



Black-throated Finch and Water Mouse Habitat Assessments

Galilee Coal Project Northern Export Facility Abbot Point

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1. Introduction

1.1. Background and Purpose

Waratah Coal proposes to utilise a coal and stockpiling and exporting facility on land within the Port of Abbot Point and the Abbot Point State Development Area (APSDA). Waratah Coal proposes to transport coal, via rail, to this facility from its new coal mining operations situated approximately 35 kilometres north-west of Alpha, Central Queensland.

As part of the environmental investigation process for the new coal terminal and associated rail components, Waratah Coal has commissioned Austecology to investigate the value of those lands for the Black-throated Finch (southern) *Poephila cincta cincta* and the Water Mouse *Xeromys myoides*, and the implications of the proposed development for the values identified.

The Black-throated Finch (southern) is listed as endangered under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) and the *Nature Conservation Act 1992* (NCA). The Water Mouse is listed as vulnerable under the EPBCA and NCA.

It is intended that the findings of this investigation will ultimately support a response to the Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) as part of Waratah Coal's submission of its impact assessment statement for the proposed project.

1.2. Project Description and Land Use Context

The proposed infrastructure will be located at the Port of Abbot Point and overlapping land within the APSDA. The APSDA has been established by the Queensland Government to accommodate expansion of the existing coal terminal and other infrastructure (NQBP 2010). The APSDA encompasses an area of approximately 16,230 hectares. The Port of Abbot Point and the APSDA are located approximately 30km north of Bowen and is Australia's most northern coal port facility.

A large proportion of terrestrial environments within the APSDA, which do not support infrastructure for the port, are currently subject to cattle grazing. A significant part of the APSDA is owned by Colinta Holdings, a subsidiary of Xstrata Coal, which also manages the Mount Luce Station. Cattle grazing is also the predominate activity on land surrounding the APSDA.

A significant ecological feature of the APSDA is the Caley Valley Wetlands. The Abbot Point-Caley Valley aggregation is 5,154ha that extends approximately 18km long and 6km wide, and is bounded by Mount Curlewis in the west, Euri Creek in the east, Bald Hill in the north and Calley Valley homestead in the south (Blackman *et al.* 1999). Wetland vegetation comprises a mixture of permanent estuarine waters, intertidal mud and sand flats, mangroves, saltmarshes, freshwater marshes and freshwater impoundments (Blackman *et al.* 1999). Caley Valley Wetland is listed on the Australian Government's "Directory of Important Wetlands". The wetland has been historically, and is currently, extensively grazed, which has led to degradation in the quality of vegetation and fauna habitat values, particularly around the perimeter of the wetland (GHD 2009a).

The infrastructure proposed for use by Waratah includes three principal components:

- A rail component linking the mine site to the coal terminal;
- A coal terminal (also known as the Abbot Point Terminal 4-7 (APT4)); and
- A rail component linking the coal terminal to the selected multi-use infrastructure corridor (MUC), and ultimately, via the MUC, to the proposed Multi Cargo Facility (MCF).

The proposed MUC is part of the overall MCF project, which is the subject of a separate environmental impact assessment¹ being facilitated by North Queensland Bulk Ports Corporation Limited (NQBPP)².

The primary footprint of the proposed infrastructure is outlined in Figure 3-1.

1.3. Terminology and Nomenclature

1.3.1. Site and Surrounds

The *study site* is the composite of three areas of interest, i.e.:

- *Area A* - The proposed coal terminal (Abbot Point Terminal 4 (APT4));
- *Area B* – The rail component linking the coal terminal to the selected multi-use infrastructure corridor (MUC); and
- *Area C* - The northern most sector of rail component linking the mine site to the coal terminal. Area C also includes an area proposed for rolling stock yards.

In this report, the term *surrounding area* refers generally to the lands surrounding the Abbot Point State Development Area (APSDA) and generally bounded by the following:

- Cape Upstart National Park, Gumlu and Rangemore in the north;
- The Bogie River and Mount Aberdeen National Park in the west; and
- The Don River and Bowen in the south.

The *study site* is embedded within the *Townsville Plains Province*, the most northerly part of the *Brigalow Belt Bioregion* (see Young *et al.* 1999). This province is characterised by alluvial plains and scattered hills which support variously, a diversity of *Eucalyptus* and *Melaleuca* woodlands (see Young *et al.* 1999).

1.3.2. Fauna

Within this report, *fauna* refers to all vertebrate fauna. The acronym BTF is used for the Black-throated Finch (southern) *Poephila cincta cincta*.

Within this report, the conservation status of a species may be described as *Endangered*, *Vulnerable*, *Regionally Vulnerable*, *Rare*, *Migratory*, *Near Threatened* or *Least Concern*. These terms are used in accordance with the provisions of the Queensland *Nature Conservation Act 1992* (NCA) and its regulations and amendments, and/or the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA). *Threatened* is a common term used to collectively describe *Endangered* and *Vulnerable* species.

¹ GHD (2010b). Proposed Abbot Point Multi Cargo Facility Environment Impact Statement.

² The NQBPP became a port authority on 1 July 2009, under the Transport Infrastructure Act 1994, for the seaport facilities at Hay Point, Mackay, Abbot Point, Weipa and Maryborough. The NQBPP is accountable for, amongst other responsibilities, strategic planning, infrastructure development, and protection of the environment.

1.3.3. Vegetation

Vegetation type descriptions used (e.g. woodland, open woodland, shrubland, and grassland) are based on the structural types described by Specht (1970) or by way of a regional ecosystem description (as per the Regional Ecosystem Description Database (REDD) (DERM 2011a)).

2. Assessment Methodology

2.1. Existing Information Reviews

Existing information regarding the potential presence of BTF and Water Mouse (the target species) on the study site and surrounding area was collated and reviewed. The following provides a summary of the resources reviewed as part of the preparation of this report.

2.1.1. Database Searches

Searches of public-access databases were undertaken to locate previous records of the target species within the wider area surrounding from the study site. The search area was defined as a 10 km radius, centered on the study site (-19.92843° 148.0523°). Databases included:

- Department of Environment and Resource Management (DERM) - WildNet Wildlife Online, including specific reports for:
 - A search area defined as a 25 km radius, centered on the study site (-19.92843° 148.0523°);
 - The Whitsunday Regional Council local government area (approximately 23,856 square kilometers); and
 - Specific reports for the Abbot Point Resource Reserve, Mount Aberdeen National Park, Cape Upstart NP, Mount Abbot National Park (Scientific), and Dryander NP.
- Department of Sustainability, Environment, Water, Population and Communities (DSEWPC) – on-line Protected matters search tool³.
- Birds Australia – Birds Australia Atlas bird lists (Birddata); and
- Eremaea Birds⁴.

In regards to BTF, the BTF Recovery Team (BTFRT) also maintains a database of records, though the details of those records are not available to the public.

2.1.2. Reports and Literature

Records of the BTF and Water Mouse were sought through a review of publicly available assessment reports. These documents included the following:

- Survey and habitat assessment reports for lands within the APSDA: EcoServe (2005); EcoServe (2007); ANCA (1996); GHD (2009a & b); BMT WBM (2010); Unidel (2011a); and
- Survey and habitat assessment reports for the surrounding area: Kutt and Kemp (1998); Parsons Brinckerhoff (2009); Lewis Consulting Services (2009); GHD (2010a); and Unidel (2011b).

³ This database is partially predictive, and may not provide verified observations or records.

⁴ Eremaea Birds is an on-line birding atlas and database, built from lists provided by contributing members.

2.1.3. Habitat and Vegetation

Existing information regarding the type and extent of habitats of the APSDA and surrounding area was drawn from the following sources:

- DERM's on-line Regional Ecosystem mapping database, Moratorium Vegetation mapping database, and Essential Habitat mapping database;
- Historical aerial photography and current Google satellite imagery; and
- Vegetation assessment reports, including: EcoServe (2005); GHD (2009a & b); and Unidel (2011a).

2.2. Field Surveys and Habitat Assessments

The field survey program was implemented 20 to 22 May 2011 (inclusive), and undertaken by two highly practiced field investigators with experience of the target species, i.e. Lindsay Agnew (LA), and Dr. Ed Meyer (EM). The field survey program in respect to BTF included the following components:

- active roaming searches throughout potentially suitable habitats;
- slow driving transects surveying road-side habitats; and
- nest searches throughout potentially suitable habitats.

These activities were conducted throughout the day, with particular attention given to early mornings and late afternoon periods. In regards, to Water Mouse, field work was limited to habitat assessments.

Field work was undertaken to ground-truth previous vegetation mapping and assess habitat values for the target species. This work included assessment of structural complexity of vegetation (i.e. tree density, canopy cover, vertical structural complexity, and ground cover including diversity of grasses, density of grasses and height of grass cover); presence of habitat trees (hollow-bearing trees); and sources of disturbance. This work included assessment of the condition of all waterbodies on the study site.

3. Findings and Discussion

3.1. Black-throated Finch (southern)

3.1.1. Species Profile

The Black-throated Finch (southern) *Poephila cincta cincta* is listed as *endangered* under the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBCA) and the Queensland *Nature Conservation Act 1992* (NCA).

The BTF was previously known from habitats extending from the Atherton Tablelands in north Queensland, to the Northern Tableland and north-west slope regions of New South Wales (Higgins *et al.* 2006). Over the last 20 years⁵, it is estimated that the extent of occurrence of the subspecies has contracted by approximately 80% of its former extent (BTFRP 2007)⁶. It appears that the southern subspecies is now confined to the northern part of its former range, i.e. at least north of Rockhampton (BTFRP 2007; DSEWPC 2011). The BTF has been regarded as locally common at a number of rural and semi-rural sites around Townsville and Charters Towers (DEWHA 2009a; DSEWPC 2011). Other locations where birds have been reported as regularly observed are scattered through the Northern Brigalow Belt Bioregion (south of Townsville; Giru to Bowen) (BTFRP 2007).

Figure 1 of the EPBCA Policy Statement 3.13 (DEWHA 2009a), maps important areas for BTF⁷ within the Cairns to Rockhampton component of its known range (based on available information at the time of publication; DEWHA 2009a). Of relevance to this project, there are no mapped “important areas” in or near the study site (the closest area being around Ayr/Home Hill).

In north Queensland, the BTF has been recorded in 17 regional ecosystems (as described in the Regional Ecosystem Description Database (REDD) (BTFRP 2007)). Within the Brigalow Belt North, which encompasses the greater Townsville area, the subspecies has been recorded in six regional ecosystems (BTFRP 2007), i.e.: RE 11.3.12; RE 11.3.25b; RE 11.3.27; RE 11.3.30; RE 11.3.35; and RE 11.11.9. In addition, NRA (2006) proposes that RE 11.12.9 (*Eucalyptus platyphylla* woodland on igneous rocks) should be regarded as potentially supporting BTF nesting habitat.

The BTF is known from a variety of grassy savannah woodland habitats dominated by *Eucalyptus* and/or *Corymbia*, though also woodlands dominated by *Melaleuca* and/or *Acacia* tree species and grasslands comprised of genera such as *Astrelba*, *Dichanthium* or *Panicum* (Higgins *et al.* 2006; BTFRP 2007; DSEWPC 2011). Within these habitats, BTF require access to three key resources for survival and breeding, i.e. water sources, seeding grasses, and suitable nesting habitat. The presence and configuration between and within these three key resources governs the distribution of the subspecies (DEWHA 2009b). Within the northern part of its

⁵ Comparison of records from the 1st bird atlas (Blakers *et al.* 1984) with those of the 2nd bird atlas project (Blakers *et al.* 1984 and Barrett *et al.* 2003).

⁶ TSSC (2005) concluded that the extent of occurrence had declined by up to 59% in the preceding decade, being 1995-2005.

⁷ DEWHA (2009a) notes – “The important areas for black-throated finch (southern) are defined as the habitat within five km of post-1995 sightings of the black-throated finch (southern). These areas are likely to contain the critical habitat configuration between water sources, grasslands and nesting trees.”

distribution, the BTF is thought to require a mosaic of different habitats in which it can find seed during the wet season (Mitchell 1996; BTFRP 2007).

Black-throated Finches (southern) are predominantly granivorous, mainly feeding on fallen grass seed or by taking seeds from seed-heads whilst on the ground (Higgins *et al.* 2006). BTFs mostly forage on the ground, often on bare or open ground, with the majority of foraging activities occurring during early morning and then late afternoon (*pers comm.* John Young, 2010).

Whilst there is limited data on the diet of the subspecies, native perennial grasses are thought to predominate in the diet, though in the Townsville region, seeds of the introduced species (*Urochloa mosambicensis* and *Digitaria ciliaris*) were also considered to be prominent in the diet (Mitchell 1996). Like other seed-eaters, the BTF requires access to water - at least daily, though presumably with increased frequency throughout the day during drier periods. BTF are known to use both natural and artificial water sources (BTFRP 2007). These include wetlands, creeks, dams, and stock troughs.

BTFs are known to nest in a variety of locations, including hollow tree limbs, pendulous tree branches, within clumps of mistletoe, at the base of active raptor nests, within old babbler nests, tree stags, at the base of dried pandanus leaves, and bushy shrubs (Beruldsen 2003; Higgins *et al.* 2006; *pers comm.* John Young, 2010; *pers. obs.* author). Nests are typically constructed with grass stems and feather or plant down lining, and are used for breeding and roosting (Higgins *et al.* 2006). They are usually built at least four metres above the ground and in the fork or hollow branch of a tree (Beruldsen 2003; Higgins *et al.* 2006; DEWHA 2009b), though can be as low as 1.5m above ground (Zann 1976).

Whilst BTFs are known to breed throughout the year under optimal conditions (Storr 1984; Higgins *et al.* 2006), in the Townsville area, breeding typically occurs during the wet season, usually between February and May (Mitchell 1996; DEWHA 2009b). The minimum area of nesting habitat required to sustain a viable breeding colony is unknown (DEWHA 2009b). There are no measures of breeding success (Higgins *et al.* 2006).

The BTF is very rarely observed in heavily modified habitats (e.g. gardens, yards or heavily grazed paddocks) (DEWHA 2009b). However, there are numerous observations of birds feeding along graded firebreaks, grassy unsealed roadsides, beneath power lines or in rail corridors where suitable seeding grasses exist and are adjacent to intact habitat areas (Mitchell 1996; DEWHA 2009b; *pers comm.* J. Young 2010).

The relatively sedentary lifestyle of the BTF is considered to significantly increase its vulnerability to disturbance, or modification, of any of its three key resources (i.e. water sources, seeding grasses; and trees providing suitable nesting habitat) (DEWHA 2009b).

3.1.2. Existing Information Review

3.1.2.1. Database Searches

Figure 1 of the EPBCA Policy Statement 3.13 maps important areas⁸ for BTF (DEWHA 2009a). There are no mapped important areas for BTF within the surrounding area. The two closest mapped important areas for BTF are approximately 75 kilometres to the north-west (around Ayr/Home Hill) and approximately 80 kilometres to the west (around Milaroo).

Searches of the DERM WildNet Wildlife Online database for the wider area surrounding the study site provided four confirmed/verified BTF records for the Whitsunday Regional Council LGA search area (an area of approximately 23,856 square kilometers)⁹. Specific reports for a variety of National Parks, and Resource Reserves provided a null result (e.g. Abbot Point Resource Reserve, Mount Aberdeen National Park, Cape Upstart NP, Mount Abbot National Park (Scientific), and Dryander NP).

3.1.2.2. APSDA

A variety of fauna surveys have been implemented throughout the APSDA (e.g. EcoServe (2005); EcoServe (2007); GHD (2009b); Unidel (2011a)). None of that work provides any records of BTF within the APSDA. The following provides a brief summary of that body of work in regards to BTF.

Neither of the two EcoServe studies included dedicated BTF surveys. Bird surveys for the EcoServe (2005) study were implemented during very dry conditions, were wide-ranging, and undertaken across all habitats within the northern and north-eastern parts of the APSDA (including the Calley Valley Wetlands). The EcoServe (2007) surveys, whilst including the terrestrial habitats, primarily focused on the Calley Valley Wetlands habitats and waterbirds.

GHD (2009b) identifies that two fauna surveys were undertaken, and described them as follows:

- Dry season terrestrial flora and fauna surveys were conducted from October 20 to November 1 2008.
- Wet season terrestrial and aquatic flora and fauna surveys were conducted in the late wet season from March 22 to April 4 2009.

The study area surveyed for GHD (2009b) is provided in Appendix A of this report.

GHD (2009b) notes that dedicated BTF surveys were undertaken. Appendix A of that report summarises the survey methodology as: *Targeted surveys of grassy scrubland/woodland/dune woodlands/pandanus near water. Survey to specifically target the presence of nesting sites. Twilight surveys of dams across the Study Area.*

No other information on survey characteristics is provided in the report to assess the adequacy of the “target surveys” (e.g. survey effort, location of surveys).

⁸ Important Areas were derived from a 5km buffer of reliable post 1995 records. Records are from the DEWHA - Species Profile and Threats Database (DEWHA 2009a).

⁹ Whitsunday Regional Council local government area extends from Conway Beach and Proserpine in the south, to Gumlu and Cape Upstart in the north, and to Collinsville in the west.

In Appendix F of the GHD (2009b) report, the following assessment is provided in regards to the likely presence within the study area: *May occur. Individuals have been observed to the south of Caley Valley. It is likely that this species occasionally inhabits the Study Area however the lack of highly suitable habitat is thought to limit the presence of a permanent local population.*

In a subsequent report, GHD (2010b) noted the following in responding to submissions received in response to the Public Notification of the Multi Cargo Facility Draft Environmental Impact Statement (MCF EIS), May 2010:

In the original EIS surveys, all creeks within the project area were traversed with the purpose of searching for nests and nesting and foraging habitat for the black-throated finch. Targeted surveys were undertaken for the black-throated finch in the wet and dry seasons. A total of four person hours were spent assessing potential nesting and foraging habitat along creeks. Additional dam watches were undertaken to detect drinking individuals. Six stock dams were surveyed in the wet season (a total of three survey hours) on the week of 22nd - 27th of March 2009. An additional 3 survey hours were spent monitoring a stock dam for drinking individuals between March 28th - April 1st, 2010.

The GHD (2010b) submission response report also refers to unspecified records of BTF in the Abbot Point area during surveys undertaken in 2008 and 2009 by Maureen Cooper and Allan Briggs of Birds Australia (report section 3.3.4). No further details are provided on these records.

The BMT WBM (2010) report was commissioned by the Department of Infrastructure and Planning (DIP) to prepare an environmental management plan (EMP) for the part of the Kaili Valley Wetlands within the APSDA. The BMT WMB (2010) report includes the BTF as one of a suite of threatened species recorded within the APSDA, though no further information is provided by the report. Subsequent discussions with the BMT WBM report authors have indicated that the BTF record cited in that report referred to the 2008 BTF record from Splitters Creek (see following discussion regarding Lewis Consulting Services (2009)).

3.1.2.3. Study Site and Surrounds within the APSDA

Unidel (2011a) undertook flora and fauna assessments of the proposed Waratah Coal port infrastructure. The “project footprint” considered for the purpose of those assessments included:

- An area of 78.5ha being the then proposed Galilee Project Coal Stockyards;
- A 50m wide corridor for an access haul road, which extends east from the proposed stockyards to the existing port road; and
- A 100m wide corridor for a proposed overland conveyor, located within the MUC proposed by the Queensland Government.

Those areas overlap with, though do not include, the full extent of the area investigated as part of the field work for the current report. The area assessed by Unidel (2011a) (that report's Figure 3) is presented in Appendix B of this report.

Unidel (2011a) implemented a fauna field assessment which was conducted over two days in October 2009. This was followed by an avifauna survey of the APSDA conducted over three days in November 2009. The survey team included P. Buosi, a member of the BTF Recovery Team. That survey involved ground-based surveys,

and an aerial survey from a helicopter. The survey effort focused primarily on waterbirds of the Caley Valley wetland.

It is not apparent from the report that dedicated BTF surveys were conducted. The Unidel (2011a) report concluded, in regards to BTF, that the species “may occur”, “suitable habitat occurs”, and that potential habitat degradation may occur if hydrology or water quality significantly changes as a result of the proposed project.

3.1.2.4. Surrounding Area

An extensive fauna survey program was implemented during 2007/08 as part of an EIS process for the Water for Bowen Project (Lewis Consulting Services 2009). That field program included pre-wet season surveys (13 to 18 October 2007) and post-wet season surveys (14 to 25 April 2008). That program provided one BTF record (comprising two birds) and is summarised as follows:

“This species was observed on one occasion in the southern precinct of the study area known as Salisbury Plains and lies immediately adjacent and potentially within the proposed balancing storage near Splitters Creek, main distribution channel or the infrastructure footprint for the proposed pipeline to Abbott Point. Two individuals were observed accessing a stock watering point followed by a foraging foray along the verges of an adjoining vehicle track. Once the birds left this area they moved in a north easterly direction towards Splitters Creek and the Bruce Highway. The birds were foraging in an area mapped as non-remnant vegetation, being largely cleared with some remnant bloodwoods (*Corymbia clarksoniana*, *Corymbia erythrophloia*) with a range of native (i.e. *Themeda triandra*, *Heteropogon contortus*, *Aristida* spp, *Dichanthium* spp), and exotic grasses and legumes (i.e. *Stylosanthes scabra*). At least one individual was observed to move in the direction of Splitters Creek which supports predominantly woodland on alluvial plains (i.e. RE’s 11.3.25, 11.3.30 and 11.3.32) with a number of these RE’s noted as having a grassy ground layer of Black Speargrass (*Heteropogon contortus*), Forest Bluegrass (*Bothriochloa bladhii*), Kangaroo Grass (*Themeda triandra*), Rat’s Tail Grass (*Sehima nervosum*), Blackheads (*Enneapogon* spp.), with forbs and succulents.”

Parsons Brinckerhoff (2009) investigated BTF habitat values associated with land proposed for a water storage facility and associated pipeline on two parcels of land along Splitters Creek (Lot 24 RP805036 and Lot 3 HR1686)¹⁰. The land is situated approximately 20km west of Bowen. Part of Lot 3 is included within the APSDA.

Dedicated BTF surveys were under over a four day period (29 June to 3 July 2009) and included a variety of field survey approaches. The area assessed by Parsons Brinckerhoff (2009), that report’s Figure 1-1, is presented in Appendix C of this report. No BTF were recorded, though the report does refer to a previous record of a pair of BTF on Lot 3 HR1686 (Lewis Consulting Services 2009).

Kutt and Kemp (1998) refer to BTF recorded in the “Haughton relief” and “Strathalbyn area” in wetlands on the Burdekin right bank (Kutt and Skull 1995) and from wetlands and open woodlands on the Burdekin left bank (ACTFR 1994). These locations are believed to be approximately 80 to 90kms west of the study site.

¹⁰ This work forms part of the “Water for Bowen Project” which proposes the supply of water for urban, industrial and agricultural use via a new water transport system originating from the Burdekin River to Bowen and surrounding areas.

3.1.3. Findings of Current Investigations

The field program provided six survey-person days (i.e. two persons for three days) during late-wet season conditions. Field coverage of the study site was considered extensive. A total of 116 native bird species were recorded across the study site and wider surrounds (within the APSDA).

These records included three finch species, the Chestnut-breasted Mannikin (*Lonchura castaneothorax*), Zebra Finch (*Taeniopygia guttata*), and Double-barred Finch (*T. bichenovii*). There were no records of the Black-throated Finch (southern).

As described previously, searches for finch nests were included as part of the field work. These searches were mainly conducted within the surrounds of a variety of water points and watercourses, though also sought opportunistically during other habitat transects, etc. A total of 22 finch nests were located during the survey program. The following provides a summary of this result:

- A total of 10 nests were considered to be those of the Double-barred Finch, of which five were considered to be in use at the time of the survey.
- A total of six nests were considered to be those of the Zebra Finch, of which one was considered to be in use at the time of the survey.
- Vestigial remains of six nests were recorded. These could not be attributed to a particular finch species, though were regarded as grassfinch nests.
- The majority of the recorded nests were located at sites between 1.5 and 3m above ground.
- One nest, attended by a Zebra Finch, was the highest site recorded, being located approximately 15m above ground in the base of a raptor nest.
- Whilst hollow-bearing trees were detected at a variety of locations surveyed, no nests attributable to grassfinches were observed within tree hollows.

For the purposes of this report, the study site has been described as comprising of three areas of interest and the following discussion refers to these as:

- *Area A* - The proposed coal terminal (Abbot Point Terminal 4-7 (APT4));
- *Area B* – The rail component linking the coal terminal to the selected multi-use infrastructure corridor (MUC); and
- *Area C* - The rail component linking the mine site to the coal terminal.

3.1.3.1. Area A

Area A is generally bounded by Splitters Creek (western and northern sides), the existing rail line (southern side), and a narrow tributary of Marle Creek (eastern side). Area A includes parts of both Salisbury Plains and Mount Luce Stations, and is located within the western sector of the APSDA (north of the Bruce Highway).

The entire extent of Area A is subject to cattle grazing. The vast majority of Area A has been cleared and little of the former native vegetation communities remain. The combination of vegetation clearing, introduction of exotic pasture grasses, and cattle grazing has led to a prevalence of weeds and suppression of native regrowth (amongst other negative impacts).

Typically, these areas support a dense (on average >67% foliage projective cover), tall (often up to 1.6m high) cover of grasses¹¹ and herbage¹². Introduced flora is

¹¹ e.g. *Pennisetum ciliare*; *Megathyrsus maximus*; *Melinis repens*; and *Paspalum dilatatum*.

¹² e.g. *Stylosanthes* spp.; *Stachytarpheta jamaicensis*; *Ricinus communis*; and *Sida* spp.

common and in most areas dominates the ground cover (e.g. see Appendix D). Associated mainly with remnant vegetation, there are a variety of woody weeds¹³.

Mapped remnant vegetation is limited to a relatively narrow and linear band of vegetation along Splitters Creek which extends through the western side, and vegetation associated with the very northern limits of Area A (also associated with Splitters Creek in north-west). The DERM (2011a) certified remnant vegetation mapping identifies the type and extent of remnant vegetation cover (see Appendix D).

DERM (2011a) mapped regional ecosystems include, as part of heterogeneous polygons:

- RE 11.3.25 - *Eucalyptus tereticornis* or *E. camaldulensis* woodland fringing drainage lines.
- RE11.3.29 - *Eucalyptus crebra*, *E. exserta*, *Melaleuca* spp. woodland on alluvial plains.
- RE 11.3.32 - *Allocasuarina luehmannii* open woodland on alluvial plains.
- RE 11.3.30 - *Eucalyptus crebra*, *Corymbia dallachiana* woodland on alluvial plains.
- RE 11.3.33 - *Eremophila mitchellii* open woodland on alluvial plains.

All of the abovementioned regional ecosystems are mapped as variously part of mosaics/heterogeneous polygons, e.g. RE 11.3.32/11.3.30/11.3.33 (see Appendix G).

To the north of Area A, there are extensive areas mapped as either RE 11.1.2a or RE 11.1.2b (Samphire forbland on marine clay plains), which also includes estuarine wetlands and mangroves at the northern extent. The other large area of mapped remnant vegetation lies approximately two kilometres south of Area A (centered on Mount Roundback) which is mapped as dominated by RE 11.12.13 (*Eucalyptus crebra*, *Corymbia* spp., *E. acmenoides* woodland on igneous rocks. Coastal hills).

There are no areas mapped by DERM as Essential Habitat for BTF (or other threatened fauna species) within the Area A (or for the APSDA for that matter).

In regards to the BTF, Area A does not support any substantive or notable areas of quality foraging habitat. At the time of survey, extensive areas of dense to very dense, tall ground cover dominated by a variety of weeds did not reflect the typical foraging conditions required by BTF. Whilst there are small areas of more open and lower ground cover (which included native and introduced grasses, though also other flora), these are unlikely to be sufficient to sustain any significant numbers of BTF. In regards to other finches, both Double-barred and Zebra Finches were not commonly encountered in Area A, being observed occasionally in small flocks (e.g. four to ten birds). These results are likely to be reflective of generally poor conditions for these species.

During drier seasonal conditions, it is conceivable that more ground cover habitat may become structurally more open and thus potentially suitable for BTF, though the limited availability of water points for drinking may counter to some extent the "improvements" in available foraging habitat. Whilst there was a range of suitable water points available to BTF during the survey period (and likely throughout the wet season), only three potential drinking points may be available during dry season conditions. All three are cattle troughs, one in the south-west, one adjacent to the

¹³ e.g. *Acacia nilotica* subsp. *indica*; *Cryptostegia grandiflora*; and *Ziziphus mautitiana*.

northern boundary of Area A (near north of Splitters Creek) and the third, adjacent to the north-east corner of Area A.

BTF are known to nest in a variety of situations and in regards to Area A, there are a variety of potentially suitable opportunities¹⁴, primarily associated with riparian vegetation along Splitters Creek, though noting that hollow-bearing trees are relatively scarce in these riparian habitats, and across Area A generally (BTF are known to nest in limb hollows). In contrast, the environs of Marle Creek on the eastern side of Area A supported very limited breeding opportunities due to the very poor condition of riparian vegetation (e.g. very sparse tree cover and no hollow-bearing trees).

3.1.3.2. Area B

The surrounds of this relatively short corridor (of approximately two kilometres in length) supported mainly open grassland habitats, though also patches of remnant and remnant regrowth vegetation (see Appendix E and G). Whilst the open grassland habitat was considered to be generally shorter than that observed in Area A, it was similarly weed infested, and at the time of survey, considered to be consistently too tall and dense to be regarded as quality foraging habitat for BTF.

The patches woody native vegetation (often where *Melaleuca viridiflora* was common) provided a degree of contrast with Area A, though not unlike Area A, woody weeds were prevalent (especially *Cryptostegia grandiflora* and *Ziziphus mauritiana*). Area B abuts, on its northern boundary, expansive areas of RE 11.1.2 (Samphire forland on marine clay plains). The northern sections of several small, narrow watercourses draining south to north across Area B exhibited brackish waters and surrounds supporting salt-tolerant flora (e.g. sedges and *Sporobolus virginicus*).

Hollow-bearing trees were considered rare in Area B. Whilst Area B is traversed by several small seasonal watercourses, the sandy nature of the beds suggest that they would only support temporary pools of water without regular recharge during the wet season. There are two water troughs which could provide year-round water points for BTF. One is located at the western end of Area B (adjacent to the north-east corner of Area A). The other is near the eastern extent of Area B, at about the area where potentially Area B connects with the multi-use conveyor corridor.

In regards to the BTF, Area B (at the time of the field survey) did not support any areas of quality foraging habitat. Similar to conditions observed in Area A, marginal habitat for BTF in Area B would be limited to the grassed edges of tracks and very small and restricted areas of sparser grass cover. As observed in Area A, Double-barred and Zebra Finches were not abundant in Area B, being observed occasionally in small flocks (e.g. four to ten birds).

3.1.3.3. Area C

Area C is located south of the Bruce Highway and adjacent to the south-west corner of the APSDA. The proposed rail corridor transects an upper tributary of Saltwater Creek.

Area C (and surrounds) include large areas of non-remnant, though also mapped remnant vegetation (see Appendix G). The DERM (2011a) certified remnant

¹⁴ Habitats which support suitable resources (e.g. suitably sized limb hollows, &/or small trees, &/or tall shrubs) within relatively close proximity (<400m) to semi-permanent or permanent water.

vegetation mapping identifies RE 11.3.9 (*Eucalyptus platyphylla*, *Corymbia* spp. woodland on alluvial plains) as the only dominant regional ecosystem, with the remaining remnant vegetation is mapped as part of heterogeneous polygons. Those regional ecosystems include:

- RE 11.3.13 - *Grevillea striata* on alluvial plains
- RE 11.3.32 - *Allocasuarina luehmannii* open woodland on alluvial plains.
- RE 11.3.30 - *Eucalyptus crebra*, *Corymbia dallachiana* woodland on alluvial plains.
- RE 11.3.33 - *Eremophila mitchellii* open woodland on alluvial plains.

The mapped areas of non-remnant vegetation are primarily open grassland. These areas are dominated by a dense and tall ground cover which is not dissimilar to that described for Area A. Introduced pasture grasses¹⁵, legumes¹⁶, and herbage¹⁷ are dominant and widespread (see Appendix F). These areas are managed for cell-grazing of cattle.

Areas of remnant vegetation are also subject to cattle grazing. There is evidence of invasion into these remnant vegetation areas by the abovementioned introduced ground cover flora. Woody weeds are also present¹⁸. Areas of remnant vegetation subject to comparatively higher levels of weed invasion are mainly found along watercourses and near surrounds.

Of the three areas assessed, parts of Area C supports comparatively higher value foraging habitat for BTF (see Appendix F). These areas support remnant woodland with a simpler, more open ground cover structure and where a variety of native grasses are present and introduced flora is less prevalent. These areas are outlined on Figure 3-1, though also see Appendix G.

In regards to BTF, there is potential breeding habitat associated along those surveyed parts of Saltwater Creek which traverse remnant vegetation (including hollow-bearing trees and large Pandanus). Whilst there were suitable water points available to BTF during the survey period (and likely throughout the wet season), outside the wet season, potential drinking points would be restricted to cattle troughs, of which there are several scattered throughout the non-remnant pasture areas which adjoin remnant vegetation.

As noted previously, there are areas of potentially suitable foraging habitat within remnant vegetation patches, though as observed during the survey (under wet season conditions), most of the large areas of non-remnant vegetation support dense and tall grassland, dominated by exotic flora, and are not considered to provide suitable foraging habitat (save those relatively small areas associated with lower grass cover along vehicle tracks).

Of relevance to Area C, is the record of BTF on land at Splitters Creek (Lewis Consulting Services 2009). That location is approximately five kilometres to the east of Area C.

¹⁵ e.g. *Pennisetum ciliare*; *Megathyrsus maximus*; *Melinis repens*; and *Paspalum dilatatum*.

¹⁶ e.g. *Clitoria ternatea* and *Chamaecrista rotundifolia*.

¹⁷ e.g. *Stylosanthes* spp.; *Stachytarpheta jamaicensis*; *Ricinus communis*; and *Sida* spp.

¹⁸ e.g. *Cryptostegia grandiflora*; and *Ziziphus mauritiana*.

3.2. Water Mouse

3.2.1. Species Profile

The Water Mouse *Xeromys myoides* is listed as vulnerable under the provisions of the EPBCA and NCA (DEWHA 2009c). In regards to its national distribution, the Water Mouse is known to occur in three discrete populations along the eastern and northern Australian coastline.

In Queensland, the Water Mouse has been recorded from two coastal regions, the central south (between Agnes Waters to Mackay) and the south-east (between Hervey Bay and south to the Coomera River, Gold Coast) (DEWHA 2009d). In Queensland, this species has been recorded in various coastal saltmarsh, mangrove and adjacent freshwater wetland habitats including sedgeland (composed of mainly *Juncus* and *Baumea* spp.), chenopod shrubland, *Sporobolus virginicus* grassland, and mangrove communities (Van Dyck and Gynther 2003; DEWHA 2009d).

In central south Queensland, the Water Mouse has only been recorded in the high intertidal zone, within tall, closed fringing mangrove forests which comprise only *Ceriops tagal* and/or *Bruguiera* sp. (Ball 2004). In this region, the Water Mouse has also been recorded from saline grassland adjacent to a closed forest of *Ceriops tagal* and/or *Bruguiera* sp., and closed forest of *Avicennia marina*. Neither of these is considered to represent core habitat for the species in the region (Ball 2004; DEWHA 2009d). Figure 2 of DEWHA (2009d) identifies areas in which the Water Mouse is “known to occur”, “may occur”, and/or is “likely to occur” in central south Queensland. Figure 2 maps much of the coastal environment, between Bowen and Ayr as “likely habitat” for Water Mouse¹⁹. There are no “known to occur” areas mapped within the Bowen and Ayr coastal environment on Figure 2.

The Water Mouse is likely to require relatively large areas of intertidal flats where it forages by following tidal waters to the low water mark and forages until advancing waters inundate the mangrove community (Van Dyck 1997). The diet of the Water Mouse has been studied in south-east Queensland and largely comprises marine intertidal crustaceans, pulmonate snails, marine gastropods and other invertebrates (Van Dyck 1997; Gynther and Janetzki 2008). The dietary preferences in central south Queensland appear to be similar and include grapsid crabs (Ball 2004; DEWHA 2009d).

The Water Mouse builds “nests” which are used as refuge (from high tides and predators) and for breeding. A variety of nest structures have been described (Van Dyck and Gynther 2003), though in central south Queensland, these structures appear to be limited to mud ramps made between the buttress roots of the mangroves *Bruguiera parviflora* and *B. gymnorhiza*, though also *Ceriops tagal* (Ball 2004).

Habitat removal and degradation as a result of development is considered to be the principal threat to the survival of the Water Mouse. Impacts to habitat resources (including food) and conditions may occur through water quality degradation, altered freshwater inflows, and changes to native vegetation cover (DEWHA 2009d).

¹⁹ DEWHA (2009d) notes that “Habitat is based on the distance thresholds from known reliable species locations extracted from the Species Profile and Threats Database. Habitat has been confined to contiguous suitable coastal vegetation. These broad vegetation groups included Mangroves, Heathlands, Shrublands and Forblands, Melaleuca Forests, Mudflats, Grasslands, Herblands, Sedgelands and Rushlands.”

Other threats to the survival of the Water Mouse include (after DERM 2009c) include:

- physical changes to saltmarsh such as runnelling or bundwall construction that modify tidal amplitude and frequency of inundation;
- reclamation of inter-tidal and terrestrial habitats as a result of deposition of dredge spoil;
- use of recreational vehicles in inter-tidal areas due to the long-lasting damage they cause through destruction and degradation of habitat;
- modified water levels and salinity in tidal waterways resulting from installation of flow control gates for flood mitigation;
- drainage of coastal and terrestrial wetlands for urban and industrial developments; and
- inappropriate burning of sedgeland, grassland and adjacent *Melaleuca* wetland communities.

3.2.2. Existing Information Review

The following provides a summary of survey reports prepared for the APSDA in regards to Water Mouse.

- The study area for the EcoServe (2005) fauna survey did not include mangrove habitat or suitable supralittoral habitats, though the report did note that an extensive area of potentially suitable habitat for Water Mouse occurs along Breakfast Creek, located to the near west of Mt. Luce and the study area.
- The GHD (2009b) study for the proposed MCF noted that the Water Mouse was included as a target species and in Appendix A,²⁰ lists the survey technique as “Hair trapping in mangrove habitats, searches of mangroves and salt marsh for characteristic nests.” There are no details of survey locations or survey effort, and there is no location of any mangrove survey sites within the report’s figure 2-1 (Flora and Fauna Survey Locations). The GHD (2009b) report notes that where RE 11.1.1 (*Sporobolus virginicus* grassland) occurs adjacent to mangroves and tidal areas, it can provide nesting habitat for the Water Mouse. No Water Mouse was recorded as a result of the GHD (2009b) field surveys.
- In a subsequent report, GHD (2010b) noted the following in responding to submissions received in response to the Public Notification of the Multi Cargo Facility Draft Environmental Impact Statement (MCF EIS), May 2010:

“A precautionary approach has been taken and the species is assumed to occur in any suitable habitat (i.e. mangroves and salt marshes). The project is expected to have a positive impact on the species by increasing the area and quality of mangrove and saltmarsh that could represent potential *Xeromys myoides* and habitat. This will result from the removal of an artificial bund that has restricted tidal influence from an area on the western side of the project area. This area has become hypersaline and currently has limited value for wildlife including *Xeromys myoides*. By removing the western bund wall and restoring the natural tidal flushing there will be an increase in the area of mangrove and saltmarsh habitat. This is expected to have a positive impact on *Xeromys myoides* if present by increasing the abundance and diversity of foraging and nesting habitat.”

²⁰ Appendix A Survey Methodology - Targeted Searches for Conservation Significant Fauna Species.

- Unidel (2011a) did not specifically survey for Water Mouse, though provided discussion on potential presence and assessments of impacts. It was concluded that Water Mouse may occur within the APSDA, though the specific project assessed would not generate any significant impacts to the Water Mouse.

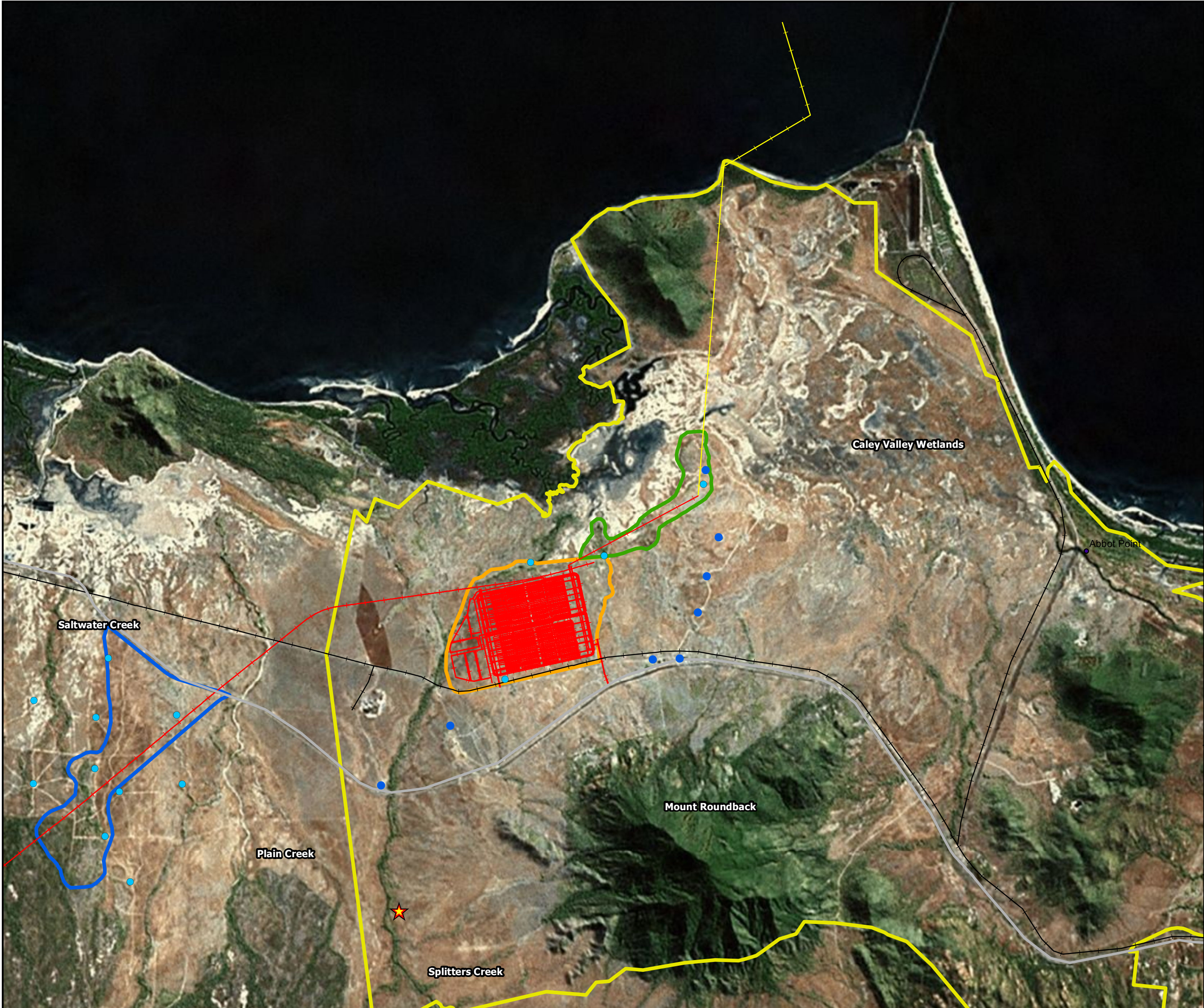
Whilst both the GHD (2009b) and the Unidel (2011a) reports were based on different areas, there was significant spatial overlap between these study areas. The shared conclusions appear to be that as no mangrove communities would be directly affected, any indirect impact that may potentially decrease Water Mouse habitat suitability could be adequately managed (e.g. potential impacts associated with changes in hydrology and water quality), such that impacts to Water Mouse would be minimal.

3.2.3. Findings of Current Investigations

As noted previously, the Water Mouse has only been recorded within the region within the upper intertidal zone fringing mangrove forests (DEWHA 2009c). There are no mangrove communities on the study site and the closest they occur is approximately two kilometres due north of the study site.

The northern fringes of both Areas A and B do support small areas of saline grassland and extensive areas of such habitat are located adjacent and to the north of Areas A and B (see Appendix F and G). Whilst the Water Mouse has been recorded in saline grassland where such habitat is located adjacent to mangrove forests (see species profile), saline grassland fringing the northern parts of Areas A and B (see Appendix G) could not be sensibly regarded as ecologically “adjacent” to the mangrove habitat (which is approximately two kilometers to the north of Areas A and B). Furthermore, these areas are unlikely to be effectively tidally influenced to the extent that habitat could be suitable for the Water Mouse.

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Legend

- Dams
- ★ 2008 Black Throated Finch Record
- Water Troughs
- SK0127 Rail Option
- Multi-User Corridor
- Area C
- Area B
- Area A
- Abbot Point State Development Area

5 Davina Street
Tarragindi QLD 4121
Ph: (07) 3892 4402
www.austecology.com.au

austecology

SCALE:

0 1 2 4

Kilometres

DATA SOURCE:
Source:EPA Regional Ecosystems Digital Database, Version 6.0, 2009©
Source:Department of Mines and Energy, Digital Database, 2011©

CLIENT: Waratah Coal Pty Ltd.

PROJECT: Black-throated Finch & Water Mouse Habitat Assessments – Galilee Coal Project Northern Export Facility at Abbot Point.

TITLE: Figure 3- 1 Study Site and Key Features

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4. Summary and Conclusions

4.1. Black-throated Finch (southern)

It is apparent from the review of existing information that there have been no systematic or regular surveys in regards to Black-throated Finch (southern) *Poephila cincta cincta* (BTF) in the wider area encompassing the APSDA. Within the APSDA, habitats have been subject to a variety of fauna surveys, including a sub-set which has been implemented with the express purpose of targeting BTF and assessing habitat conditions for BTF. Of relevance to the study site, dedicated field surveys for BTF were undertaken within parts of the current study site and on adjoining/nearby lands (see GHD 2009b and Lewis Consulting Services 2009).

To date, there is only one reliable record of BTF within the APSDA, being two birds detected during surveys in April 2008 as part of the Water for Bowen project (Lewis Consulting Services 2009). That record site is within the southern part of the APSDA, adjacent to Mount Roundback. Other putative records for the general area have been variously referred to in some of the reports reviewed, though none of these reports provide any record details, and to date, have not been able to be verified for the purposes of the current report.

In regards to the current investigations, the key findings and conclusions of field surveys and habitat assessments for the study site are summarised as follows:

- Under surveyed conditions (i.e. late wet season), the majority of the study site was not considered to support suitable foraging habitat for BTF. The majority of areas assessed supported ground cover habitats that were regarded as structurally unsuitable (too tall and too dense) and dominated by introduced flora (native grasses present though clearly subdominant).
- Under such conditions, the extent to which BTF might be able to access suitable ground cover to forage, would be generally be restricted to well-used vehicle tracks and their edges, and any small patches of low cover created at cattle “camps”. The combination of these areas provides only a very small area of structurally suitable foraging habitat. Our field observations indicate that the quantity and composition of the native grass component in such areas is relatively poor.
- During drier seasonal conditions, it is conceivable that more ground cover habitat may become structurally more open and thus potentially accessible for BTF. Whilst the quality, quantity and composition of required grass seed resources available to BTF during such conditions is unknown, based on current observations, it is unlikely to be an abundant or quality resource for BTF. The extent to which foraging resources and conditions of suitability to BTF during drier seasonal conditions (though also other times of the year) is likely to be highly variable, and subject to other additional influences such as seasonal variation between years, grazing management practices, and fire regimes.
- Whilst potential drinking sites were relatively common and widespread during the survey period (and assumed throughout the wet season), during drier periods, BTF, if they were present, would be reliant mainly on cattle troughs as sources of drinking water. Whilst BTF are known to drink from cattle troughs, the availability and distribution of these water sources across the study site would be subject to seasonal station management regimes. Nonetheless, it is reasonable to assume that the availability of water from such sources may be more reliable than that provided by natural wetlands and watercourses (the sandy nature of the soils

indicates that these habitats would only support temporary pools of water without regular, on-going recharge during the wet season) and would be dry during other periods.

- The exception to the relatively poor conditions for BTF as summarised above was an area of remnant vegetation within the southern third of Area C (south of the Bruce Highway). This area generally coincides with the proposed rolling stock yards. This part of Area C supports remnant woodland habitat with a simpler, more open ground cover structure and where a greater variety of native grasses are present and introduced flora is less prevalent. This area coincides with the southern section of Saltwater Creek where the range/diversity of breeding opportunities appeared to be comparatively greater than that observed throughout the remainder of the study site.
- The majority of the study site does not provide highly suitable habitat for the BTF and the removal of these heavily disturbed habitats for the establishment of the proposed infrastructure would not appear to represent a potentially significant impact to BTF. The exception, as highlighted above, is the southern third of Area C. It is highly recommended, that further consideration be given to investigating the values of this area for BTF and alternatives to the location and/or extent of the proposed rolling stock yards. Much of the development footprint of the proposed rolling stock yards coincides with comparatively higher potential habitat values for BTF.

4.2. Water Mouse

The Water Mouse *Xeromyces myoides* has only been recorded within the region within the upper intertidal zone fringing mangrove forests (DEWHA 2009c). There are no mangrove communities on the study site and the closest they occur is at least two kilometres due north of the study site (Areas A and C).

The northern fringes of both Areas A and B do support small areas of saline grassland and larger areas of such habitat are located adjacent and to the north of Areas A and B (see Appendix F and G). Whilst the Water Mouse has been recorded in saline grassland where such habitat is located adjacent to mangrove forests (see species profile), saline grassland fringing the northern parts of Areas A and B (see Appendix G) could not be sensibly regarded as ecologically “adjacent” to the mangrove habitat (which is approximately two kilometers to the north of Areas A and B). Furthermore, these areas are unlikely to be effectively tidally influenced to the extent that habitat could be suitable for the Water Mouse.

There is a potential for indirect negative impacts (downstream and off-site) arising from operations with Areas A and B. These are associated with degraded of water quality and increased sediment loads leaving the study site. It is expected that, with implementation of best practice environmental management practices, any potential impacts to potential Water Mouse habitats can be controlled to a negligible level of impact to the species, if indeed it does occur within mangrove habitats to the north of the study site.

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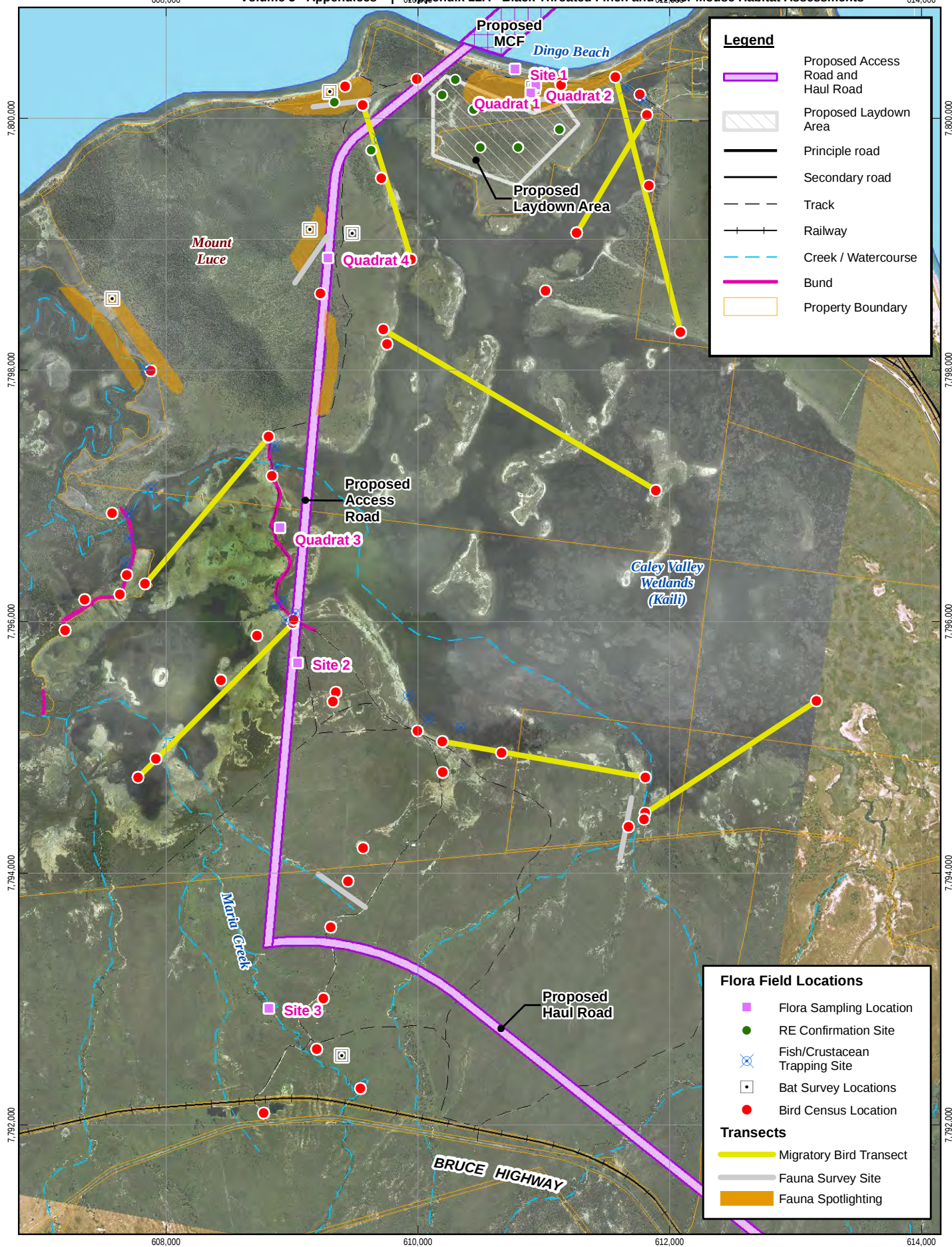
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Appendix A GHD 2009 Survey Area

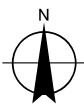
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0 500 1,000 1,500
Metres

Map Projection: Universal Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 55



North Queensland Bulk Ports Corporation
Abbot Point Multi Cargo Facility

Job Number 41-20549
Revision D
Date 22 DEC 2009

Flora and Fauna
Survey Locations

Figure 2-1

G:\41\20549\GIS\Projects\4120549_053_FloraFauna_rev_D.mxd

Level 4, 201 Charlotte St Brisbane QLD 4000 T 61 7 3316 3000 F 61 7 3316 3333 E bnemail@ghd.com.au W www.ghd.com.au

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Data Source: Geoscience Australia: Road, Rail - 250K; DERM: cadastre - 2009 and aerial - 1995. Created by: jvc,

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Appendix B Unidel 2011 Survey Area

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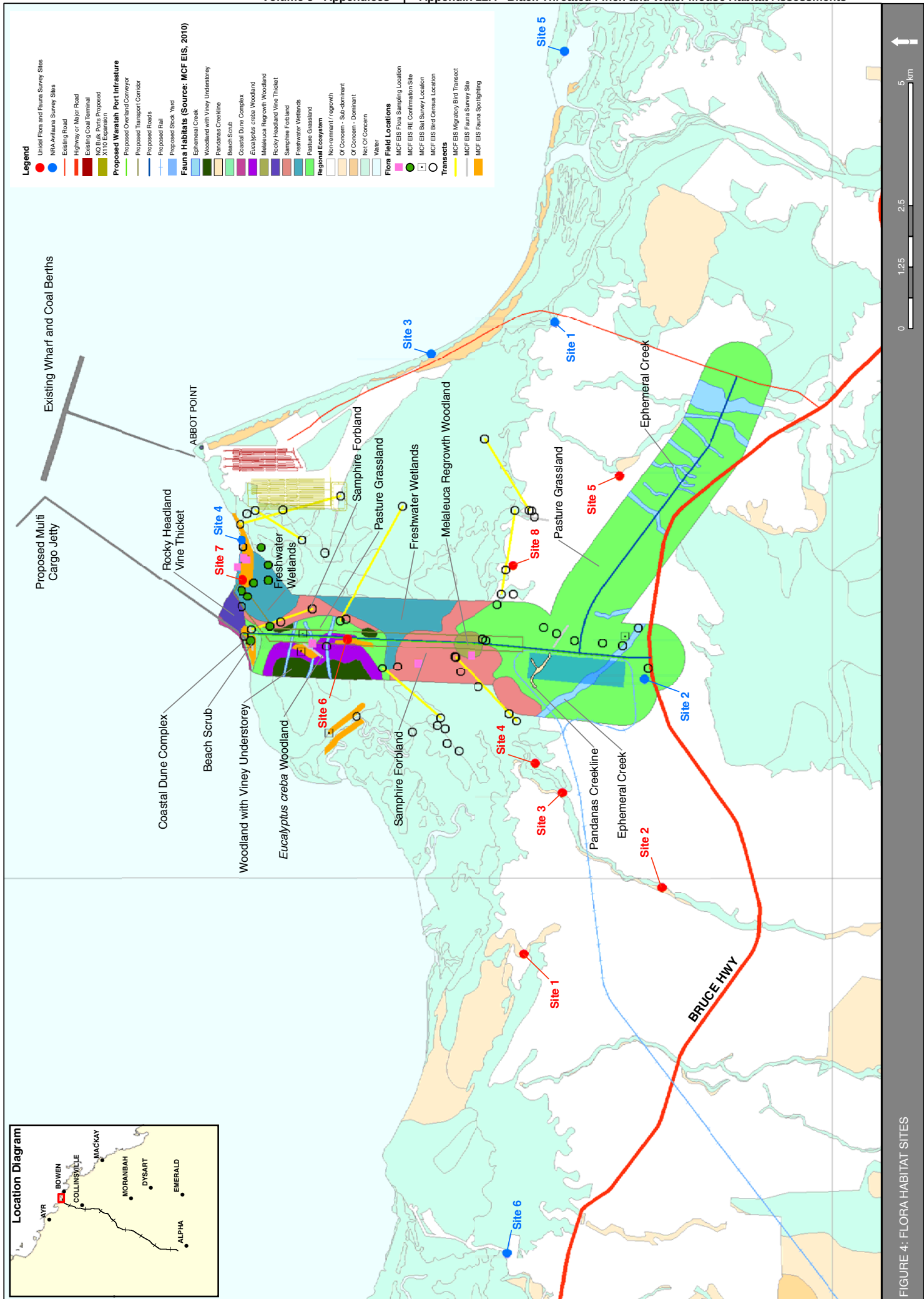


FIGURE 4: FLORA HABITAT SITES

Appendix C Parsons Brinkerhoff 2009 Survey Area

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Appendix D Habitat Photographs for Area A



Area A is characterised by extensive areas of dense and tall grassland (*note white roof of vehicle in centre of photograph below*)





The majority of Area A is dominated by dense, tall, sparsely treed pastures.





Representative examples of habitat adjacent to Splitters Creek on the western side of Area A.





Splitters Creek riparian environment – northern side of Area A. *Note presence of salt couch.*





Splitters Creek riparian environment – north-western corner of Area A.





Marle Creek riparian environment - eastern side of Area A



Appendix E Habitat Photographs for Area B



Area B is dominated by open grasslands similar to Area A, though also small patches of remnant regrowth, often dominated by paperbarks.





Areas of saline grassland adjacent to the northern parts of Area B



Appendix F Habitat Photographs for Area C



Examples of the dense and/or tall ground cover layer typical of a large part of Area C





Area C – part of the mapped remnant vegetation assessed. Above, *Allocasuarina leuhmannii* woodland (RE 11.3.32), and below, potential drinking point within Saltwater Creek and adjacent *Melaleuca viridiflora* dominated vegetation.





Within remnant vegetation, weed infestations mainly associated with watercourses and adjacent areas. Above, Wynn Cassia (*Chamaecrista rotundifolia*) dominates the ground cover up to 150m from watercourse. Below, with the same remnant area, low open grass cover dominated by native taxa (and suitable BTF foraging habitat).





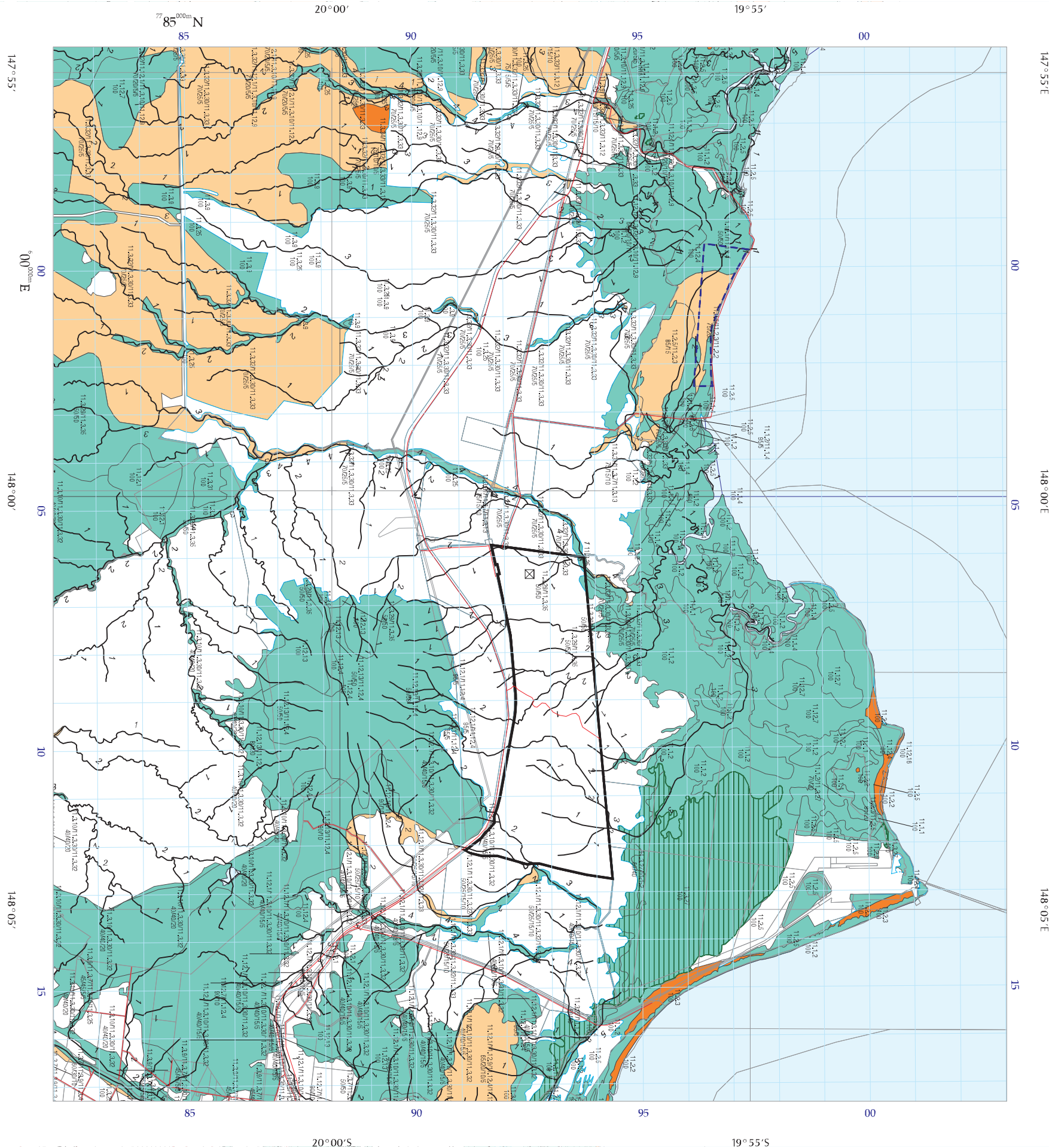
Habitat part of remnant vegetation mapped as RE 11.3.32/11.3.30/11.3.33



Appendix G DERM Certified RE Mapping

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Vegetation Management Act Regional Ecosystem and Remnant Map-Version 6

Remnant vegetation containing endangered regional ecosystems Based on 2006 Landsat TM imagery

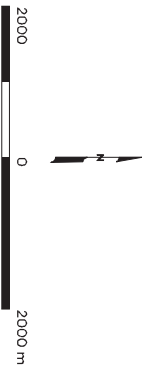
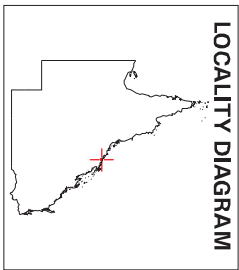
Requested By: LINDSAY@AUSTECOLOGY.COM.AU

Date: 13 Jun 11 Time: 15:20:20

Centered on point position: Latitude: -19.96054 Longitude: 148.016554 (decimal degrees)

Bioregion: Brigalow Belt

- Dominant
- Sub-dominant
- Remnant vegetation containing of concern regional ecosystems
- Dominant
- Sub-dominant
- Remnant vegetation that is a least concern regional ecosystem
- Remnant vegetation under Section 20AH of the VMA
- Non-remnant
- Plantation Forest
- Dam or Reservoir
- Remnant Vegetation
- PM/AV Category X area
- Great Barrier Reef Wetlands
- Vegetation Management Act Essential Habitat
- For further information on VMA Essential Habitat, please see the attached VMA Essential Habitat map.
- Subject Lot
- Watercourse (Stream order shown as black number against stream where available)
- Bioregion boundary
- Roads MapInfo Australia Pty Ltd 2009
- National Park, Conservation Area State Forest and other reserves
- Cadastral line
- Property boundaries shown are provided as a locational aid only.
- Towns
- Coordinate entered



Horizontal Datum: Geocentric Datum of Australia 1994 (GDA94)

A remnant map covers areas not covered by a regional ecosystem map.

Defined map areas are labelled with the regional ecosystem (RE) code along with the percentage breakdown if more than one RE occurs within the area. Detailed definitions of regional ecosystems are available from www.derm.qld.gov.au/REDD. Defined map areas smaller than 5ha may not be labelled.

Regional ecosystem linework has been compiled at a scale of 1:100 000, except in designated areas where a compilation scale of 1:50 000 is available. Linework should be used as a guide only. The positional accuracy of RE data mapped at a scale of 1:100 000 is +/-100 metres. The extent of remnant regional ecosystems as of 2006, depicted on this map is based on rectified 2006 Landsat TM imagery (supplied by the Statewide Landcover and Trees Study (SLATS), Department of Environment and Resource Management (DERM)).

Some watercourse lines are derived from GeoScience Australia 1:250 000 mapping.

Disclaimer:
While every care is taken to ensure the accuracy of this product, the Department of Environment and Resource Management and MapInfo Australia Pty Ltd, makes no representations or warranties about its accuracy, reliability, completeness or suitability for any particular purpose and disclaims all responsibility and all liability (including without limitation, liability in negligence) for all expenses, losses, damages (including indirect or consequential damage) and costs which you might incur as a result of the product being inaccurate or incomplete in any way and for any reason.

All datasets are updated as they become available to provide the most current information as of the date shown on this map.

Additional information is required for the purposes of land clearing or assessment of a regional ecosystem map or PM/AV applications. For further information go to the web site: www.derm.qld.gov.au/vegetation or contact the Department of Environment and Resource Management. Digital regional ecosystem data is available in shapfile format, for Lot on Plans from www.derm.qld.gov.au/REDDATA or from DERM for larger areas.

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