

The Queensland Herbarium RE mapping describes two communities occurring within the Lot: RE 7.12.1 and RE 7.3.10 (described in **Table 2**). Field investigations largely confirmed the occurrence of these communities as mapped. In addition, the more intensive level of mapping was able to delineate variations within the major RE types, and note possible areas of non-remnant vegetation. For instance, areas of forest dominated by *Acacia* near the end of Mission Circle are better mapped as RE 7.12.1b rather than 7.12.1a. **Figure 2** presents the types and extents of REs within the study area, as determined during field investigations. Community descriptions of each RE are provided below.

Table 2: Regional Ecosystems mapped within the study area and their status

RE Code	Short description (EPA 2008)	VM Act Status	Biodiversity Status	EPBC Act
7.3.10b	Mesophyll vine forest recovering from disturbance, with <i>Acacia</i> spp. canopy or emergents. Moderately to poorly-drained alluvial plains, of moderate fertility. Lowlands of the very wet and wet zone. This vegetation community is a subtype of 7.3.10, described as: Simple to complex mesophyll to notophyll vine forest on moderate to poorly drained alluvial plains of moderate fertility.	Of concern	Endangered	Not listed
7.12.1a	Mesophyll to notophyll vine forest. Lowlands and foothills of the very wet and wet rainfall zones. Granite and rhyolite. This vegetation community is a subtype of 7.12.1, described as: Simple to complex mesophyll to notophyll vine forest on moderately to poorly drained granites and rhyolites of moderate fertility of the moist and wet lowlands, foothills and uplands.	Not of concern	No concern at present	Not listed
7.12.1b	Mesophyll to notophyll vine forest recovering from disturbance, with <i>Acacia</i> spp. canopy or emergents. Lowlands and foothills of the very wet and wet rainfall zones. Granite and rhyolite. This vegetation community is a subtype of 7.12.1 (see above).			

VM Act = Queensland *Vegetation Management Act 1999*, EPA = Queensland Environmental Protection Agency, EPBC Act = Commonwealth *Environment Protection and Biodiversity Conservation Act 1999*.

RE 7.3.10 Simple-complex mesophyll to notophyll vine forest. Moderately to poorly-drained alluvial plains of moderate fertility.

This community was present across the poorly drained eastern half of the allotment. It had a sparse to very sparse canopy of pioneer species, 14–22 m tall, including *Acacia celsa*, *Commersonia bartramia* and *Alstonia muelleriana*. The dense subcanopy was approximately 8– 14 m tall, and comprised a diverse range of mesophyll/notophyll rainforest species. A poorly delineated shrub stratum contained *Licuala ramsayi*, *Pandanus monticola*, *Pilidiostigma tropicum*, *Hornstedtia scottiana*, *Ammomum dallachyi* (listed as Rare under State legislation), *Calamus moti* and *Myrtistica insipida*. The ground stratum was very sparse, and dominated by seedlings and sedges. Because of the presence of *Acacia celsa* and other pioneer species in the canopy, this community can be referred to RE 7.3.10b.

Variation in the community: Toward its eastern edge, the community was subject to wet season inundation, with *Melaleuca leucadendra* present in the canopy, and *Licuala ramsayi* in places forming a closed subcanopy. *Arenga australasica* (Vulnerable, EPBC Act) was frequently observed in this area. The community is bounded to the east by a wetland community currently mapped as non-remnant.

Condition: This vegetation type showed abundant evidence of disturbance, indicating that much of its area was relatively young regrowth. Evidence of disturbance or possibly recent clearing included:

- sparse to very sparse canopy dominated by pioneer species, with a closed subcanopy often covered in vines;
- absence of large stem diameters amongst canopy and subcanopy trees;
- presence of numerous young *Licuala ramsayi* within the shrub stratum, but absent from the subcanopy;

Some areas of this vegetation community may constitute non-remnant vegetation for the purposes of the Queensland *Vegetation Management Act 1999* (VM Act), however detailed measurements of canopy height and coverage are required to confirm this.

RE 7.12.1 Simple-complex mesophyll to notophyll vine forest.

Description: The canopy was mid-dense, 15–20 m tall, up to 25 m in gullies. Species prominent in the canopy included *Castanospermum australe*, *Cardwellia sublimis*, *Elaeocarpus angustifolius*, unidentified Lauraceae and *Alstonia scholaris*. The mid-dense to dense mid-strata included *Polyscias australiana*, *Alstonia muelleriana*, *Chionanthus ramiflora*, *Hydriastele wendlandiana*, *Licuala ramsayi* and *Syzygium kuranda*. Vines were prominent along edges, including *Lygodium reticulatum*, *Rourea brachyandra* (note: listed as Rare under State legislation), *Tetracera nordiana*, *Tetracera daemeliana*, *Hypserpa laurina* and *Cissus penninervis*, with slender vines more common than robust vines. The ground stratum was mid-dense, an unusual feature in rainforests which reflected the openness of the cyclone-impacted canopy. Species prominent in the ground and shrub stratum (other than juveniles of canopy species) included *Bowenia spectabilis*, *Hornstedtia scottiana*, and in more open areas along tracks, *Blechnum orientale*, **Rubus alceifolius* and **Stachytarpheta jamaicensis*.

Variation in the community: This community occurs on the western half of the block, on the lower slopes of the Walter Hill Range. It reaches its maximum height and structural complexity along the drainage line which more-or less bisects the study area. Towards the northern and southern boundaries of the allotment, the pioneer species *Acacia celsa*, *Alstonia muelleriana* and *Acacia mangium* were prominent in the canopy, reflecting relatively recent disturbance. These *Acacia*-dominated communities constitute the subtype RE 7.12.1b.

Condition: This is a diverse and relatively intact community. On the upper slopes, a broken canopy and dense lower strata are the result of the recent impacts of Cyclone Larry. Tracks have been cut through this community, and are providing entry corridors for weed species. These tracks are located on steep slopes and are vulnerable to erosion. However, at the time of survey, there was no sign of erosion, and streams within the study area showed very low levels of turbidity. Although anthropogenic and storm-related disturbance/clearing is evident in parts, it is unlikely that any of these disturbed areas is large enough to warrant remapping as non-remnant.

Status of Vegetation Communities

The EPBC Act identifies three categories for threatened ecological communities, those being critically endangered, endangered and vulnerable. DEWHA's protected matters search tool

identified one nationally significant ecological community as potentially occurring in the study area, *ie* “littoral rainforest and coastal vine thickets of Eastern Australia” which is listed as Critically Endangered. According to the Threatened Species Scientific Committee (2008a), the “littoral rainforest and coastal vine thickets of Eastern Australia” occurs within two kilometres of the coast or adjacent to a large salt water body, and thus is influenced by the sea. It is naturally distributed as a series of disjunct and localised stands occurring on a range of landforms derived from coastal processes. As a result, the ecological community is not associated with a particular soil type and can occur on a variety of geological substrata. Within the Wet Tropics bioregion, the REs that equate wholly to the ecological community are: 7.2.1a-i, 7.2.2a-h, 7.2.5a, 7.2.6b, 7.11.3b, and 7.12.11d (Threatened Species Scientific Committee 2008a).

Field surveys and Queensland Herbarium RE mapping confirm that no threatened ecological communities (EPBC Act), including *littoral rainforest and coastal vine thickets of Eastern Australia*, occur within the Lot.

Note that REs are also afforded two levels of conservation status under State legislation and planning processes. The principal system is administered under the Queensland *Vegetation Management Act 1999* (VM Act) which lists REs as Endangered, Of Concern or Not of Concern. Each RE is also afforded an Environmental Protection Agency (EPA) Biodiversity status. This system differs from the VM Act system in that it also considers the quality of the remnant vegetation when assigning a status. While not legislatively binding the system is used to guide biodiversity assessment and planning and lists REs as Endangered, Of Concern or Not Concern at Present.

The status of REs occurring within the Lot is described in **Table 2**.

3.3 Threatened Flora

3.3.1 Overview

One hundred and eighty-seven plant species were recorded during the one-day field survey, this is a high number of species and indicative of the species diversity found in rainforests in the region. Of these, 63 were not reported in the database searches, 23 (12.3%) were exotic species, and four were listed as Rare or Threatened under State or Federal legislation. The Lot has very high palm diversity, with six genera recorded during surveys. A full list of species recorded during field surveys is presented in **Appendix B**.

3.3.2 Threatened Flora

The Vulnerable palm, *Arenga australasica*, was the only EPBC Act listed plant species recorded during the field survey. With respect to other EPBC Act listed plants, the Endangered vine, *Carronia pedicellata*, is considered to have a high likelihood of occurrence within the Lot while the Vulnerable orchid, *Taeniophyllum muelleri*, is considered to have a moderate likelihood of occurrence. Brief habitat descriptions for each species are provided in **Table 3**. *Carronia pedicellata* and *Taeniophyllum muelleri* are difficult species to locate due to their size and growth form and require a higher intensity survey to verify their presence.

Arenga australasica was associated with rainforest on the eastern half of the block, mapped as RE 7.3.10 (**Figure 2**), whilst the habitat description given for *Carronia pedicellata* is consistent with RE 7.12.1.

While the current study is limited to EPBC Act listed species, the field survey identified three plants listed as Rare under the Queensland *Nature Conservation Act 1992* (NC Act) within the

Lot (in addition to *Arenga australasica* which is also Vulnerable under NC Act). These species are described in **Tables 3 and 4**, locations shown on **Figure 2**. No further discussion or consideration of NC Act species is provided in this report.

3.4 Fauna

3.4.1 Threatened Fauna

The Cassowary was the only EPBC Act threatened fauna species observed within the Lot during field surveys. This species is discussed separately in the following section.

Of the fauna identified during database searches only the closed forest dwelling species are likely to use habitats within the Lot. The Vulnerable Spectacled Flying Fox (*Pteropus conspicillatus*) is the only listed EPBC Act threatened fauna species with a high likelihood of utilising habitats within the Lot that was not recorded during the field surveys. The species was identified during the QPWS Wildlife Online database search. While no roost sites were located at the Lot, the rainforest found across most of the Lot is likely to provide potential foraging habitat. The drainage lines within the Lot do not appear to be suitable habitat for the Endangered stream-dwelling frogs (eg Common Mist Frog, *Litoria rheocola*, Australian Lacelid, *Nyctimystes dayi* and Waterfall Frog, *Litoria nannotis*) known from adjacent lowland areas and they have a low likelihood of occurrence. The absence of caves and of records of the Greater large-eared Horseshoe Bat (*Rhinolophus philippinensis maros*) in the local area mean that this species has a low likelihood of occurring within the Lot.

While consideration of migratory listed (EPBC Act) fauna is beyond the scope of this report (and not identified as an issue in the Statement of Reasons, EPBC 2008/4257, 21 July 2008) species such as the Rainbow Bee-eater (*Merops ornatus*), Spectacled Monarch (*Monarcha trivirgatus*), Black-faced Monarch (*Monarcha melanopsis*) and Rufous Fantail (*Rhipidura rufifrons*) are likely to utilise habitats within the Lot. Although these species were not observed during field surveys they are relatively common residents or frequent visitors to closed forest communities (including rainforest) in northern Australia. The Lot is unlikely to provide important habitat or support ecologically significant populations (as defined in DEH 2006) of these species and they are not considered further here.

3.4.2 Southern Cassowary

Overview

Twenty nine Cassowary sign comprising 20 scats, eight sets of foot prints and one sighting (an adult female) were recorded during the field assessment. The distribution of Cassowary sign is shown on **Figure 3**. The substrate was generally poor for collecting high quality foot print data but this did not significantly hamper the assessment.

The following analysis of population abundance, structure and use patterns should be interpreted in the context that the field assessment was conducted over a very short time period in one season, at a time when the substrate was not ideal for foot print records and where search effort was biased toward open roads and tracks. The analysis therefore provides a partial, but still useful, snapshot of the species during and immediately prior to the survey period, and is of sufficient quality for the purpose of this assessment.

Table 3: Likelihood of EPBC Act listed plants (including observed species) occurring within Lot 66 on SP164474 and their status.

Species	Habitat Description	EPBC Act	NC Act	Likelihood of Occurrence
<i>Arenga australasica</i> ^{1,2,3} Arecaceae	Clumping palm occurring in littoral rainforests in sands and coralline soils, in north-eastern Queensland and Northern Territory (Jones 1996, TSSC 2008b).	V	V	Present
<i>Carronia pedicellata</i> ² Menispermaceae	Robust vine of well-developed lowland rain forest. Grows in complex mesophyll or notophyll vine forest of deep soils derived from basalt, granite or metamorphic substrates at altitudes from near sea level to 520 m. Known from the area between Belfenden Ker and Mission Beach, and in the Cooper and Noah Creek basins in the Daintree (Hyland <i>et al.</i> 2002, TSSC 2008c). The species has been collected from the El Arish Mission Beach road within 10 km of the Lot.	E	E	High
<i>Taeniophyllum muelleri</i> ¹ Orchidaceae	A tiny epiphytic orchid. Grows on outer branches and branchlets of rainforest trees; coast and coastal ranges, from sea level to 250 m alt., north from the Bellingier River (NSW) to Cape York, and Norfolk Island (NSW Flora Online 1999-2009, TSSC 2003). The 'vulnerable' listing applies to Norfolk Island populations (TSSC 2003).	V	LC	Moderate
<i>Dendrobium superbiens</i> ¹ Orchidaceae	Generally lithophytic in exposed situations and occasionally epiphytic. Recorded from the McAlister Range to the Torres Straits Islands.	V	V	Low

¹ EPBC online database records

² Queensland Herbarium HERBRECS database records

³ Wildnet Online database records

Table 4: NC Act listed plants observed within Lot 66 on SP164474 and their status (excluding those shown in Table 3).

Species	Habitat Description	EPBC Act	NC Act	Likelihood of Occurrence
<i>Rourea brachyandra</i> ² Connaraceae	Grows in well-developed lowland and upland rainforest. Altitude ranges from near sea level to 700 m (Hyland <i>et al.</i> 2002).	-	R	Present
<i>Macaranga polyadenia</i> ^{2,3} Euphorbiaceae	Grows in well-developed rain forest which is periodically flooded or in situations close to permanent water. Altitude ranges from near sea level to about 100 m (Hyland <i>et al.</i> 2002).	-	R	Present
<i>Annonum daltachiyi</i> ^{2,3} Zingiberaceae	Grows as an understorey shrub in disturbed areas in well developed lowland rain forest (Hyland <i>et al.</i> 2002).	-	R	Present

¹ EPBC online database records

² Queensland Herbarium HERBRECS database records

³ Wildnet Online database records

Population Abundance and Structure

Interpretation of the footprint record in combination with the sighting (adult female) data indicate that four Cassowary were within the Lot during the field assessment. The population comprised an adult female and an adult male, and the footprint record suggests that the male had at least one and possibly two attendant young. In the absence of sighting data the relationship of the second young bird with the adult male is difficult to determine. The second young bird (footprint approx. 160 mm) is much larger than the other chick (footprint approx. 125 to 135) and although its foot prints were always found alongside the adult male and smaller chick, the degree of association is unclear (eg it might be shadowing the adult male). This 160 mm bird is probably from a previous clutch and in the process of becoming a fully independent subadult. While the amount of time the adult birds spent within the subject land is unclear, the observed density of Cassowary during the field survey is relatively high based on known densities in the bioregion and consistent with densities found in other parts of Mission Beach.

Use Patterns

During the survey period fresh evidence of the adult male and small chick was recorded in both the western (upper reaches) and eastern sections (lower reaches) of the site with the greatest concentration of sign in the lower section along Rockingham Close. The subadult bird was recorded in similar areas to the adult male although a number of smaller sized scats located near the terminus of Mission Circle probably belonged to this subadult and may suggest high utilisation of this area. The only confirmed (and recent) evidence of the adult female (footprint and sighting) was along the northern extent of Rockingham Close (in and north of the Lot).

The most frequently used routes appeared to be along Rockingham Close, a small patch of Fan Palm forest adjacent to the south-eastern boundary of the Lot (eastern side of Rockingham Close) and an internal track running from the end of Mission Circle west to the house adjacent to the Lot. Two very old scats along internal tracks in the south-west of the site suggest this area was more heavily utilised in the weeks and months prior to the survey.

Very fresh and fresh scats suggest Cassowary were feeding on the following plants during and immediately prior to the survey: *Syzygium forte* (White Apple), *Calamus spp.* (Wait-a-while), *Ficus spp.* (Figs), *Polyscias australiana* (Ivory Basswood), *Gmelina fasciculifera* (White Beech), Palms, Bracket Fungi and an unidentified cultivated plant. Very old and old scats suggest Cassowary were feeding on the following plants in the weeks and months prior to the survey: *Pandanus monticola* (Urchin-fruited Pandan), *Terminalia sericocarpa* (Damson Plum), *Gmelina fasciculifera* (White Beech), *Elaeocarpus angustifolius* (Blue Quandong), *Calamus spp.*, *Ficus spp.*, *Myristica sp.* (Native Nutmeg), *Prunus turneriana* (Wild Almond), *Pachygone ovata* (no common name), *Linospadix minor* (Minor Walking-stick Palm), *T. sericocarpa*, *Normanbya normanbyi* (Queensland Black Palm - cultivated) and other unidentifiable cultivated palms. The above native species are found across a variety of habitat types within the Lot and provide little insight into use patterns. The presence of fruit from cultivated plants indicates that those Cassowary using the Lot also forage in adjacent land parcels.

Habitat and Connectivity

Nearly the entire Lot supports fruiting rainforest plants, many of which are known Cassowary food plants. The entire site can therefore be assumed to provide suitable Cassowary foraging habitat. While no areas of especially important foraging habitat are identifiable, the areas mapped as non-remnant and RE 7.12.1b are probably of lower current value due to the general absence of food plants in the former and a predominance of Acacias (non-Cassowary food plants) in the latter (Figure 2). However, RE 7.12.1b is a successional stage in rainforest regeneration and in the absence of further disturbance events these areas are expected to eventually develop into RE 7.12.1a, ie a more favourable form of Cassowary habitat.

Lot 66 SP164474 (DNRW 2008)

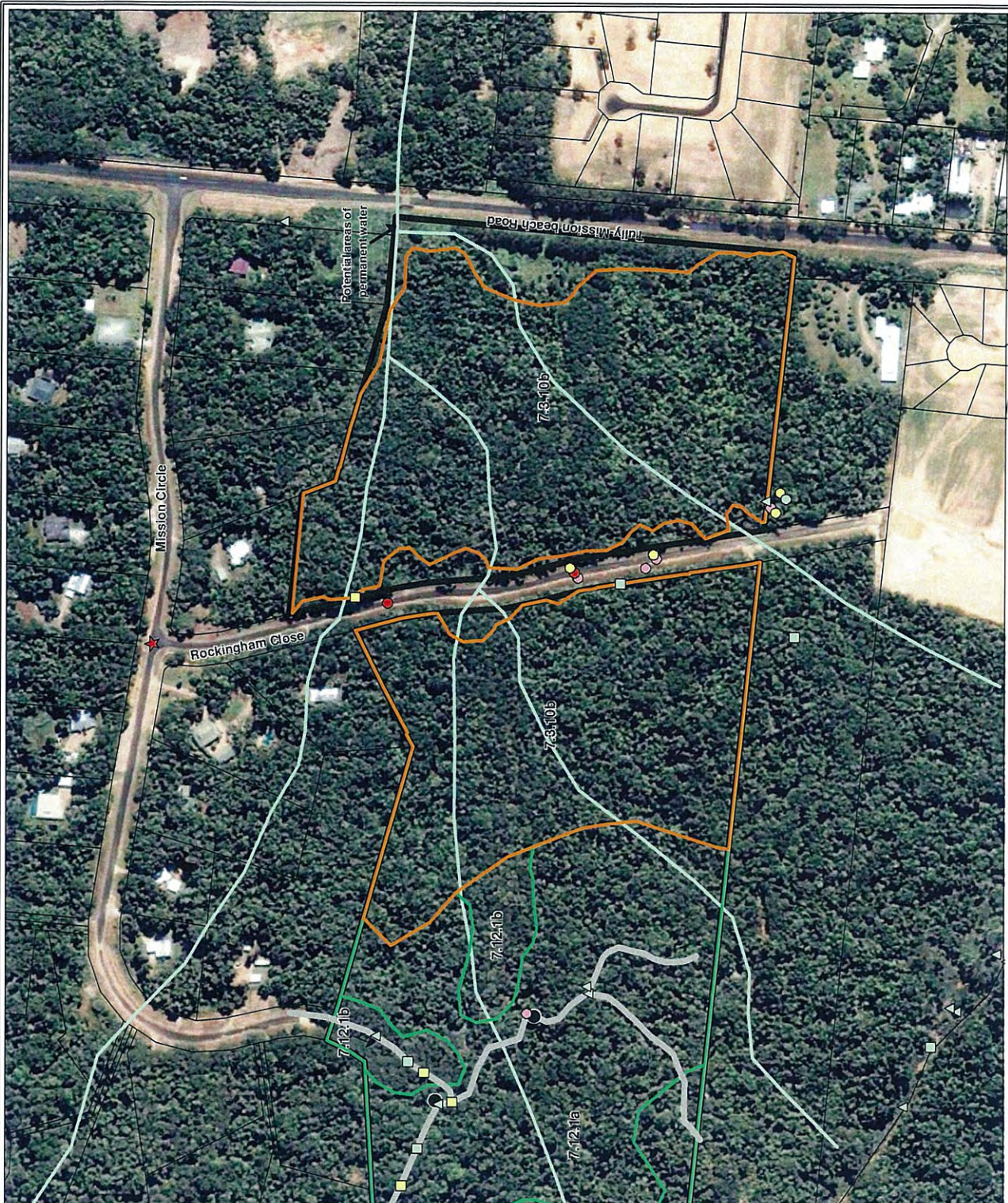
- Drainage
- Site Tracks

Regional Ecosystems and VMA Status (as mapped by NRA)

- Not of Concern
- Of Concern

Cassowary Signs

- Adult Female Sighting
- Adult Female Print
- Adult Male with Chick Print
- Subadult Print
- Subadult Fresh Scat
- Unknown Adult Print
- Unknown Adult Fresh Scat
- Unknown Adult Old Scat
- Camera Location



PROJECT: Rockingham Close Cassowary and Flora Assessment
 TITLE: NRA Mapped Regional Ecosystems and Cassowary Signs
 JOB NO: 326001
 DATE: February 2009
 SOURCE: EPA, NRA, QDMR

Figure 3

Habitat types and their quality/integrity within the Lot are similar to that in the adjacent local area. While the impacts of cyclone Larry which occurred in March 2006 are still apparent the forests within the Lot have retained their value as high quality foraging habitat. This assessment is indirectly supported by the fact that the Lot is within the home range of two adult Cassowary, and at least one, probably two, generations of young have been raised at the site since cyclone Larry.

One of the specific values of the Lot in terms of Cassowary habitat is the fact that it comprises free draining foothills/slopes and low-lying areas subject to wet season inundation. This variation in land zones increases the diversity of forest types within the Lot and increases the likelihood of continuity in food availability. The lowland section is probably of particular relative importance because areas below Rockingham Close are likely to provide permanent water, a critical habitat component for Cassowary (drinking and bathing).

The Lot is also part of a tract of forest that provides habitat connectivity between the foothills of Tam O'Shanter National Park (part of the Wet Tropics World Heritage Area) and remnant coastal habitats, notably Reserve 214 (comprising Lot 634 CWL3519 and Lot 109 CWL3519). The majority of coastal habitats in the Wongaling and greater Mission Beach area have been cleared and/or fragmented for farming and urban development. Reserve 214, to the north-east of the Lot, has been identified as an important coastal remnant that has become increasingly isolated from the foothills due to clearing. Biotropica (2008) identified six remaining linkages between Reserve 214 and the foothills. The Lot is within what Biotropica (2008) considers to be the primary and most significant linkage that is critical to long term movement of fauna between Reserve 214 and adjacent foothills (**Appendix C**). Threats to this value were also identified as a major issue in the Statement Reasons (EPBC 2008/4257, 21 July 2008) for the rejection of the original development proposal.

4. Constraints Planning Assessment

4.1 Introduction

The purpose of the following constraints analysis is to identify the critical design parameters to be considered when planning development within the Lot. The requirements of the EPBC Act were considered when conducting the assessment and developing the advice. Minor alterations to recommended design parameters (eg juxtaposition of high constrained areas) are permissible as long as the underlying intent of the advice is not compromised.

4.2 Values Assessment

4.2.1 Flora

This report identified that *threatened ecological communities* as described under the EPBC Act do not occur within the Lot and therefore pose no constraint to development.

The Vulnerable palm, *Arenga australasica*, was the only EPBC Act listed plant species recorded during the field survey. A greater field survey effort is required to determine the actual extent of this species within the site. It is likely to be reasonably common in the lower-lying areas to the east of Rockingham Close (especially in the north-east of the site) and is relatively common in similar habitats in the wider Mission Beach area. While there is insufficient information to conduct a detailed constraints assessment for this species any effort to protect its favoured habitat is likely to be beneficial for the species. It is recommended that detailed surveys for the species be conducted prior to clearing and effort devoted to protecting (via modifying clearing envelopes) a majority of individuals. Relocation is a less preferable, alternative option for achieving the recommended levels of protection.

The Endangered vine, *Carronia pedicellata*, is considered to have a high likelihood of occurrence within the Lot while the Vulnerable orchid, *Taeniophyllum muelleri*, is considered to have a moderate likelihood of occurrence. Again a greater survey effort is required to determine the presence/extent of these species and there is insufficient information to conduct a detailed constraints assessment. It is recommended that detailed surveys for these species be conducted prior to clearing and effort devoted to protecting (via modifying clearing envelopes) the species, especially *Carronia pedicellata* should it occur.

4.2.2 Fauna

The Lot is known Cassowary habitat and may provide foraging habitat for the Vulnerable Spectacled Flying-fox. No areas of particular importance can be identified for the Spectacled Flying-fox and the species will benefit from any habitat retention measures. As such measures recommended for the Cassowary will benefit both species and no further discussion of the Spectacled Flying-fox is provided.

The values of the Lot with respect to Cassowary can be summarised according to foraging habitat, water and habitat connectivity as follows:

- Foraging habitat. The entire Lot is likely to provide foraging habitat for the Cassowary. Given the number of Cassowary utilising the Lot it is recommended that most of the two main habitat types (RE 7.3.10 and 7.12.1) are retained.
- Water. The north-eastern section of the Lot is likely to provide permanent standing water and this area and feature should be protected from development.

- **Habitat connectivity.** The Lot is part of an important habitat linkage between Reserve 214 and the Tam O’Shanter National Park. This linkage should be maintained within the Lot. Corridor widths of approximately 100 m will be required to maintain a satisfactory linkage. The effectiveness of the corridor is reliant on the Lot providing direct linkage to intact forest on the eastern side of Tully-Mission Beach Road and to Tam O’Shanter National Park along the western border of the Lot.

4.3 Constraints Assessment and Recommended Design Principles

For the constraints assessment the Lot was mapped according to areas highly, moderately or least constrained. The main objective is to protect the majority of foraging habitat (both RE 7.3.10 and 7.12.1) and permanent water as well as habitat connectivity. The recommended conditions for each category are described below and locations are shown on **Figure 4**.

- **Highly constrained.** It is recommended that cassowary access to these areas is maintained and clearing or disturbance be avoided. The purpose of this area is to maintain habitat connectivity, permanent water sources and at least 25% of foraging habitat.
- **Moderately constrained.** It is recommended that cassowary access to these areas is maintained and clearing is avoided over most of this area. The purpose of this area is to protect the values described for highly constrained areas while providing some flexibility when designing the Lot layout and clearing envelope. It will provide protection for at least an additional 25% of foraging habitat.
- **Least constrained.** While these areas are outside the identified critical habitat components they still contain important foraging habitat and clearing in this area should be minimised.

Although these conditions will reduce the impacts associated with clearing, a number of other threats are associated with residential development. Recommended design principles to address these are described in **Table 5**.

Table 5: Potential threats to the Cassowary from a proposed residential development on Lot 66 Sp164474 and recommended design principles to reduce threats.

Potential Threat	Recommended Design Principles to Reduce Threat	Rationale
Habitat loss and fragmentation	<ul style="list-style-type: none"> • Development to occur in accordance with constraints mapping (Figure 4). • Limit clearing to house pad, access road and within 10 m of house pad. • Locate house pad to avoid potential impacts from tree fall. Where the risks of tree fall are unavoidable and selective clearing must occur, protection should be afforded to cassowary food plants (eg <i>Eleocarpus</i> spp. over <i>Alstoria</i> spp.). 	The site at least particularly supports a breeding population of Cassowary including at least two adult birds. Habitat loss and fragmentation is the greatest threat to Cassowary and this threat is occurring incrementally across the species range. Limiting the loss of foraging habitat on the Lot is critical to retaining the value of the site to Cassowary.
Vehicle strike	<ul style="list-style-type: none"> • Minimise the extent of roads within the Lot. • Avoid any new roads (especially larger/main arterial roads) bisecting, or impacting on, areas mapped as highly 	Vehicle strike is the second largest threat to Cassowary in Mission Beach. Design should aim to result in no net increase in this threat.

Potential Threat	Recommended Design Principles to Reduce Threat	Rationale
	<p>constrained (Figure 4) by providing access on east-west alignment rather than north-south alignment.</p> <ul style="list-style-type: none"> Where possible use existing access nodes (Mission Circle, Rockingham Close and Tully-Mission Beach Road). Reduce speed limits to 40 km/hour on any new access roads. Traffic calming devices (eg speed bumps) should be used to reduce speeds. 	
Human interaction	<ul style="list-style-type: none"> All prospective property owners should be provided with educational material about Cassowary and the dangers of feeding them. Fencing (including a closing gate) should be used to physically separate human habitation areas from Cassowary habitat. The fence should be >2 m high and obscure visibility. A chain mesh fence with shade cloth attached to the outside or wooden paling fence are potentially suitable designs. 	Human interactions with Cassowary, especially hand feeding, can result in their habituation. This is known to result in dangerous Cassowary behaviours including birds spending proportionally more time in dangerous environments (eg near roads) and increased incidence of aggressive behaviours to humans.
Dog attacks	<ul style="list-style-type: none"> A ban on owning dogs should be attached to the title of the land. 	Dogs are known to attack Cassowary and their presence alone may change Cassowary behaviour (eg a bird leaving a foraging site).

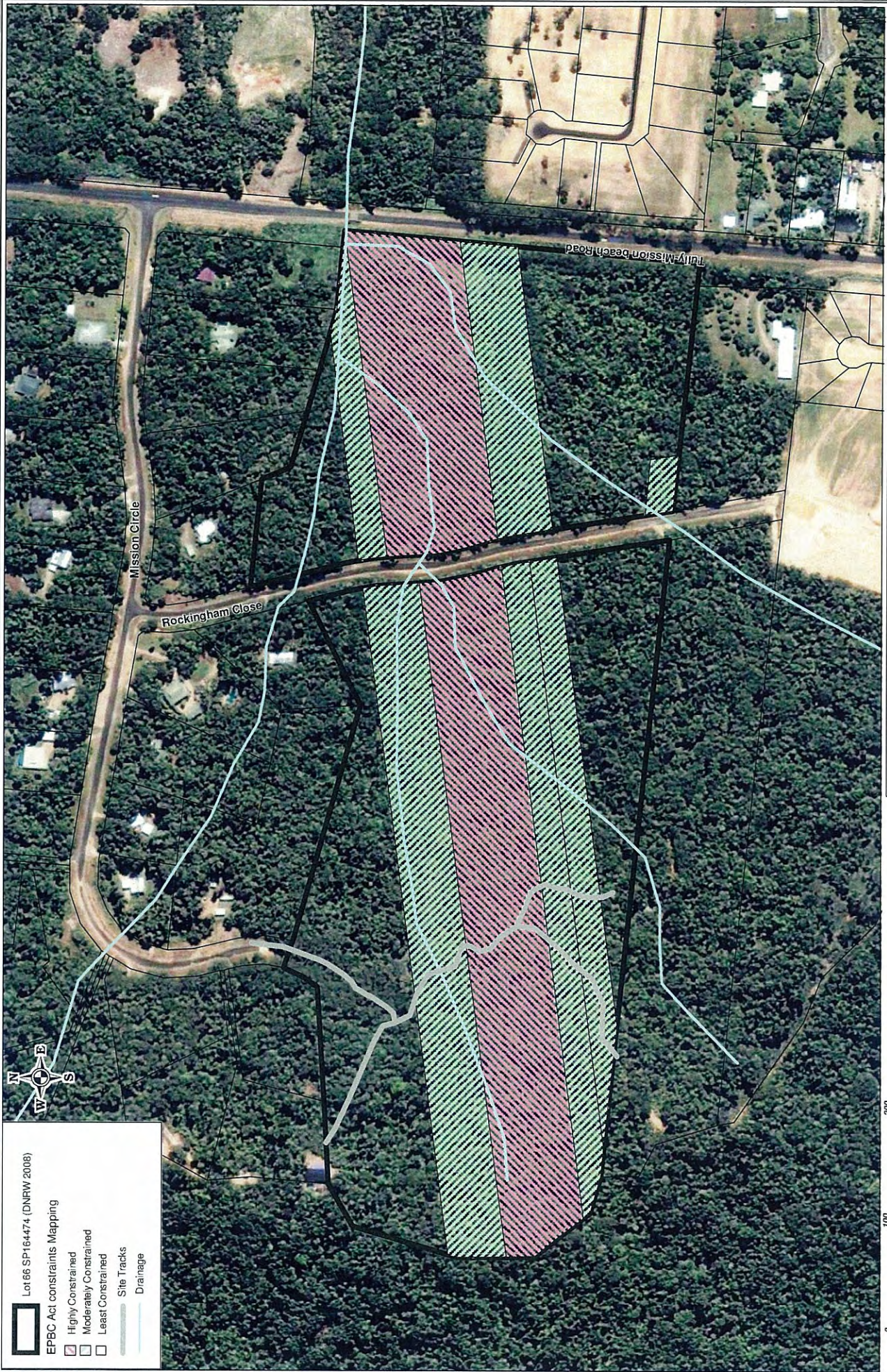
4.4 Other Considerations

Connectivity in the local area is compromised by two existing roads: Rockingham Close and Tully-Mission Beach Road, possible actions to manage any associated impacts are described below. While the actions recommended are outside the jurisdiction of the proponent the information is an important consideration for any development planning or assessments associated with the Lot.

Rockingham Close appears to be a relatively quiet road used mainly by locals from neighbouring residential areas. Development of the Lot is likely to increase traffic flow through this area. If the area is developed for residential purposes then traffic calming (eg speed bumps) and signage warning of the presence of Cassowary should be installed along this road. The most desirable outcome would be to close the central section of the road adjacent to the areas mapped as highly constrained on **Figure 4**.

Tully-Mission Beach Road is a busy dual lane carriage-way. The speed limit adjacent to the habitat linkage (the highly constrained area mapped on **Figure 4**) is 80 km/hour. This severely compromises the value of this important linkage. The situation is made more hazardous for Cassowary by the wooden paling fence on the opposite side of Tully-Mission Beach Road and bordering the Mission Shores residential development. Cassowary frightened off the road toward the fence may be tempted to run back onto the road to find better shelter. The speed limit through this section should be reduced to 60 km/hour. This would involve extending the current 60 km/hour zone approximately 600 m north of its current point, ie 80km/hour zone would start immediately north of the intersection with Mission Circle. Cassowary warning signs should also be erected adjacent to this linkage.

- Lot 66 SP164474 (DNRW 2008)
- EPBC Act constraints Mapping
- Highly Constrained
- Moderately Constrained
- Least Constrained
- Site Tracks
- Drainage



PROJECT: Rockingham Close Casseway and Flora Assessment
 TITLE: EPBC Act constraints Mapping Assessment
 JOB NO: 326001
 DATE: February 2009
 SOURCE: EPA, NRA, ODMR



Figure 4

Habitats along the north-eastern edge of the site are degraded and much of this area is currently covered with rank grasses. This is also an area where water ponds and may therefore function as an important Cassowary drinking and bathing site. Opportunity exists to rehabilitate this area to improve its value as Cassowary habitat. Tall growing trees and palms are recommended for the area to help shade out grasses and to allow Cassowary movement. The rank grasses may also be increasing sediment deposition in this area thereby reducing the area's water holding capacity and residence time. The area is suitable habitat for the Vulnerable palm, *Arenga australasica* and plantings in this area could offset any impacts that may result elsewhere on the site.