamps, rivers, dams etc. or open areas such as golf course or cane fields, where insects are taken on the wing. <a href="http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds">http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds</a>  ALA records from the Study Area and surrounds.
	<i>Chrysococcyx osculans</i> syn. <i>Chalcites osculans</i>	Black-eared Cuckoo	-	Ma	-	PMR	Possible	Dry forests, mallee and woodlands. <a href="https://bie.ala.org.au/species/urn:lsid:biodiversity.org.au:afd.taxon:155cafce-e269-4589-82f0-3d777f3d7231">https://bie.ala.org.au/species/urn:lsid:biodiversity.org.au:afd.taxon:155cafce-e269-4589-82f0-3d777f3d7231</a>  No ALA records for the Study Area but within the EPBC Expert Distribution for the species.
	<i>Cuculus optatus</i>	Oriental Cuckoo	SL	Mi	-	OUV, PMR	Confirmed	The Oriental Cuckoo is a regular migrant to Australia, where it spends the non-breeding season (Sept- May) in coastal regions across northern and eastern Australia as well as offshore islands. The species uses a range of vegetated habitats such as monsoon rainforest, wet sclerophyll forest, open woodlands and appears quite often along edges of forests, or ecotones between forest types. <a href="http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds">http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds</a>
	<i>Erythrotriorchis radiatus</i>	Red Goshawk	E	V	-	PMR	Possible	The Red Goshawk occurs in coastal and sub-coastal areas in wooded and forested lands of tropical and warm-temperate Australia. Riverine forests are also used frequently. Such habitats typically support high bird numbers and biodiversity, especially medium to large species which the goshawk requires for prey. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=942">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=942</a>  No ALA records for the Study Area but within the EPBC Expert Distribution for the species.
	<i>Gallinago hardwickii</i>	Latham's Snipe	S	Mi, Ma	-	PMR	Possible	In Australia, Latham's Snipe occurs in permanent and ephemeral wetlands up to 2000 m above sea-level. They usually inhabit open, freshwater wetlands with low, dense vegetation (e.g. swamps, flooded grasslands or heathlands, around bogs and other water bodies). However, they can also occur in habitats with saline or brackish water, in modified or artificial habitats, and in habitats located close to humans or human activity. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=863">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=863</a>  ALA records from the Daintree River area. Potentially utilises wetlands within the study area.
	<i>Haliaeetus leucogaster</i>	White-bellied Sea-Eagle	-	Ma	-	PMR	Confirmed	The White-bellied Sea-Eagle is found in coastal habitats (especially those close to the sea-shore) and around terrestrial wetlands in tropical and temperate regions of mainland Australia and its offshore islands. The habitats occupied by the sea-eagle are characterised by the presence of large areas of open water (larger rivers, swamps, lakes and the sea). <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=943">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=943</a>  Numerous ALA records from within the study area.
	<i>Hirundapus caudacutus</i>	White-throated Needletail	SL	Mi, Ma	-	OUV, PMR	Confirmed	The White-throated Needletail is a non-breeding migrant to Australia (present October-April). It is widespread across eastern and south-eastern Australia but is considered a vagrant in central and western Australia. The species is found across a range of habitats, more often over wooded areas, where it is almost exclusively aerial, though does roost in tree hollows and the foliage canopy. <a href="http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds">http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds</a>



Fauna Group	Scientific Name	Common Name	NC Act Status	EPBC Act Status	Relevant OUV Category	Source	Likelihood of Occurrence	Habitat
	<i>Hirundo rustica</i>	Barn Swallow	SL	Mi, Ma	-	PMR	Probable	In tropical northern Australia, the Barn Swallows arrive Sept-October but the first southern records tend to be in November. Departure from the south is around March and in April from northern Australia. Habitat: in the air above open vegetated areas including farmland, sports grounds, native grasslands and airstrips as well as over open water such as billabongs, lagoons, creeks and sewage treatment plants. <a href="http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds">http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds</a>  ALA records from the Daintree River area. Potentially utilises habitat within the study area.
	<i>Merops ornatus</i>	Rainbow Bee-eater	-	Ma	-	PMR	Confirmed	The Rainbow Bee-eater occurs mainly in open forests and woodlands, shrublands, and in various cleared or semi-cleared habitats, including farmland and areas of human habitation. It usually occurs in open, cleared or lightly-timbered areas that are often, but not always, located in close proximity to permanent water. It also occurs in inland and coastal sand dune systems, and in mangroves in northern Australia, and has been recorded in various other habitat types including heathland, sedgeland, vine forest and vine thicket, and on beaches. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=670">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=670</a>  Numerous ALA records from within the study area.
	<i>Monarcha frater</i>	Black-winged Monarch	SL	Mi, Ma	-	PMR	Possible	The Black-winged Monarch is a rainforest species, but will use mixed tropical open eucalypt forests and woodlands that are adjacent to areas of rainforest. These woodlands contain understorey elements similar to those found in rainforest habitats. <a href="http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds">http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds</a>  No ALA records for the Study Area but is within the EPBC Expert Distribution (maybe) for the species.
	<i>Monarcha melanopsis</i>	Black-faced Monarch	SL	Mi, Ma	-	OUV, PMR	Confirmed	The Black-faced Monarch breeds in eastern coastal Australia during summer and migrates to spend the non-breeding winter period in New Guinea. A portion of the population overwinters in northern Australia rather than making the full migration to New Guinea. The Black-faced Monarch is a wet forest specialist, occurring mainly in rainforests and riparian vegetation. In wet sclerophyll forest, the species mostly frequents sheltered gullies and slopes with a dense understorey of ferns and/or shrubs. <a href="http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds">http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds</a>
	<i>Monarcha trivirgatus</i> syn. <i>Symposiarchus trivirgatus</i>	Spectacled Monarch	SL	Mi, Ma	-	OUV, PMR	Confirmed	Insectivore occupying dense vegetation, mainly in rainforest but also in moist or wet sclerophyll forest and occasionally in other densely vegetated habitats such as mangroves, drier forest, woodlands, parks and gardens. <a href="http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds">http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds</a>  Numerous ALA records from within the Study Area.
	<i>Myiagra cyanoleuca</i>	Satin Flycatcher	SL	Mi	-	OUV, PMR	Confirmed	Satin Flycatchers are eucalypt forest and woodland inhabitants. They are particularly common in tall wet sclerophyll forest, often in gullies or along water courses. In woodlands they prefer open, grassy woodland. <a href="http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds">http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds</a>
	<i>Pandion cristatus</i> syn. <i>Pandion haliaetus</i>	Eastern Osprey	SL	Mi, Ma	-	OUV, PMR	Confirmed	The Osprey is a piscivore (fish eater), foraging over open, clear water. Favoured habitats are coastal areas, especially the mouths of large rivers, lagoons and lakes but also along the larger coastal rivers such as the Clarence where nesting occurs upriver of Grafton, New South Wales. Breeding habitat for this species is in close proximity to water bodies. <a href="http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds">http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds</a>  Numerous ALA records from within the Study Area
	<i>Rhipidura rufifrons</i>	Rufous Fantail	SL	Mi, Ma	-	OUV, PMR	Confirmed	Rufous Fantails inhabit moist, dense habitats, including mangroves, rainforest, riparian forests and thickets, and wet eucalypt forests. <a href="http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds">http://www.environment.gov.au/biodiversity/threatened/publications/epbc-act-referral-guidelines-migratory-birds</a>  Numerous ALA records from within the Study Area
	<i>Rostratula australis</i> syn. <i>Rostratula benghalensis</i> (sensu lato)	Australian Painted-snipe	V	E, Ma	-	PMR	Possible	The Australian Painted Snipe generally inhabits shallow terrestrial freshwater (occasionally brackish) wetlands, including temporary and permanent lakes, swamps and claypans. They also use inundated or waterlogged grassland or saltmarsh, dams, rice crops, sewage farms and bore drains. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=77037">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=77037</a>

Fauna Group	Scientific Name	Common Name	NC Act Status	EPBC Act Status	Relevant OUV Category	Source	Likelihood of Occurrence	Habitat
								No ALA records, but within the EPBC Expert Distribution (maybe) for the species. Potentially utilises wetlands within the study area.
	<i>Tyto novaehollandiae kimberli</i>	Masked Owl	V	V	-	PMR	Possible	In northern Australia, the Masked Owl has been recorded from riparian forest, rainforest, open forest, Melaleuca swamps and the edges of mangroves, as well as along the margins of sugar cane fields. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=26048">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=26048</a>  No ALA records, but within the EPBC Expert Distribution (likely) for the species.
<b>Reptiles</b>								
	<i>Calyptotis thornstonensis</i>	Thornton Peak Calyptotis	V	-	1g(ii); 2a(i)	OUV	Confirmed	This species is found in moist rainforest, beneath rocks and logs. It is found in mulch, and is very sensitive to heat stress. <a href="https://www.iucnredlist.org/species/102965805/102965807">https://www.iucnredlist.org/species/102965805/102965807</a>
	<i>Crocodylus porosus</i>	Estuarine Crocodile	V	Mi	-	OUV, PMR	Confirmed	In Queensland, the species is usually restricted to coastal waterways and floodplain wetlands. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1774">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1774</a>
	<i>Egernia rugosa</i>	Yakka Skink	V	V	1d(ii)	OUV, PMR	Confirmed	The Yakka Skink is known to occur in open dry sclerophyll forest, woodland and scrub. The core habitat of this species is within the Mulga Lands and Brigalow Belt South Bioregions. The species has been observed in ecotonal forest in rainforest and wet/dry sclerophyll forest. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1420">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=1420</a>  No ALA records, but within the EPBC Expert Distribution (maybe) for the species.
<b>Fish</b>								
	<i>Stiphodon pelewensis</i>	cling goby	V	-	-	OUV	Confirmed	Inhabits short-steep-coastal-streams (SSCS) in the Australian Wet Tropics (Ebner <i>et al.</i> 2016)
	<i>Stiphodon rutilaureus</i>	Orange Cling Goby	V	-	-	OUV	Confirmed	Inhabits short-steep-coastal-streams (SSCS) in the Australian Wet Tropics (Ebner <i>et al.</i> 2016).
	<i>Stiphodon semoni</i>	Opal Cling Goby	-	CE	-	OUV	Confirmed	Inhabits short-steep-coastal-streams (SSCS) in the Australian Wet Tropics (Ebner <i>et al.</i> 2016).

Notes:

- NC Act status: SL = Special Least Concern; NT = Near Threatened; V = Vulnerable; E = Endangered
- EPBC Act status: M = Marine; Mi = Migratory (Bonn, CAMBA, JAMBA, ROKAMBA); V = Vulnerable; E = Endangered; CE = Critically Endangered
- Relevant OUV category (DES 2018)
  - **1d(ii)**: Outstanding examples representing the major stages in the earth's evolutionary history; (d) The final break-up of Gondwana; (ii) Evolutionary history is represented by relicts of early descendants of Gondwanic reptile fauna
  - **1d(iii)**: Outstanding examples representing the major stages in the earth's evolutionary history; (d) The final break-up of Gondwana; (iii) Evolutionary history is represented by relicts of early descendants of Gondwanic bird fauna
  - **1e(iv)**: Outstanding examples representing the major stages in the earth's evolutionary history; (e) The origins of the Australian sclerophyll flora and marsupial fauna; (iv) Evolutionary history is represented by ancestral stock from which the marsupial component of Australia's fauna evolved
  - **1g(ii)**: Outstanding examples representing the major stages in the earth's evolutionary history; (g) The mixing of the continental biota of the Australian and Asian continental plates; (ii) Evolutionary history is represented by the unique record of the mixing of two continental faunas.
  - **2a(i)**: Outstanding examples representing significant ongoing ecological and biological processes; (a) Processes leading to areas of high endemism and speciation; (i) Biogeographic processes leading to areas of high endemism
  - **2a(iii)**: Outstanding examples representing significant ongoing ecological and biological processes; (a) Processes leading to areas of high endemism and speciation; (iii) Disjunct populations: extra-Wet Tropics region (speciation processes). *Note: No species list provided so species taken from text.*
  - **4a(v)**: The most important habitats for the in situ conservation of biological diversity, including those containing threatened species of plants and animals of outstanding universal value from the point of view of science and conservation; (a) Habitats for conserving biodiversity and rare & threatened species of flora and fauna; (v) Threatened fauna. *Note: 86 threatened fauna were used for the purpose of mapping taxa richness for this OUV. Only the eight species in the above table were referred to in the text and no species list provided. This category may then apply to other species in the table.*
- Source: OUV = DES (2018) (base species data used in the analysis of OUVs); PMR = EPBC Act Protected Matters Report
- Marine species including seasnakes, sea turtles, cetaceans, mammals and fish that are restricted to open waters have been omitted as they will not be impacted by the proposal. However, stream and estuarine species such as cling gobies and the Saltwater Crocodile that have the potential to be impacted have been retained in the analysis.
- Migratory shorebirds and seabirds have been omitted as they will not be impacted by the proposal.

Appendix B. Flora Likelihood of Occurrence Assessment

Species	Common Name	NC Act Status	EPBC Act Status	Relevant OUV Category	Source	Likelihood of Occurrence	Habitat requirements, distribution and occurrences*
<i>Acriopsis emarginata</i>	Pale Chandelier Orchid	V	V	-	PMR	Possible	<i>Acriopsis emarginata</i> is endemic to north Queensland, from the tip of Cape York Peninsula to the Daintree River. <i>Acriopsis emarginata</i> grows on trees in hot, humid, lowland rainforest, rainforest margins, and in swamps. This species is found in near-coastal swamps in the most southerly parts of its range where it can be found growing on paperbarks, palms, and Pandanus spp. <a href="http://www.environment.gov.au/biodiversity/threatened/species/pubs/83928-conservation-advice.pdf">http://www.environment.gov.au/biodiversity/threatened/species/pubs/83928-conservation-advice.pdf</a>  ALA record to the west of the Study Area in Upper Daintree region.
<i>Acronychia acuminata</i>	Thornton Aspen	NT	-	1c(v); 2a(i)	OUV	Confirmed	Endemic to NEQ, known only from collections made between the Daintree River and Bloomfield River. Altitudinal range from 300-900 m. Grows in well-developed upland rain forest, windswept mountain rain forest and gallery forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Acronychia_acuminata.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Acronychia_acuminata.htm</a>  ALA records are present from within Study Area
<i>Actephila foetida</i>	-	V	V	2a(i)	PMR	Confirmed	<i>Actephila foetida</i> is known from north-eastern Queensland, where it occurs in the vicinity of Bellenden Ker, near and along Harvey Creek and north of the Daintree River in the Cooper and Hutchinson Creek catchments. It grows in lowland rainforest (evergreen, complex mesophyll vineforest) on alluvium overlying granite substrates at altitudes from near sea level to 100 m. <a href="http://www.environment.gov.au/biodiversity/threatened/species/pubs/12078-conservation-advice.pdf">http://www.environment.gov.au/biodiversity/threatened/species/pubs/12078-conservation-advice.pdf</a>  ALA records are present from within Study Area
<i>Albizia</i> sp. (Windsor Tableland B.Gray 2181)	-	V	-	2a(i)	OUV	Confirmed	Probably endemic to NEQ, known only from collections made on the Windsor Tableland and in the area between the Daintree and Bloomfield Rivers. Altitudinal range from 300-1000 m. Grows in well-developed lowland and upland rain forest on a variety of sites. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Albizia_sp._Windsor_Tableland_(B.Gray_2181).htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Albizia_sp._Windsor_Tableland_(B.Gray_2181).htm</a>  ALA records are present from within Study Area
<i>Aphyllorchis anomala</i>	Simple Pauper Orchid	NT	-	2a(i)	OUV	Confirmed	Endemic to Queensland. Occurs in NEQ. Altitudinal range not known with any certainty. Probably extends from near sea level to 700 m. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Aphyllorchis_anomala.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Aphyllorchis_anomala.htm</a>  ALA records are present from within Study Area
<i>Archidendron kanisii</i>	-	E	-	2a(i)	OUV	Confirmed	Endemic to NEQ, known only from collections made in the Daintree-Cape Tribulation area. Altitudinal range from near sea level to 200 m. Grows as an understory plant in lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Archidendron_kanisii.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Archidendron_kanisii.htm</a>  ALA records are present from within Study Area
<i>Archidendropsis xanthoxylon</i>	Yellow Siris	NT	-	-	OUV	Confirmed	Endemic to NEQ, restricted to the area between Rossville and Mt Molloy. Altitudinal range from sea level to 500 m. Grows in well-developed lowland and upland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Archidendropsis_xanthoxylon.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Archidendropsis_xanthoxylon.htm</a>  ALA records are present from within Study Area
<i>Argophyllum cryptophlebium</i>	-	V	-	2a(i)	OUV	Confirmed	Endemic to NEQ. Altitudinal range from 700-1500 m. Usually grows in stunted vegetation on the tops and upper slopes of mountains. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Argophyllum_cryptophlebium.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Argophyllum_cryptophlebium.htm</a>  ALA records are present from within Study Area
<i>Asplenium wildii</i>	-	V	V	-	OUV, PMR	Confirmed	<i>Asplenium wildii</i> is endemic to north-east Queensland. A number of collections have been made in the Daintree River area, Daintree National Park, near Cairns and Stewart Creek. Although some sources suggest that this species is limited to the Daintree area, herbarium records suggest that this species was known from ranges west of Cairns. <i>Asplenium wildii</i> is generally found on mossy boulders in accumulated soil within lowland rainforest, occasionally on the banks of streams. <a href="http://www.environment.gov.au/biodiversity/threatened/species/pubs/19154-conservation-advice.pdf">http://www.environment.gov.au/biodiversity/threatened/species/pubs/19154-conservation-advice.pdf</a>  ALA records are present from within Study Area
<i>Austromuellera trinervia</i>	Mueller's Silky Oak	NT	-	1c(v) 2a(i)	OUV	Confirmed	Endemic to NEQ, restricted to the area between the Big Tableland and the Daintree River and the Butchers Creek-Boonjee area on the western side of Mt Bartle Frere. Altitudinal range from sea level to 800 m. Grows in well-developed lowland and upland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Austromuellera_trinervia.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Austromuellera_trinervia.htm</a>  ALA records are present from within Study Area
<i>Beilschmiedia castrisnensis</i>	-	NT	-	2a(i) 1c(i)	OUV	Confirmed	Endemic to NEQ, restricted to the area between Bloomfield and the Daintree River. Altitudinal range from sea level to 660 m. Grows in well-developed lowland and upland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Beilschmiedia_castrisnensis.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Beilschmiedia_castrisnensis.htm</a>  ALA records are present from within Study Area
<i>Bruguiera hainesii</i>	Haines's Orange Mangrove	-	CE	-	PMR	Possible	<i>Bruguiera hainesii</i> was discovered in Australia as a population of around 49 trees at Trinity Inlet within the city limits of Cairns in January 2016. <a href="https://www.qld.gov.au/_data/assets/pdf_file/0030/69096/cooper-kudo-duke-bruguiera-hainesii-austrobaileya-v9s4-p481-488.pdf">https://www.qld.gov.au/_data/assets/pdf_file/0030/69096/cooper-kudo-duke-bruguiera-hainesii-austrobaileya-v9s4-p481-488.pdf</a>

Species	Common Name	NC Act Status	EPBC Act Status	Relevant OUV Category	Source	Likelihood of Occurrence	Habitat requirements, distribution and occurrences*
							In future, Haines's Orange Mangrove may be discovered between its lowest latitude occurrences in Asia and its highest latitude occurrences in Cairns along the eastern coast of Cape York. Factors that influence this trend in the global distribution patterns of mangroves include global temperature gradients, global climate gradients and global dispersal mechanisms. <a href="http://www.environment.gov.au/biodiversity/threatened/species/pubs/88756-conservation-advice-22022019.pdf">http://www.environment.gov.au/biodiversity/threatened/species/pubs/88756-conservation-advice-22022019.pdf</a>  Only confirmed records are from Cairns
<i>Bubbia queenslandiana</i> subsp. <i>queenslandiana</i>	Australian Pepper Tree	NT	-	1c(i) 1c(v) 2a(i) 2a(ii)	OUV	Confirmed	Endemic to NEQ. Altitudinal range from 700-1250 m. Grows as an understory tree in well-developed mountain rain forest, usually on granite. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Bubbia_queenslandiana_subsp_queenslandiana.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Bubbia_queenslandiana_subsp_queenslandiana.htm</a>  ALA records are present from within Study Area
<i>Bubbia whiteana</i>	-	V	-	1c(i) 1c(v) 2a(i) 2a(ii)	OUV	Confirmed	Endemic to NEQ, known only from the Thornton Peak and Mt Pieter Botte areas. Altitudinal range from 800-1500 m. Grows as an understory plant in mountain rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Bubbia_whiteana.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Bubbia_whiteana.htm</a>  ALA records are present from within Study Area
<i>Buchanania mangoides</i>	Plum Tree	V	-	2a(i)	OUV	Confirmed	Endemic to NEQ, known only from collections made on Snapper, High Bedarra and North Brook Islands. Altitudinal range near sea level. Grows on calcium rich substrates in beach forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Buchanania_mangoides.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Buchanania_mangoides.htm</a>  ALA records are present from within Study Area
<i>Buckinghamia ferruginiflora</i>	Spotted Oak	V	-	-	OUV	Confirmed	Endemic to NEQ, restricted to the area between Bloomfield and the Daintree River. Altitudinal range from sea level to 350 m. Grows in well-developed lowland and upland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Buckinghamia_ferruginiflora.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Buckinghamia_ferruginiflora.htm</a>  ALA records are present from within Study Area
<i>Calamus aruensis</i>	Lockerbie Scrub Wait-a-while	V	-	-	OUV	Confirmed?	Occurs in CYP. Known only from a few collections, one from the Jardine River and the other two from the Lockerbie area. Altitudinal range probably quite small, from near sea level to 60 m. Grows in lowland rain forest or monsoon forest. Also widespread in New Guinea and the Solomon Islands. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Calamus_aruensis.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Calamus_aruensis.htm</a>  No ALA records from the Study Area, but used in base data for the OUV study. Occurrence unconfirmed.
<i>Canarium acutifolium</i>	-	V	V	1c(v)	PMR	Unlikely	Occurs in NEQ, restricted to the area between Mossman and Tully. Altitudinal range very small, from sea level to 100 m. Almost confined to creek and river banks in lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Canarium_acutifolium.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Canarium_acutifolium.htm</a>  No ALA records from the Study Area
<i>Carronia pedicellata</i>	-	E	E	2a(i)	OUV, PMR	Confirmed	Endemic to NEQ. Altitudinal range from near sea level to 150 m. Grows in well-developed lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Carronia_pedicellata.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Carronia_pedicellata.htm</a>  ALA records are present from within Study Area
<i>Cepobaculum carronii</i>	Pink Tea Tree Orchid	?	E	-	PMR	Unlikely	Occurs in far north-eastern Queensland from Bamaga to Mcllwraith Range. Altitude: 200-600 m. Occurs in stunted open forests, especially adjacent to low-lying areas subject to occasional flooding. It is often found growing on <i>Melaleuca viridiflora</i> in bright, exposed situations and survives on trees on the margins of monsoonal thickets. <a href="http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Cepobaculum_carronii.htm">http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Cepobaculum_carronii.htm</a>  No ALA records from the Study Area
<i>Ceratopetalum corymbosum</i>	Mountain Sycamore	V	-	1c(iii) 2a(i)	OUV	Confirmed	Endemic to NEQ, restricted to the Thornton Peak area north of the Daintree River. Altitudinal range from 1200-1300 m. Grows in stunted mountain rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Ceratopetalum_corymbosum.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Ceratopetalum_corymbosum.htm</a>  ALA records are present from within Study Area
<i>Ceratopetalum macrophyllum</i>	-	NT	-	1c(iii) 2a(i)	OUV	Confirmed	Endemic to NEQ, restricted to the Noah Creek, Alexandra Creek, and Roaring Meg Creek catchments. Altitudinal range from near sea level to about 600 m. Grows in well-developed rain forest often along creeks and gullies. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Ceratopetalum_macrophyllum.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Ceratopetalum_macrophyllum.htm</a>  ALA records are present from within Study Area
<i>Chingia australis</i>	-	E	E	1a(iv)	OUV, PMR	Confirmed	<i>Chingia australis</i> occurs in the Wet Tropics of Queensland in lowland and upland mesophyll vine forest and upland simple notophyll vine forest. It is a moisture and light loving fern dependent on surrounding rainforest habitat and disturbance processes that provide it with gaps in the rainforest canopy. These requirements indicate that the species is a specialist of small to medium sized gaps, responding specifically to newly formed mineral soil niches within rainforest ecosystems. <i>Chingia australis</i> occurs in rainforest on steep creek banks and slopes of ridges. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=24603">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=24603</a>  ALA records are present from within Study Area



Species	Common Name	NC Act Status	EPBC Act Status	Relevant OUV Category	Source	Likelihood of Occurrence	Habitat requirements, distribution and occurrences*
<i>Citrus inodora</i>	Queensland Wild Lime	V	-	2a(i)	OUV	Confirmed	Endemic to NEQ, known only from the eastern foothills of the Bellenden Ker Range - Mt Bartle Frere area and also from the Cape Tribulation area. Altitudinal range from near sea level to 120 m. Grows as an understory plant in undisturbed well developed lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Citrus_inodora.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Citrus_inodora.htm</a> ALA records are present from within Study Area
<i>Crepidomanes aphlebooides</i> (accepted name: <i>Crepidomanes aphlebooides</i> )	Filmy Fern	E	-	-	OUV	Confirmed	<i>Crepidomanes aphlebooides</i> occurs in tropical rainforest where it grows on rocks, on the ground or sometimes climbing up the bases of trees. It occurs on steep creek banks and on rock faces with permanent water seepage. <a href="https://apps.des.qld.gov.au/species-search/details/?id=21854">https://apps.des.qld.gov.au/species-search/details/?id=21854</a> ALA records are present from within Study Area
<i>Cyclophyllum costatum</i>	-	V	V	1g(i) 2a(i)	PMR	Possible	Endemic to NEQ. Altitudinal range apparently from 960 to 1100 m. Grows in well-developed lowland and upland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Cyclophyllum_costatum.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Cyclophyllum_costatum.htm</a> ALA records are present adjacent to Study Area
<i>Demorchis queenslandica</i>	Rainforest Bells	NT	-	-	OUV	Confirmed	Occurs in lowland rainforests growing in small groups among leaf litter on the forest floor. It is rarely seen, being cryptic and diminutive, and above ground for only 1-2 weeks. The capsules and peduncles, which elongate during fruiting, are more conspicuous than the flowers. Occurs in far north-eastern Queensland from the McIlwraith Range to the Russell River near Cairns. Highly localised. <a href="http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Demorchis_queenslandica.htm">http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Demorchis_queenslandica.htm</a> ALA records are present from within Study Area
<i>Dendrobium johannis</i> (accepted name: <i>Cepobaculum johannis</i> )	Chocolate Tea Tree Orchid	V	V	-	PMR	Unlikely	Occurs in far north-eastern Queensland from Cape York to McIlwraith Range. Occurs in open humid habitats, close to swamps, in pockets of monsoon forest, and on slopes in open woodlands. <a href="http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Cepobaculum_johannis.htm">http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Cepobaculum_johannis.htm</a> No ALA records from Study Area: closest record Cooktown area
<i>Dendrobium mirbelianum</i> (accepted name: <i>Durabaculum mirbelianum</i> )	Dark-stemmed Antler Orchid	E	E	-	PMR	Confirmed	Occurs north-eastern in Queensland from the Daintree to Innisfail. Occurs in mangroves and coastal swamps in humid, high light situations growing on trees and less often on rocks. <a href="http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Durabaculum_mirbelianum.htm">http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Durabaculum_mirbelianum.htm</a> ALA records are present from within Study Area
<i>Dendrobium nindii</i> (accepted name <i>Durabaculum nindii</i> )	Blue Orchid	E	E	-	OUV, PMR	Confirmed	Occurs in north-eastern Queensland from the McIlwraith Range to Innisfail. Altitude: 5-400 m. Occurs in a wide range of habitats. Along the coast it is found in rainforests and mangroves growing in hot humid conditions and in marginal swamps growing in trees and palms. Much of this coastal habitat has now been cleared. Highly localised. <a href="http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Durabaculum_nindii.htm">http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Durabaculum_nindii.htm</a> ALA records are present from within Study Area
<i>Dioclea hexandra</i>	-	V	-	-	OUV	Confirmed	Occurs in NEQ. Altitudinal range quite small, from near sea level to 50 m. Grows in lowland rain forest or swamp forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Dioclea_hexandra.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Dioclea_hexandra.htm</a> ALA records are present from within Study Area
<i>Diospyros granitica</i> (ex <i>Diospyros</i> sp. Mt Spurgeon)	-	NT	-	2a(i)	OUV	Confirmed	Endemic to NEQ, restricted to the Mt Lewis-Mt Spurgeon area. Altitudinal range from 1100-1200 m. Grows in mountain rain forest on granite. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Diospyros_sp._Mt_Spurgeon_(C.T.White_10677).htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Diospyros_sp._Mt_Spurgeon_(C.T.White_10677).htm</a> ALA records are present from within Study Area
<i>Dissiliaria tuckeri</i>	-	V	-	2a(i)	OUV	Confirmed	Endemic to Queensland. Occurs in NEQ. Known from a few populations between Cooktown and Mossman. Altitudinal range from near sea level to about 760 m. Grows along watercourses in well-developed rain forest on rocky alluvia derived from granite. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Dissiliaria_tuckeri.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Dissiliaria_tuckeri.htm</a> ALA records are present from within Study Area
<i>Drosera prolifera</i>	Trailing Sundew	V	V	1c(v) 2a(i)	OUV, PMR	Confirmed	Endemic to NEQ, known only from the Thornton Peak area. Altitudinal range from 400-1200 m. Grows on moist rocks and mossy ledges in rainforest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Drosera_prolifera.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Drosera_prolifera.htm</a> ALA records are present from within Study Area
<i>Endiandra cooperana</i>	-	E	E	1c(i) 1c(v) 2a(i)	OUV, PMR	Confirmed	Endemic to NEQ, restricted to the area between Cape Tribulation and the Daintree River. Altitudinal range probably very small, from near sea level to 10 m. Grows in well-developed lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Endiandra_cooperana.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Endiandra_cooperana.htm</a> ALA records are present from within Study Area
<i>Endiandra grayi</i>	-	V	-	1c(i) 1c(v) 2a(i)	OUV	Confirmed	Endemic to NEQ, restricted to the area between the Daintree River and Cape Tribulation. Altitudinal range from sea level to 40 m. Grows in well-developed lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Endiandra_grayi.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Endiandra_grayi.htm</a> ALA records are present from within Study Area



Species	Common Name	NC Act Status	EPBC Act Status	Relevant OUV Category	Source	Likelihood of Occurrence	Habitat requirements, distribution and occurrences*
<i>Endiandra microneura</i>	-	NT		1c(i) 1c(v) 2a(i)	OUV	Confirmed	Endemic to NEQ, restricted to the Daintree River and Cape Tribulation area. Altitudinal range from sea level to 250 m. Grows in well-developed lowland rain forest, usually on soils derived from metamorphic rocks. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Endiandra_microneura.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Endiandra_microneura.htm</a> ALA records are present from within Study Area
<i>Endiandra phaeocarpa</i>	-	V		1c(i) 1c(v) 2a(i)	OUV	Confirmed	Endemic to NEQ, known only from collections made in the Mt Spurgeon-Mt Lewis and Mt Hemmant-Mt Sorrow areas. Altitudinal range from 600-1100 m. Grows in well-developed mountain rain forest on soils derived from granite. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Endiandra_phaeocarpa.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Endiandra_phaeocarpa.htm</a> ALA records are present from within Study Area
<i>Euodia hylandii</i>	Dwarf Euodia	V	-	1e(iii) 2a(i)	OUV	Confirmed	Occurs in CYP and NEQ. Altitudinal range from sea level to 550 m. Grows as an understory tree in well-developed lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Euodia_hylandii.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Euodia_hylandii.htm</a> ALA records are present from within Study Area
<i>Euodia pubifolia</i>	-	V	-	1e(iii) 2a(i)	OUV	Confirmed	Endemic to NEQ (?). Altitudinal range from near sea level to 200 m. Grows as an understory plant in well-developed lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Euodia_pubifolia.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Euodia_pubifolia.htm</a> ALA records are present from within Study Area
<i>Freycinetia percostata</i>	Climbing Pandan	V	-	-	OUV	Confirmed	Occurs in NT, CYP and NEQ. Altitudinal range from near sea level to 450 m. Grows in well-developed lowland and upland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Freycinetia_percostata.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Freycinetia_percostata.htm</a> ALA records are present from within Study Area
<i>Gardenia actinocarpa</i>	-	E	E	1g(i) 2a(i)	OUV, PMR	Confirmed	Endemic to NEQ, known only from the Noah Creek area. Altitudinal range quite small, close to sea level. Grows as an understory plant in undisturbed lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Gardenia_actinocarpa.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Gardenia_actinocarpa.htm</a> ALA records are present from within Study Area
<i>Glochidion pruinatum</i>	-	E	-	2a(i) 2a(ii)	OUV	Confirmed	Montane rainforest bordering on heath. <a href="https://www.rbg.vic.gov.au/documents/Muelleria_4(3),_p207-241,_Airy_Shaw,_Euphorbiaceae_II.pdf">https://www.rbg.vic.gov.au/documents/Muelleria_4(3),_p207-241,_Airy_Shaw,_Euphorbiaceae_II.pdf</a> ALA records are present from within Study Area
<i>Grammitis reinwardtii</i> (accepted name: <i>Oreogrammitis reinwardtii</i> )	-	V	V	-	OUV	Confirmed	<i>Grammitis reinwardtii</i> is known from north-east Queensland, where it has been found on Mt Finnegan, Mt Lewis and Mt Spurgeon. This species grows in tropical rainforest, and is found both as an epiphyte on trees and as a lithophytic fern growing on granite boulders. <a href="http://www.environment.gov.au/biodiversity/threatened/species/pubs/3221-conservation-advice.pdf">http://www.environment.gov.au/biodiversity/threatened/species/pubs/3221-conservation-advice.pdf</a> ALA records are present from within Study Area
<i>Gymnostoma australianum</i>	Oak	V	-	1c(v) 1e(ii) 1h(i) 2a(i)	OUV	Confirmed	Endemic to NEQ, restricted to Thornton Peak and its environs. Altitudinal range from near sea level to 1350 m. Grows in association with rain forest but usually in situations where full rain forest development is arrested, e.g. along watercourses subject to flood damage or on mountain tops. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Gymnostoma_australianum.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Gymnostoma_australianum.htm</a> ALA records are present from within Study Area
<i>Hedyotis novoguineensis</i>	-	E	-	-	OUV	Confirmed	Occurs in NEQ from Mount Windsor to Tully in the south. Altitudinal range from near sea level to 660 m. Grows in rainforest, sclerophyll forest, <i>Allocasuarina-Melealeuca</i> woodland, <i>Melaleuca</i> swamp and in grassland. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Hedyotis_novoguineensis.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Hedyotis_novoguineensis.htm</a> ALA records are present from within Study Area
<i>Helicia grayi</i>	Gray's Silky Oak	V	-	1c(v) 2a(i)	OUV	Confirmed	Endemic to NEQ, known only from a few localities, Mt Finnegan, Thornton Peak and Mt Lewis. Altitudinal range from 400-1200 m. Grows as an understory tree in upland and mountain rain forest. ALA records are present from within Study Area
<i>Helicia lewisensis</i>	-	V	-	1c(v) 2a(i)	OUV	Confirmed	Endemic to NEQ, known only from Thornton Peak, the Windsor Tableland and Mt Lewis. Altitudinal range from 900-1200 m. Grows as an understory tree in well-developed mountain rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Helicia_lewisensis.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Helicia_lewisensis.htm</a> ALA records are present from within Study Area
<i>Hemmantia webbii</i>	-	V	-	1c(i) 2a(i)	OUV	Confirmed	Endemic to NEQ, known only from the Mt Hemmant area. Collected at 600 m. Grows as an understory plant in undisturbed, well developed, upland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Hemmantia_webbii.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Hemmantia_webbii.htm</a> ALA records are present from within Study Area
<i>Hymenophyllum digitatum</i>	-	V	-	1a(iv)	OUV	Possible	Record details from within Study Area: Filmy fern. Tiny frond on flaky bark at base of large tree. Granite boulders on surface. Soil brown loam. <a href="https://biocache.ala.org.au/occurrences/f806eeb8-3fb3-4df2-a659-5b273afecf63">https://biocache.ala.org.au/occurrences/f806eeb8-3fb3-4df2-a659-5b273afecf63</a>

Species	Common Name	NC Act Status	EPBC Act Status	Relevant OUV Category	Source	Likelihood of Occurrence	Habitat requirements, distribution and occurrences*
							ALA records are present adjacent to Study Area
<i>Hymenophyllum kerianum</i>	-	V	-	1a(iv)	OUV	Confirmed	Record details from within Study Area: Forming small dense patches on tree overhanging stream <a href="https://biocache.ala.org.au/occurrences/d8a3253f-2549-419e-ad2e-ab7a100f149e">https://biocache.ala.org.au/occurrences/d8a3253f-2549-419e-ad2e-ab7a100f149e</a> ; Creek community dominated by <i>Xanthostemon formosus</i> , also <i>Ormosia</i> , <i>Buckinghamia ferruginiflora</i> , <i>Musgravea</i> , <i>Carnarvonia</i> , <i>Acmena resa</i> , <i>Licuala</i> & <i>Normanbya</i> . Small trees/shrubs: <i>Crispiloba</i> , <i>Schistocarphaea</i> , <i>Hedrianthera</i> , <i>Ardisia</i> & <i>Choriceras</i> . Lithophytic filmy on granite boulder, forming large sparse mats. Fronds relatively firm. Also epiphytic. Uncommon in area. <a href="https://biocache.ala.org.au/occurrences/94bb5629-6f6e-488c-98ab-782049b4e5f1">https://biocache.ala.org.au/occurrences/94bb5629-6f6e-488c-98ab-782049b4e5f1</a>  ALA records are present from within Study Area
<i>Hymenophyllum pallidum</i>	-	NT	-	1a(iv)	OUV	Confirmed	Record details from within Study Area: Little Cooper Creek area, off Turpentine Road just beyond Stonewood Road turnoff. Notophyll rainforest near creek on soil derived from granite, many granite boulders. Creek community dominated by <i>Xanthostemon formosus</i> , also <i>Ormosia</i> , <i>Buckinghamia ferruginiflora</i> , <i>Musgravea</i> , <i>Carnarvonia</i> , <i>Acmena resa</i> , <i>Licuala</i> and <i>Normanbya</i> . Small trees/shrubs: <i>Crispiloba</i> , <i>Schistocarphaea</i> , <i>Hedrianthera</i> , <i>Ardisia</i> and <i>Choriceras</i> . Epiphytic filmy fern forming large mats on trunk of <i>Musgravea</i> . Fronds blue-glaucous, rather attractive. Rare in area, unusual location. <a href="https://biocache.ala.org.au/occurrences/4ab20edf-908e-4a24-b611-b9379dd970de">https://biocache.ala.org.au/occurrences/4ab20edf-908e-4a24-b611-b9379dd970de</a>  ALA records are present from within Study Area
<i>Hymenophyllum whitei</i>	-	PE	EX	-	OUV	Extinct	<i>Hymenophyllum whitei</i> was an epiphytic fern. It was known from Thornton Peak in north-eastern Queensland growing in tropical rainforest at approximately 1000 m altitude. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=15113">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=15113</a>  Extinct
<i>Lepiderema hirsuta</i>	Noah's Tamarind	NT	-	2a(i)	OUV	Confirmed	Endemic to NEQ, known only from the Noah Creek area north of the Daintree River, the McDowall Range and the Mt Pieter Botte area. Altitudinal range from near sea level to 900 m. Grows as an understory plant in well developed, undisturbed lowland and upland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Lepiderema_hirsuta.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Lepiderema_hirsuta.htm</a>  ALA records are present from within Study Area
<i>Lindsaea terrae-reginae</i>	-	V	-	1a(iv)	OUV	Confirmed	Known only from two localities in north-eastern Qld. Grows in moist deeply shaded situations in rainforest. <a href="http://www.anbg.gov.au/abrs/online-resources/flora/stddisplay.xsql?pnid=56822">http://www.anbg.gov.au/abrs/online-resources/flora/stddisplay.xsql?pnid=56822</a> Thornton Peak, between the campsite on Hilda Creek and the summit. Low closed forest on granite on plateau of summit. A fern. In rock crevices at the foot of huge boulders. <a href="https://biocache.ala.org.au/occurrences/6f23ef5a-4489-4ede-8ad0-59a94937e98a">https://biocache.ala.org.au/occurrences/6f23ef5a-4489-4ede-8ad0-59a94937e98a</a>  ALA records are present from within Study Area
<i>Litsea granitica</i>	Bollywood	V	-	1c(i) 1c(v)	OUV	Confirmed	Endemic to NEQ, known only from collections from Thornton Peak, the Windsor Tableland and the Mt Spurgeon-Mt Lewis area. Altitudinal range from 1000-1200 m. Grows in mountain rain forests on soils derived from granite. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Litsea_granitica.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Litsea_granitica.htm</a>  ALA records are present from within Study Area
<i>Medicosma glandulosa</i>	-	NT	-	1c(v) 1e(iii) 2a(i)	OUV	Confirmed	Endemic to NEQ, restricted to the higher mountains between Mt Finnigan and Mt Lewis. Altitudinal range from 1000-1200 m. Grows as an understory tree in well-developed mountain rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Medicosma_glandulosa.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Medicosma_glandulosa.htm</a>  ALA records are present from within Study Area
<i>Megahertzia amplexicaulis</i>	-	NT	-	1c(v) 2a(i)	OUV	Confirmed	Endemic to NEQ, known only from Noah Creek, Mt Sorrow, Mt Hemmant, Pieter Botte Logging Area and Roaring Meg Creek. Altitudinal range from near sea level to 700 m. Grows as an understory tree in well-developed lowland rain forest but is probably more frequently encountered in fringing forest along creeks and watercourses. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Megahertzia_amplexicaulis.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Megahertzia_amplexicaulis.htm</a>  ALA records are present from within Study Area
<i>Mesua larnachiana</i>	-	V	-	2a(i)	OUV	Confirmed	Endemic to NEQ, restricted to a small area between Cape Tribulation and Mossman. Altitudinal range from sea level to about 100 m. Grows in well-developed lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Mesua_larnachiana.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Mesua_larnachiana.htm</a>  ALA records are present from within Study Area
<i>Mischocarpus albescens</i>	-	NT	-	1c(v) 2a(i)	OUV	Confirmed	Record details from within Study Area: Timber Reserve 165, McDowall Range, c. 500m NE of tower, site 93. Simple notophyll rainforest on narrow ridge on mudstone. Canopy of <i>Syzygium kuranda</i> , <i>Acacia celsa</i> , <i>Flindersia bourjotiana</i> , <i>Syzygium endophloium</i> , <i>Stenocarpus reticulatus</i> and <i>Ceratopetalum iugumensis</i> . With <i>Denhamia viridissima</i> , <i>Tasmannia</i> , <i>Crispiloba</i> , <i>Brombya</i> , <i>Acronychia acuminata</i> , <i>Steghanthera</i> and <i>Austromatthaea</i> . <i>Lepidozamia</i> and <i>Cyathea rebecca</i> conspicuous.  ALA records are present from within Study Area
<i>Myrmecodia beccarii</i>	Ant Plant	V	V	-	OUV, PMR	Confirmed	<i>Myrmecodia beccarii</i> is known from the coastal woodlands between Cooktown and Ingham in Queensland. This species occurs in open woodland dominated by <i>Melaleuca viridiflora</i> or mangroves. <a href="http://www.environment.gov.au/biodiversity/threatened/species/pubs/11852-conservation-advice.pdf">http://www.environment.gov.au/biodiversity/threatened/species/pubs/11852-conservation-advice.pdf</a>  ALA records are present from within Study Area

Species	Common Name	NC Act Status	EPBC Act Status	Relevant OUV Category	Source	Likelihood of Occurrence	Habitat requirements, distribution and occurrences*
<i>Noahdendron nicholasii</i>	Noahdendron	E	-	1c(iii) 2a(i)	OUV	Confirmed	Endemic to NEQ, restricted to the Noah Creek area between the Daintree River and Cape Tribulation. Altitudinal range from near sea level to 500 m. Grows as an understory tree in well-developed lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Noahdendron_nicholasii.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Noahdendron_nicholasii.htm</a> ALA records are present from within Study Area
<i>Paramapania parvibractea</i>	-	V	-	-	OUV	Confirmed	Record details from within Study Area: Little Cooper Creek area, off Turpentine Road just beyond Stonewood Road turnoff. Notophyll rainforest near creek on soil derived from granite, many granite boulders. Creek community dominated by <i>Xanthostemon formosus</i> , also <i>Ormosia</i> , <i>Buckinghamia ferruginiflora</i> , <i>Musgravea</i> , <i>Carnarvonina</i> , <i>Acmena resa</i> , <i>Licuala</i> and <i>Normanbya</i> . Small trees/shrubs: <i>Crispiloba</i> , <i>Schistocarpha</i> , <i>Hedrianthera</i> , <i>Ardisia</i> and <i>Choriceras</i> . Sedge with a conspicuously erect rhizome. <a href="https://biocache.ala.org.au/occurrences/d0a43fae-dbb7-41be-a51f-5aebc3668211">https://biocache.ala.org.au/occurrences/d0a43fae-dbb7-41be-a51f-5aebc3668211</a> ALA records are present from within Study Area
<i>Phaius australis</i>	Lesser Swamp-orchid	E	E	-	PMR	Possible	The Lesser Swamp-orchid is commonly associated with coastal wet heath/sedgeland wetlands, swampy grassland or swampy forest and often where Broad-leaved Paperbark or Swamp Mahogany are found. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=5872">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=5872</a> . Occurs in Queensland from near Cooktown to Lake Cathie, south of Port Macquarie, in New South Wales. <a href="http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Phaius_australis.htm">http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Phaius_australis.htm</a> There are no ALA records from within the Study Area
<i>Phaius pictus</i>	Forest Swamp Orchid	V	V	-	PMR	Possible	Occurs in north-eastern Queensland on the Mcllwraith Range, and from the Bloomfield River to Kirrama Range between Tully and Cardwell. Occurs in humid rainforests, usually in sheltered sites close to streams or localised seepage areas. It can also be found growing among forest litter on boulders. <a href="http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Phaius_pictus.htm">http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Phaius_pictus.htm</a> There are no ALA records from within the Study Area
<i>Phalaenopsis amabilis</i> subsp. <i>rosenstromii</i> (accepted name: <i>Phalaenopsis rosenstromii</i> )	Native Moth Orchid	E	E	-	PMR	Possible	Occurs in north-eastern Queensland from Iron Range to Mt Spec. Occurs in rainforests in humid airy situations on sheltered slopes and in gullies, in deep gorges and close to waterfalls and streams, growing on trees, rarely rocks. <a href="http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Phalaenopsis_rosenstromii.htm">http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Phalaenopsis_rosenstromii.htm</a> There are no ALA records from within the Study Area
<i>Phaleria biflora</i>	-	V	V	1c(v) 1g(i) 2a(i)	OUV, PMR	Confirmed	Endemic to NEQ, restricted to the Thornton Peak and Mt Spurgeon-Mt Lewis areas. Altitudinal range from 1000-1200 m. Grows as an understory tree in mountain rain forests often found in stunted rain forest on windswept ridges. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Phaleria_biflora.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Phaleria_biflora.htm</a> ALA records are present from within Study Area
<i>Phlegmariurus dalhousieanus</i>	Blue Tassel-fern	E	E	1a(i) 1a(ii) 1a(iv) 1a(v)	PMR	Possible	The Blue Tassel-fern is known from only two collections in Queensland, both of which are in lowland swamp forest near Cairns, one of which has been lost to urban development. It is an epiphyte on trees or rocks and has been recorded growing in clumps of <i>Platyserium</i> (staghorn), and anecdotal information suggests the species still occurs in coastal swamps between Daintree River and Cooktown, and in the Mcllwraith Range. <a href="http://www.environment.gov.au/biodiversity/threatened/species/pubs/86550-conservation-advice.pdf">http://www.environment.gov.au/biodiversity/threatened/species/pubs/86550-conservation-advice.pdf</a> There are no ALA records from within the Study Area
<i>Phlegmariurus phlegmarioides</i>	Layered Tassel-fern	V	-	1a(i) 1a(ii) 1a(iv) 1a(v)	OUV	Confirmed	Occurs in north-east Queensland from Iron Range, Cape York Peninsula, south to Townsville. Occurs in lowland swamps or rainforests on slopes and along watercourses. Occurs from sea level to 550 m altitude. <a href="http://www.environment.gov.au/biodiversity/threatened/species/pubs/24166-listing-advice.pdf">http://www.environment.gov.au/biodiversity/threatened/species/pubs/24166-listing-advice.pdf</a> ALA records are present from within Study Area
<i>Phlegmariurus squarrosus</i>	Rock Tassel-fern	E	CE	1a(i) 1a(ii) 1a(iv) 1a(v)	PMR	Possible	<i>Phlegmariurus squarrosus</i> is restricted to north-east Queensland, where it has been recorded from Mcllwraith Range, Cape Tribulation region, the Mossman region, around Mt Bellenden Ker and 'near Cairns'. It occurs on rocks, particularly around waterfalls, or on tree trunks in lowland swamps and low to mid-altitude rainforest. <a href="http://www.environment.gov.au/biodiversity/threatened/species/pubs/86556-conservation-advice.pdf">http://www.environment.gov.au/biodiversity/threatened/species/pubs/86556-conservation-advice.pdf</a> Records are present adjacent to the Study Area
<i>Phyllanthus brassii</i>	Phyllanthus	V	-	-	OUV	Confirmed	Endemic to Queensland, occurs in NEQ with an isolated occurrence in south-eastern Queensland. Altitudinal range in NEQ from 300-1300 m. Grows as an understory plant in mountain rain forest, usually on creek banks. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Phyllanthus_brassii.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Phyllanthus_brassii.htm</a> ALA records are present from within Study Area
<i>Polyphlebium endlicherianum</i>	Middle Filmy Fern	V	E	1a(iv)	PMR	Possible	The Middle Filmy Fern occurs in north-east Queensland and on Norfolk Island in Australia. It grows on damp rocks and tree trunks, in tropical rainforest, often near streams or beside waterfalls. Sites are moist and shaded. <a href="http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=87494">http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=87494</a> ALA records are present adjacent to the Study Area
<i>Polyalthia submontana</i> subsp. <i>submontana</i> Syn. <i>Polyalthia submontana</i>	-	NT	-	1c(i) 2a(i)	OUV	Confirmed	Endemic to NEQ, occurs as scattered populations at Big Tableland, Mt Finnigan, Cedar Bay and from Daintree to Mossman Gorge. Altitudinal range from 40-1000 m. Grows as an understory shrub or small tree in well-developed rain forest, more common on soils derived from metamorphic rocks. <a href="http://www.canbr.gov.au/cpbr/cd-keys/RFK7/key/RFK7/Media/Html/entities/Polyalthia_submontana_subsp._submontana.htm">http://www.canbr.gov.au/cpbr/cd-keys/RFK7/key/RFK7/Media/Html/entities/Polyalthia_submontana_subsp._submontana.htm</a>

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							ALA records are present from within Study Area
<i>Polyscias bellendenkerensis</i>	-	V	V	2a(i)	PMR	Possible	Endemic to NEQ, known only from collections made on the Bellenden Ker Range, Mt Bartle Frere, the headwaters of Douglas Creek on the Daintree River catchment and the Mt Pieter Botte area at elevations of 750 m or more. Grows only in mountain rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Polyscias_bellendenkerensis.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Polyscias_bellendenkerensis.htm</a>
							ALA records are present adjacent to the Study Area
<i>Randia audasii</i>	Daintree Gardenia	NT	-	2a(i)	OUV	Confirmed	Endemic to NEQ, restricted to the area between Cooktown, Cairns and Atherton. Altitudinal range from near sea level to 600 m. Grows as an understory tree in well-developed lowland and upland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Randia_audasii.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Randia_audasii.htm</a>
							ALA records are present from within Study Area
<i>Ristantia gouldii</i>	-	V	V	1c(v) 1e(i) 2a(i)	PMR	Possible	Endemic to NEQ, known only from the following localities: Timber Reserve 165, Pieter Botte Logging Area; Timber Reserve 1230, Boonjee Logging Area; State Forest Reserve 756, Velvin Logging Area. Altitudinal range from 450-800 m. Grows in well-developed upland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Ristantia_gouldii.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Ristantia_gouldii.htm</a>
							ALA records are present adjacent to the Study Area
<i>Romnalda ophiopogonoides</i>	-	V	-	2a(i)	OUV	Confirmed	Only known from four localities in the Cape Tribulation area along the upper Cooper Creek, Roaring Meg Creek, and near Mt Sorrow in Daintree National Park. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Romnalda_ophiopogonoides.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Romnalda_ophiopogonoides.htm</a>
							ALA records are present from within Study Area
<i>Ryparosa kurrangii</i>	-	NT	-	2a(i) 1c(iii)	OUV	Confirmed	Occurs in NEQ, restricted to the area between the Daintree River and Cape Tribulation. Altitudinal range small, from near sea level to 100 m. Grows as an understory tree in well-developed lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Ryparosa_kurrangii.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Ryparosa_kurrangii.htm</a>
							ALA records are present from within Study Area
<i>Samadera baileyana</i> syn. <i>Quassia baileyana</i>		NT	-	2a(i)	OUV	Confirmed	Endemic to NEQ, restricted to the area between Cape Tribulation and Innisfail. Altitudinal range from near sea level to 750 m. Grows as an understory tree in well-developed rain forest on a variety of sites. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Quassia_baileyana.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Quassia_baileyana.htm</a>
							ALA records are present from within Study Area
<i>Sarcopteryx montana</i>	-	NT	-	1c(v) 2a(i)	OUV	Confirmed	Endemic to NEQ, restricted to the higher mountains between Thornton Peak and Mt Lewis. Altitudinal range from 950-1300 m. Grows in mountain rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Sarcopteryx_montana.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Sarcopteryx_montana.htm</a>
							ALA records are present from within Study Area
<i>Stenocarpus cryptocarpus</i>	Giant-leaved Stenocarpus	NT	-	1c(v) 2a(i)	OUV	Confirmed	Endemic to NEQ, restricted to the area between Cooktown and Innisfail. Altitudinal range from sea level to 1000 m. Grows in well-developed lowland and upland rain forest on a variety of sites. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Stenocarpus_cryptocarpus.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Stenocarpus_cryptocarpus.htm</a>
							ALA records are present from within Study Area
<i>Stenocarpus davallioides</i>	Fern-leaved Stenocarpus	V	-	1c(v) 2a(i)	OUV	Confirmed	Endemic to NEQ, known only from the Alexandra Logging Area, Thornton Peak and Mt Lewis. Altitudinal range from 650-1200 m. Grows in well-developed upland and mountain rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Stenocarpus_davallioides.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Stenocarpus_davallioides.htm</a>
							ALA records are present from within Study Area
<i>Strongylodon lucidus</i>	Pink Strongylodon	NT	-	-	OUV	Confirmed	Occurs in NEQ. Altitudinal range from near sea level to 100 m. Grows in well-developed lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Strongylodon_lucidus.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Strongylodon_lucidus.htm</a>
							ALA records are present from within Study Area
<i>Symplocos ampulliformis</i>	-	NT	-	2a(i)	OUV	Confirmed	Endemic to NEQ. Altitudinal range from 850-1400 m. Grows in upland and mountain rain forest, usually on soils derived from granite. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Symplocos_ampulliformis.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Symplocos_ampulliformis.htm</a>
							ALA records are present from within Study Area
<i>Symplocos oresbia</i>	-	NT	-	2a(i)	OUV	Confirmed	Record details from within Study Area: Heath/shrubland to 2 m amongst boulderfield. Associated species includes <i>Zieria madida</i> , <i>Trochocarpa bellendenkerana</i> , <i>Rhododendron viriosum</i> , <i>Uromyrtus metrosideros</i> , <i>Bubbia whiteana</i> , <i>Garcinia brassii</i> , <i>Gahnia sieberiana</i> , <i>Acronychia chooreechillum</i> . <a href="https://biocache.ala.org.au/occurrences/3eabb410-48ac-421b-8e9e-10f2a73c5c55">https://biocache.ala.org.au/occurrences/3eabb410-48ac-421b-8e9e-10f2a73c5c55</a>
							ALA records are present from within Study Area



Species	Common Name	NC Act Status	EPBC Act Status	Relevant OUV Category	Source	Likelihood of Occurrence	Habitat requirements, distribution and occurrences*
<i>Syzygium glenum</i>	Satinash	E	-	2a(i)	OUV	Confirmed	A rare species, endemic to NEQ, known only from collections made between the Daintree River and Cape Tribulation. Altitudinal range quite small, from near sea level to about 100 m. Grows in well-developed lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Syzygium_glenum.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Syzygium_glenum.htm</a> ALA records are present from within Study Area
<i>Trachymene geraniifolia</i>	Geranium-leaved Trachymene	NT	-	1c(v) 2a(i)	OUV	Confirmed	Occurs in the coastal mountains of north-eastern Queensland. Found occasionally in rainforest also in heath vegetation. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Trachymene_geraniifolia.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Trachymene_geraniifolia.htm</a> ALA records are present from within Study Area
<i>Tristellateia australasiae</i>	Shower of Gold	NT	-	-	OUV	Confirmed	Occurs in NEQ. Altitudinal range from near sea level to 100 m. Grows in well-developed lowland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Tristellateia_australasiae.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Tristellateia_australasiae.htm</a> ALA records are present from within Study Area
<i>Tropilis callitrophilis</i>	Thin Feather Orchid	V	V	-	PMR	Unlikely	Occurs in north-eastern Queensland from Mount Finnigan to the Evelyn Tableland. Occurs in rainforests and rainforest margins at high altitudes. It favours Stringybark Cypress Pine ( <i>Callitris macleayana</i> ) as a host, but also grows on various shrubby myrtles, such as <i>Rhodamnia</i> and <i>Austromyrtus</i> . <a href="http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Tropilis_callitrophilis.htm">http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Tropilis_callitrophilis.htm</a> There are no ALA records from within the Study Area
<i>Vappodes lithocola</i>	Dwarf Butterfly Orchid	-	E	-	PMR	Unlikely	Occurs in north-eastern Queensland on the coastal ranges between Daintree and Cairns. Altitude: 300-800 m. Occurs on coastal ranges and mountains growing on rocks, boulders and cliff faces on ridges and slopes. The plants are often exposed to full sun and can withstand long periods of hot dry conditions during which they completely defoliate. <a href="http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Vappodes_lithocola.htm">http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Vappodes_lithocola.htm</a> There are no ALA records from within the Study Area
<i>Vappodes phalaenopsis</i>	Cooktown Orchid	-	V	-	PMR	Unlikely	Occurs in north-eastern Queensland from Cooktown to Font Hills west of Mount Molloy. Occurs in coastal scrub, littoral rainforests, riverine vegetation, monsoon thickets, vine thickets, swamps and gullies in open forest. Plants grow on trees and rocks and rapidly recolonise disturbed sites. <a href="http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Vappodes_phalaenopsis.htm">http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Vappodes_phalaenopsis.htm</a> There are no ALA records from within the Study Area
<i>Vrydagzynea grayi</i>	Tonsil Orchid	E	E	2a(i)	PMR	Possible	Occurs in north-eastern Queensland in the Daintree River region. Recorded from a single locality only, occurring in dense lowland rainforests, growing in well-drained loamy soil and litter on outcrops of decomposed shale. <a href="http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Vrydagzynea_grayi.htm">http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Vrydagzynea_grayi.htm</a> There are no ALA records from within the Study Area
<i>Wendlandia connata</i>	-	NT	-	2a(i) 2a(ii)	OUV	Confirmed	Endemic to NEQ, restricted to the Mt Spurgeon-Mt Lewis area. Altitudinal range from 1000-1400 m. Grows as an understory tree in well-developed mountain rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Wendlandia_connata.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Wendlandia_connata.htm</a> ALA records are present from within Study Area
<i>Wilkiea sp. (McDowall Range J.G.Tracey 14552)</i>	-	NT	-	1c(i) 2a(i)	OUV	Confirmed	Endemic to NEQ, known only from a few localities north of the Daintree River (McDowall Range, Mt Pieter Botte and Mt Hemmant). Altitudinal range not known, collections to date fall in the 500-900 m range. Grows as an understory plant in well-developed, undisturbed, upland rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Wilkiea_sp._McDowall_Range_(J.G.Tracey_14552).htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Wilkiea_sp._McDowall_Range_(J.G.Tracey_14552).htm</a> ALA records are present from within Study Area
<i>Xanthophyllum fragrans</i>	Fragrant Boxwood	NT	-	2a(i)	OUV	Confirmed	Endemic to NEQ. Altitudinal range from near sea level to 1000 m. Grows in well-developed rain forest on a variety of sites. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Xanthophyllum_fragrans.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Xanthophyllum_fragrans.htm</a> ALA records are present from within Study Area
<i>Xanthostemon formosus</i>	-	E	E	1c(v) 1e(iii) 2a(i)	OUV, PMR	Confirmed	Endemic to NEQ, restricted to a few creeks between the Daintree River and Cape Tribulation. Altitudinal range quite small, from near sea level to 100 m. Grows as a rheophyte along rocky or bouldery creeks flowing through rain forest. <a href="http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Xanthostemon_formosus.htm">http://keys.trin.org.au/key-server/data/0e0f0504-0103-430d-8004-060d07080d04/media/Html/taxon/Xanthostemon_formosus.htm</a> ALA records are present from within Study Area
<i>Zeuxine polygonoides syn. Rhomboda polygonoides</i>	Velvet Jewel Orchid	-	V	-	PMR	Unlikely	Occurs in north-eastern Queensland from Daintree River to Paluma. Occurs in rainforests in shady moist situations and in litter on large boulders adjacent to streams. Its leaves are highly ornate. <a href="http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Rhomboda_polygonoides.htm">http://keys.trin.org.au:8080/key-server/data/08090a09-0d0e-410b-860c-020705070e0e/media/Html/Rhomboda_polygonoides.htm</a> There are no ALA records from within the Study Area



Notes:

\* Many sensitive species records have their locations generalised to 0.1 degrees to deter illegal harvesting. This makes it difficult to confirm presence within the Study Area.

- Source: OUV = DES (2018) (base species data used in the analysis of OUVs); PMR = EPBC Act Protected Matters Report
- NC Act status: SL = Special Least Concern; NT = Near Threatened; V = Vulnerable; E = Endangered; PE = Presumed Extinct
- EPBC Act status: V = Vulnerable; E = Endangered; CE = Critically Endangered; Ex = Extinct

The following Outstanding Universal Value (OUV) categories relating to pertinent flora species are taken from DES (2018). *A Spatial Representation of Selected Natural Outstanding Universal Values of the Wet Tropics World Heritage Area*. Brisbane: Department of Environment and Science, Queensland Government.

**OUV 1a(i)** Outstanding examples representing the major stages in the earth's evolutionary history; (a) The Age of the Pteridophytes; (i) Evolutionary history is represented by the earliest living ancestors of two main branches of land plants

**OUV 1a(ii)** Outstanding examples representing the major stages in the earth's evolutionary history; (a) The Age of the Pteridophytes; (ii) Evolutionary history is represented by the diversity within ancient families of true ferns

**OUV 1a(iv)** Outstanding examples representing the major stages in the earth's evolutionary history; (a) The Age of the Pteridophytes; (iv) Evolutionary history is represented by the Area being a major centre of fern diversity.

**OUV 1a(v)** Outstanding examples representing the major stages in the earth's evolutionary history; (a) The Age of the Pteridophytes; (v) Evolutionary history is represented by the Area being a major centre of endemism for East Gondwanan fern taxa

**OUV 1c(i)** Outstanding examples representing the major stages in the earth's evolutionary history; (c) The Age of the Angiosperms; (i) Evolutionary history is represented by the richest assemblage of families of primitive flowering plants.

**OUV 1c(iii)** Outstanding examples representing the major stages in the earth's evolutionary history; (c) The Age of the Angiosperms; (iii) Evolutionary history is represented by Orders occupying nodal positions in the evolution of the angiosperms.

**OUV 1c(v)** Outstanding examples representing the major stages in the earth's evolutionary history; (c) The Age of the Angiosperms; (v) Evolutionary history is represented by East Gondwanan Families or Genera.

**OUV 1e(ii)** Outstanding examples representing the major stages in the earth's evolutionary history; (e) The origins of the Australian sclerophyll flora and marsupial fauna; (ii) Evolutionary history is represented by ancestral stock from which the sclerophyll Casuarinaceae component of Australia's flora evolved.

**OUV 1e(iii)** Outstanding examples representing the major stages in the earth's evolutionary history; (e) The origins of the Australian sclerophyll flora and marsupial fauna; (iii) Evolutionary history is represented by ancestral stock from which the sclerophyll Rutaceae component of Australia's flora evolved.

**OUV 1g(i)** Outstanding examples representing the major stages in the earth's evolutionary history; (g) The mixing of the continental biota of the Australian and Asian continental plates; (i) Evolutionary history is represented by the unique record of the mixing of two continental floras that has no parallel. Plants from the Asian plate constituted both old Gondwanan and Asian elements.

**OUV 1h(i)** Outstanding examples representing the major stages in the earth's evolutionary history; (h) The extreme effects of the Pleistocene glacial periods on tropical rainforest vegetation. (i) Evolutionary history is represented by relict taxa that survived the Pleistocene ice ages.

**OUV 2a(i)** Outstanding examples representing significant ongoing ecological and biological processes; (a) Processes leading to areas of high endemism and speciation; (i) Biogeographic processes leading to areas of high endemism.

**OUV 2a(ii)** Outstanding examples representing significant ongoing ecological and biological processes; (a) Processes leading to areas of high endemism and speciation; (ii) Disjunct populations within Wet Tropics (speciation processes).

**Appendix C. Regional Ecosystems and Threatened Ecological Communities with potential to be encountered.**

Regional Ecosystem	VM Status	Short Description	Analogous EPBC TEC	Options with potential for intersection with RE
7.2.1	Endangered	Mesophyll vine forest on beach ridges and sand plains of beach origin	Littoral Rainforest and Coastal Vine Thickets of Eastern Australia	1,2,3
7.2.3	Of concern	<i>Corymbia tessellaris</i> and/or <i>Acacia crassicaarpa</i> and/or <i>C. intermedia</i> and/or <i>C. clarksoniana</i> woodland to closed forest on beach ridges (predominantly Holocene)	-	1,2,3
7.2.4	Of concern	<i>Eucalyptus</i> spp. (often <i>E. pellita</i> or <i>Corymbia intermedia</i> ) open forest and/or <i>Lophostemon suaveolens</i> open forest on swampy sand plains and Pleistocene beach ridges	-	1,2,3
7.2.7	Of concern	<i>Casuarina equisetifolia</i> +/- <i>Corymbia tessellaris</i> open forest +/- groved vine forest shrublands on strand and foredunes	-	1,2,3
7.2.8	Of concern	<i>Melaleuca leucadendra</i> open forest to woodland on sands of beach origin	-	1,2,3
7.3.3	Of concern	Mesophyll vine forest with <i>Archontophoenix alexandrae</i> on poorly drained alluvial plains	-	1,2,3
7.3.4	Of concern	Mesophyll vine forest with <i>Licuala ramsayi</i> on poorly drained alluvial plains and alluvial areas of uplands	-	1,2,3

Regional Ecosystem	VM Status	Short Description	Analogous EPBC TEC	Options with potential for intersection with RE
7.3.7	Endangered	<i>Eucalyptus pellita</i> and <i>Corymbia intermedia</i> open forest to woodland (or vine forest with emergent <i>E. pellita</i> and <i>C. intermedia</i> ), on poorly drained alluvial plains	-	1,2,3
7.3.10	Of concern	Simple-complex mesophyll to notophyll vine forest on moderately to poorly-drained alluvial plains of moderate fertility	-	1,2,3,4
7.3.17	Endangered	Complex mesophyll vine forest, on well-drained alluvium of high fertility	-	1,2,3,4
7.3.19	Of concern	<i>Corymbia intermedia</i> or <i>C. tessellaris</i> +/- <i>Eucalyptus tereticornis</i> open forest (or vine forest with these species as emergents) on well-drained alluvium	-	1,2,3,4
7.3.20	Of concern	<i>Corymbia intermedia</i> and <i>Syncarpia glomulifera</i> , or <i>C. intermedia</i> and <i>Eucalyptus pellita</i> , or <i>S. glomulifera</i> and <i>Allocasuarina</i> spp., or <i>E. cloeziana</i> , or <i>C. torelliana</i> open forest (or vine forest with these emergents) on alluvial fans at the base of ranges	-	1,2,3
7.3.25	Of concern	<i>Melaleuca leucadendra</i> +/- vine forest species open forest to closed forest on alluvium fringing streams	-	1,2,3,4
7.3.30	Endangered	Complex of fernlands and sedgelands with emergent rainforest pioneering spp.	-	1,2,3

Regional Ecosystem	VM Status	Short Description	Analogous EPBC TEC	Options with potential for intersection with RE
		in permanently wet peat swamps of alluvial plains		
7.3.40	Endangered	<i>Eucalyptus tereticornis</i> open forest on well-drained alluvial plains of lowlands	-	1,2,3
7.3.46	Endangered	<i>Lophostemon suaveolens</i> open forest to woodland on alluvial plains	-	1,2
7.11.18	Of concern	<i>Corymbia intermedia</i> and/or <i>C. tessellaris</i> +/- <i>Eucalyptus tereticornis</i> open forest to woodland (or vine forest with these species as emergents) on coastal metamorphic headlands and foothills	-	1,2,3,4
7.11.19	Of concern	<i>Corymbia intermedia</i> and/or <i>Lophostemon suaveolens</i> open forest to woodland on uplands on metamorphics	-	1,2,3
7.11.23	Of concern	Complex mesophyll vine forest on fertile, well-drained metamorphics of very wet and wet footslopes	-	1,2,3,4
7.11.24	Of concern	Closed vineland of wind-disturbed vine forest of metamorphic slopes, often steep and exposed	-	1,2,3
7.11.28	Of concern	Wind-sheared notophyll vine forest of exposed metamorphic ridge crests and steep slopes	-	1,2,3
7.11.40	Of concern	Complex of sclerophyll communities dominated by <i>Syncarpia glomulifera</i> , or <i>Melaleuca</i> spp., or sedges, or ferns, or microphyll vine forest with <i>Trochocarpa</i>	-	1,2,3

Regional Ecosystem	VM Status	Short Description	Analogous EPBC TEC	Options with potential for intersection with RE
		<i>bellendenkerensis</i> on highlands, on quartzite or associated metamorphics		
7.11.44	Of concern	<i>Eucalyptus tereticornis</i> open forest to woodland on coastal metamorphic foothills	-	1,2,3