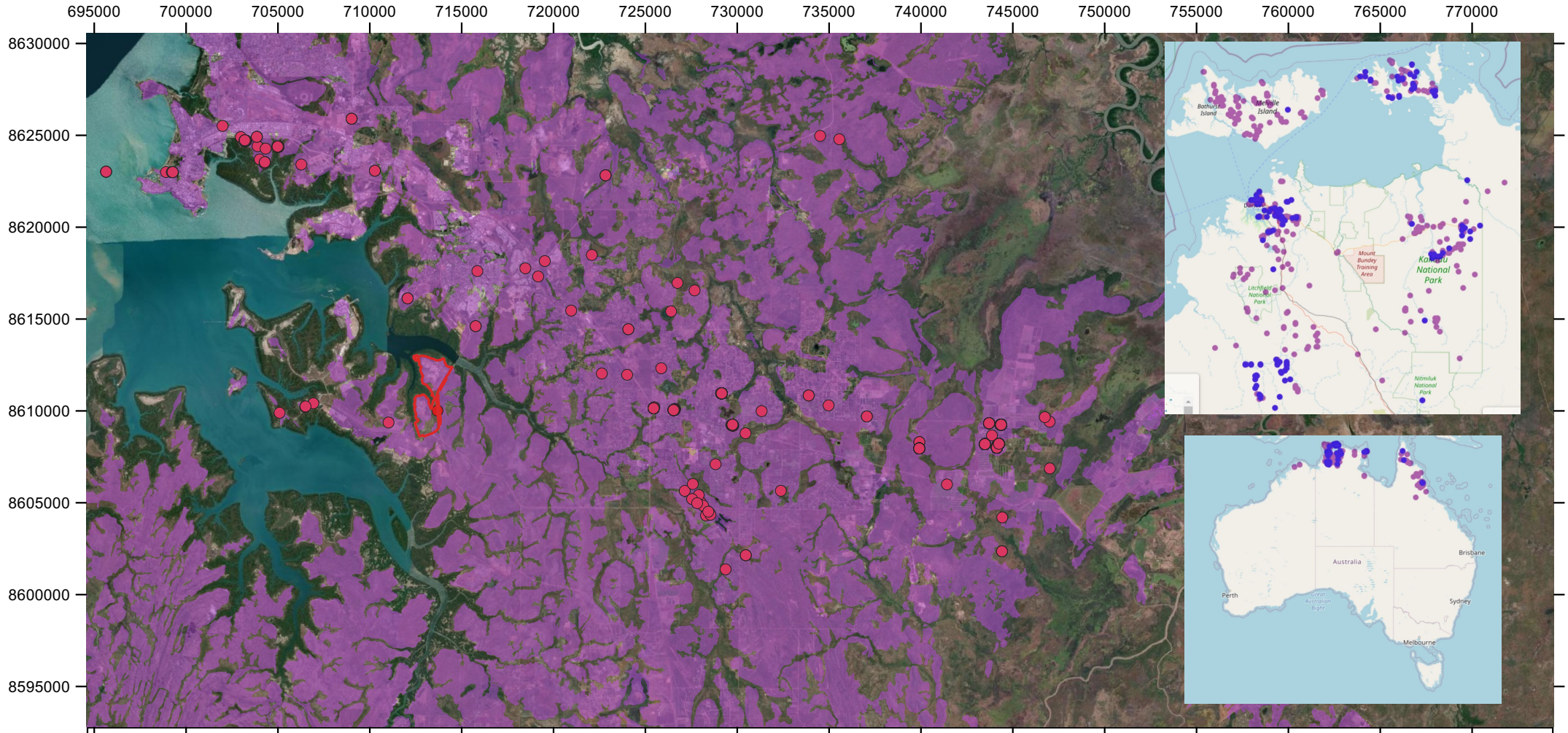

Figure 3-4. Distribution of Black-footed Tree Rat records in the Darwin Region and (inset) in the Top End of the NT and in Australia

Legend

NT Fauna Atlas records

Black-footed Tree Rat

Lot 1817 boundary

LANDUNIT_25K_SURVEY_DATA

Forest and woodland dominated by Eucalyptus miniata and E. tetrodonta

Inset: Source Atlas of Living Australia

All records

Records 2010-2020

0 2.5 5 km

eleanor@animalplantmineral.com.au

date: 21/07/2020

CRS: GDA94 MGA Zone 52

basemap: ESRI

Other disturbances at Lot 1817 that have reduced the quality of habitat for *M. g. gouldii* are:

- historic extraction industry activity that has disturbed 315 ha or 64.5 % of Lot 1817.
- fragmentation of the entire Lot 1817 by the presence of the Channel Island Road, the Adelaide Darwin Railway line, and the Elizabeth River.
- fragmentation within Lot 1817 by the cleared areas and roads.
- frequent human disturbance within Lot 1817 from unregulated access by the general public who use it for recreational purposes, such as off-leash dog walking, motorbike riding, and rally driving, as well as for illegal rubbish dumping, and intentional and accidental fires.
- frequent human disturbance within Lot 1817 for the planned maintenance of existing infrastructure, such as power lines and pipelines, road maintenance, slashing of 28.8 ha of land, and machinery and humans performing maintenance activities.
- poor rehabilitation of 61.5 ha, and no rehabilitation in 106.8 ha, with a high abundance of the weedy Gamba grass, known to exacerbate the risk and intensity of fires
- the presence of introduced fauna, such as Feral Cats and Dogs, that compete for prey and pose risks to *M. g. gouldii*

3.1.3.5 Threatening Processes

Key threats facing this species include inappropriate fire regimes; predation by Feral Cats and, potentially, wild Dogs/Dingoes; habitat loss and fragmentation; and exotic invasive grasses changing vegetation structure and leading to altered fire regimes. This species is also potentially threatened by Cane Toads. It has been suggested are *M. g. gouldii* is relatively common in the Darwin area because of the favourable fire regime. Less frequent/intense fires are less likely to destroy valuable tree hollows and understorey cover (Hill, 2012; TSSC, 2015b).

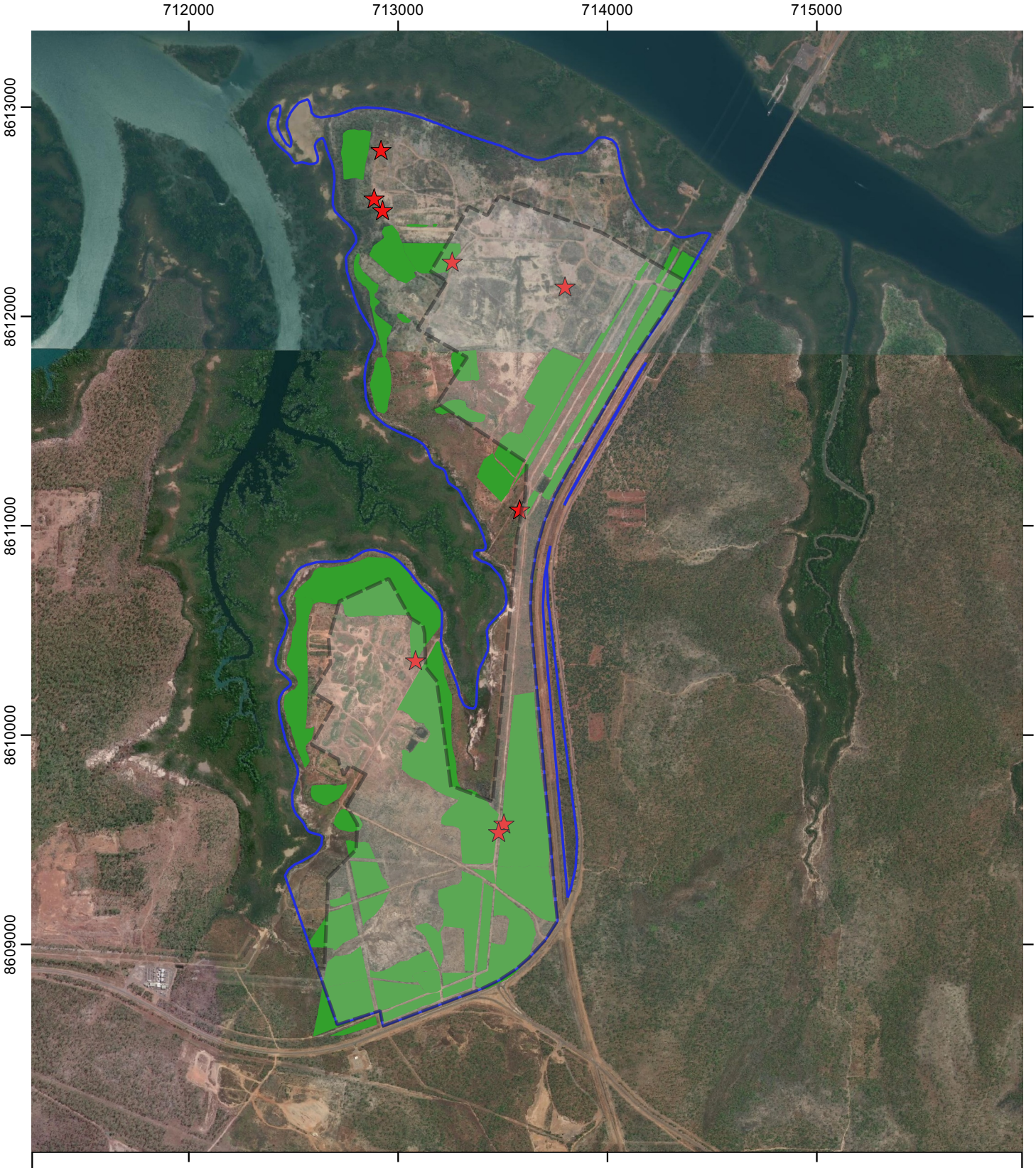

Figure 3-5. Distribution of Black-footed Tree-rat records in Lot 1817 and suitable habitat in relation to the Development Envelope

Legend

Site fauna survey records

Black-footed Tree-rat

Fauna habitat mapping

Eucalyptus woodland

EIS Supplement Development Envelope

Lot 1817 boundary

0 250 500 m

eleanor@animalplantmineral.com.au
date: 20/01/2021
CRS: GDA94 MGA Zone 52
basemap: ESRI

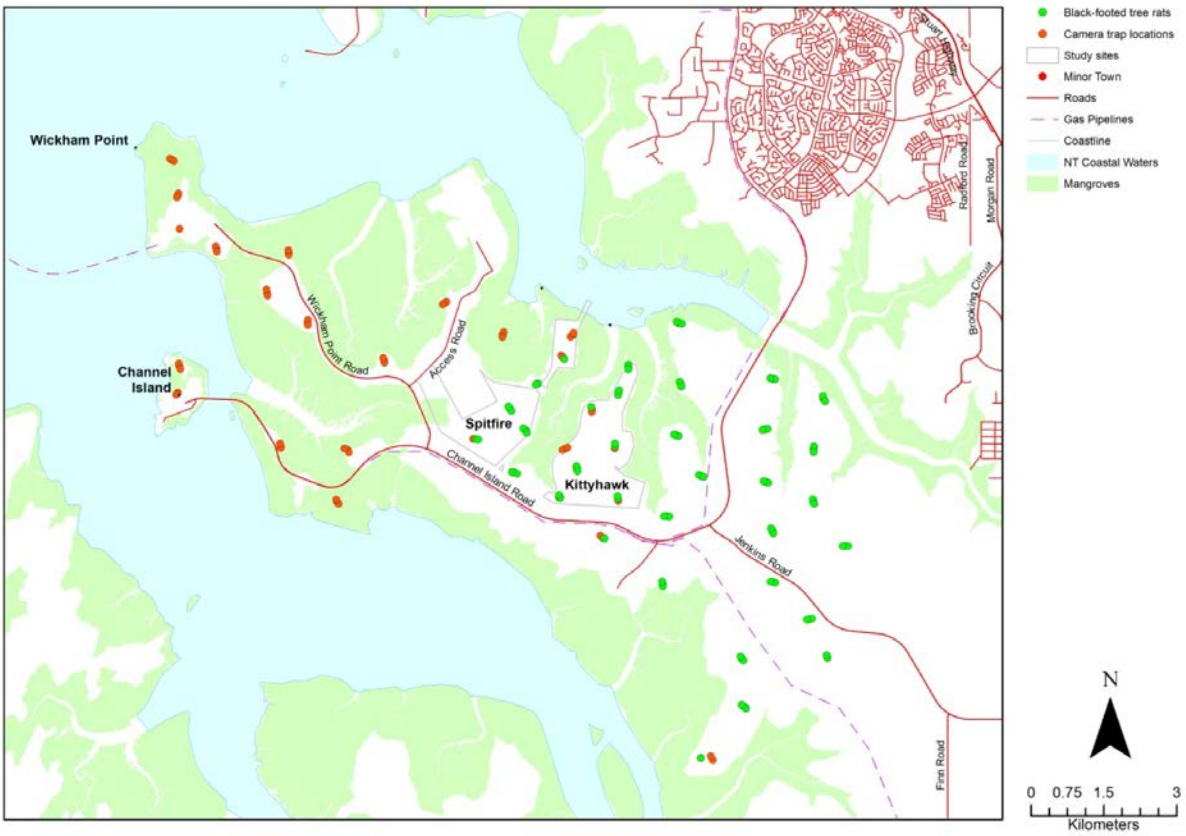

Figure 3-6. Black-footed Tree-rat locations recorded by DEPWS Flora and Fauna Division on Middle Arm

3.1.4 *Rattus tunneyi* – Pale Field Rat

3.1.4.1 Description

Rattus tunneyi is a medium-sized rodent, averaging weights of 86 g. It has shiny, pale brown fur above, and yellow-grey to cream fur below, with large, protruding eyes, pale brown ears, a broad, rounded head, and white feet. The tail is shorter than the head-body length, and has dark scale rings (Young & Hill, 2012).

3.1.4.2 Distribution and Habitat

This species is restricted to higher rainfall areas of Australia, having previously occurred in arid and semi-arid areas, and temperate southwest Australia. Along the north coast, the range extends from the west Kimberley, WA to the west Gulf of Carpentaria, QLD, with populations on several nearshore islands in the Pilbara, WA (**Figure 3-7**). While it is notable on islands in the Pilbara, it has only been recorded from a few islands in the NT (Menkhorst & Knight, 2011; Young & Hill, 2012).

Rattus tunneyi inhabits a range of dense environments, including tall grasslands, woodlands, and monsoon forests, usually near small, often seasonal, watercourses, such as creeks. In Kakadu National Park, it is known to occupy rocky slopes (Menkhorst & Knight, 2011; Van Dyck & Strahan, 2008; Young & Hill, 2012).

The species is known to occur in the Darwin region, including in Charles Darwin National Park (Young &Hill, 2012). There are also two records of this species less than 10 km west of Lot 1817, one from 2001 and one from 2014 (**Figure 3-7**).

3.1.4.3 Suitable Habitat in Relation to the Project Area

Three records were made from the same location within the Monsoon Closed Forest habitat in Lot 1817 during a survey by GHD in 2017 (**Figure 3-8**). The species was not recorded in subsequent surveys in 2018 and 2019.

Habitat suitability within Lot 1817 is high in the remnant Monsoon closed forest. Whilst the species is known to inhabit Mixed Woodland and Melaleuca woodland, habitat suitability in the habitat types in the Study Area is low as vegetation is not dense and/or is lacking seasonal water courses. In the disturbed areas where seasonal water is available there is no dense vegetation and the sandy/lateritic surface soil has been removed and the clay rich subsoil is at the surface – this is unsuitable for Pale Field Rat tunnelling.

Disturbances at Lot 1817 that have reduced the quality of habitat for *Rattus tunneyi* are:

- historic extraction industry activity that has disturbed 315 ha or 64.5 % of Lot 1817, and removed surface soils suitable for tunnelling.
- alteration of surface hydrology and possible reduction of surface water flows.
- fragmentation of the entire Lot 1817 by the presence of the Channel Island Road, the Adelaide Darwin Railway line, and the Elizabeth River.
- fragmentation within Lot 1817 by the cleared areas and roads.
- frequent human disturbance within Lot 1817 from unregulated access by the general public who use it for recreational purposes, such as off-leash dog walking, motorbike riding, and rally driving, as well as for illegal rubbish dumping, and intentional and accidental fires.
- frequent human disturbance within Lot 1817 for the planned maintenance of existing infrastructure, such as power lines and pipelines, road maintenance, slashing of 28.8 ha of land, and machinery and humans performing maintenance activities.
- poor rehabilitation of 61.5 ha, and no rehabilitation in 106.8 ha, with a high abundance of the weedy Gamba grass, known to exacerbate the risk and intensity of fires.
- the presence of introduced fauna, such as Feral Cats and Dogs, that pose predation risks to *R. tunneyi,* and feral pigs that reduce habitat quality.

3.1.4.4 Ecology

Rattus tunneyi is nocturnal, sheltering during the day in complex, shallow burrows, with four or five entrances. Burrows are usually in loose sandy soil, a requirement that may be a limiting factor in the local distribution of the species. Termite mounds may also be used for burrows, presumably to avoid flooding during the wet season (Van Dyck & Strahan, 2008; Young & Hill, 2012). The diet of *R. tunneyi* consists of grass stems, seeds, and roots. In Kakadu National Park, it specialises on shoot-bases from *Alloteropsis* grasses, Sorghum seeds, *Pandanus* roots, and some sedges. During the dry season, it forages on grass seeds trapped in sandstone outcrops (Van Dyck & Strahan, 2008; Young & Hill, 2012).

In the NT, this species breeds between January and August, typically during the dry season. Several litters may be raised per year, with a gestation period of 21-22 days. While females have 10 teats, between two and 11 pups may form a litter, with average litter sizes in the NT of four pups (Van Dyck & Strahan, 2008; Young & Hill, 2012).

3.1.4.5 Threatening Processes

While no single threat has been demonstrated to have caused the declines seen in *R. tunneyi*, it is likely that ongoing inappropriate fire regimes and predation by Feral Cats are both contributing substantially. Additionally, its favoured creek-lined habitats are susceptible to degradation from introduced mammals, including Rabbits and domestic livestock (Van Dyck & Strahan, 2008; Young & Hill, 2012).

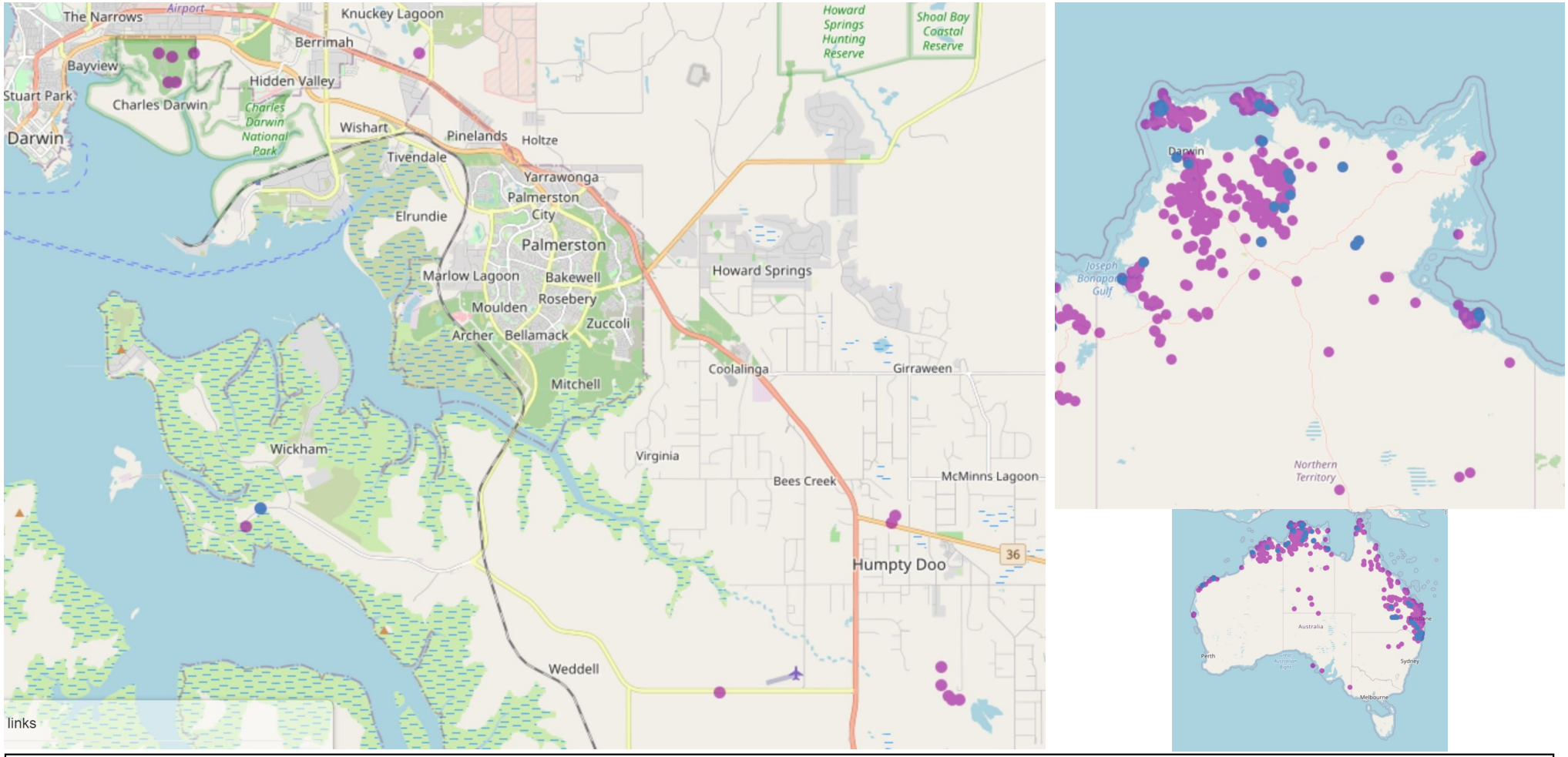

Figure 3-7. Distribution of Pale Field Rat locations in the Darwin Region and (inset) in the Top End of the NT and in Australia

Legend

Source Atlas of Living Australia
- All records
- Records 2010-2020

eleanor@animalplantmineral.com.au
date: 21/07/2020
CRS: GDA94 MGA Zone 52

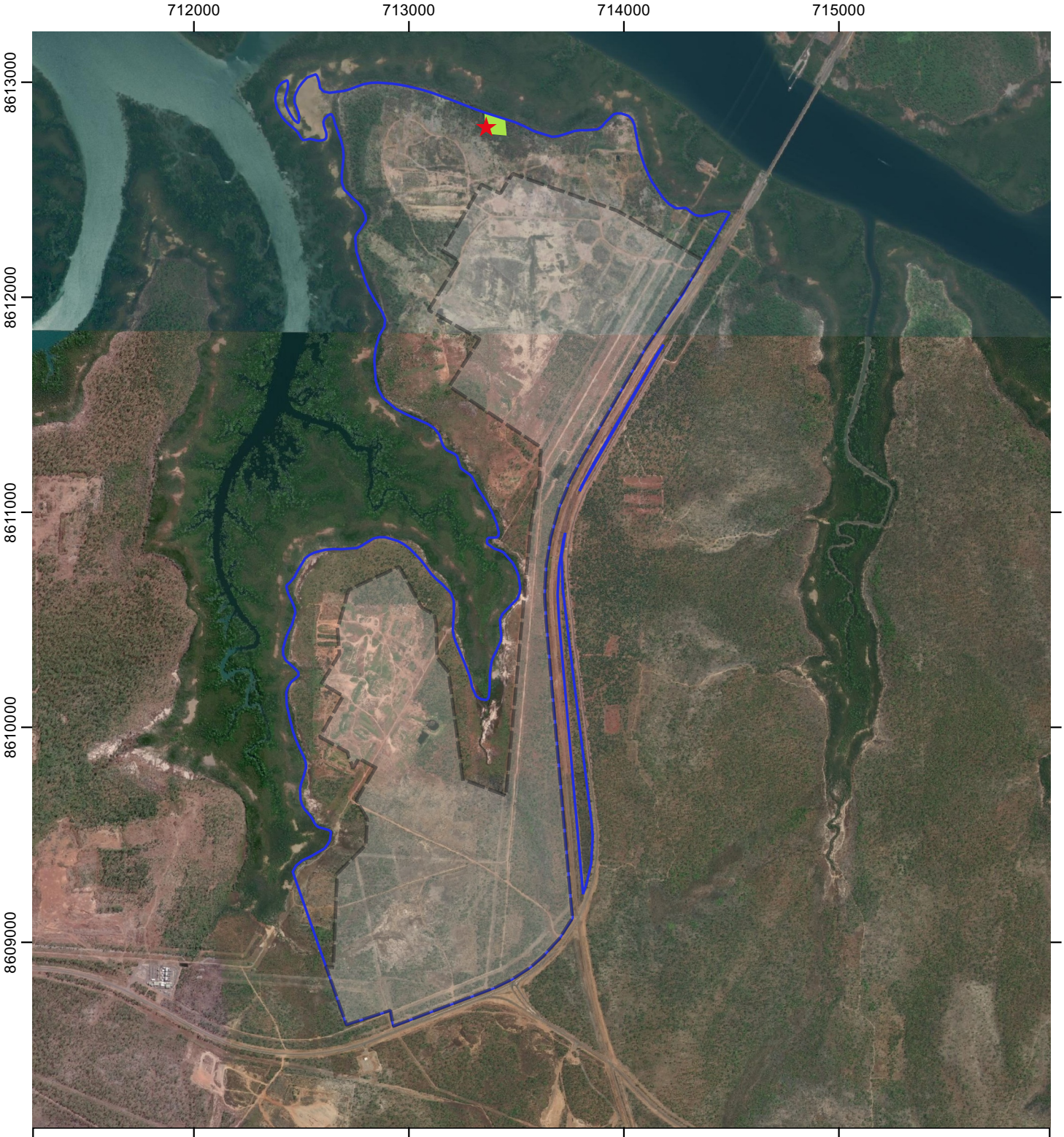

Figure 3-8. Distribution of Pale Field Rat records in Lot 1817 and suitable habitat in relation to the Development Envelope

Legend

Fauna habitat mapping

Monsoon Closed Forest

Site fauna records

Pale Field-rat

EIS Supplement Development Envelope

Lot 1817 boundary

0 250 500 m

eleanor@animalplantmineral.com.au
date: 20/01/2021
CRS: GDA94 MGA Zone 52
basemap: ESRI

3.1.5 *Uperoleia daviesae* – Howard River Toadlet

3.1.5.1 Description

Uperoleia daviesae is a small (17 – 23 mm snout-vent length) frog with a distinctive call. The dorsal surface has pale brown tubercles, surrounded by black, and a narrow yellow to pale red stripe running along the spine. The ventral surface is cream, and the groin is orange-red. It has unfringed toes that have only basal webbing (Ward, Young & Hill, 2012; Young, Tyler & Kent, 2005). It was discovered in 2000 and first described five years later by Young, Tyler and Kent (2005).

3.1.5.2 Distribution and Habitat

This species is endemic to the NT, where it is likely confined to the Howard and Elizabeth River Catchments (**Figure 3-9**). It appears to be specialised in its habitat requirements and is confined to sandsheet heathland (areas of sandy soils with short vegetation that is inundated in the wet season), often associated with alluvial plains, drainage lines, and seepage zones in the two river catchments (Ward, Young & Hill, 2012).

Within Darwin Harbour, it has been recorded at least four times in Lot 1816 (less than 1 km from the Project area).

3.1.5.3 Suitable Habitat in Relation to the Project Area

There have been 15 unconfirmed records of this species within the Project area during surveys by GHD in 2017, however they were made by visual assessment and in Melaleuca woodland. Visual assessment is not a suitable method for identifying the species and Melaleuca woodland is not the known preferred habitat of the Howard River Toadlet, which is sand sheet heath. Targeted surveys with audio (call) playback are required to verify the identification, as its short raspy call of 22 pulses distinguishes it from other sympatric species of *Uperoleia* (Young, Tyler and Kent 2005).

There is no sandsheet heath habitat present in Lot 1817. Previous use of Lot 1817 for extractive industries has removed the sand and laterite layer from much of the area. Land unit mapping identifies the Lot as being Eucalypt woodland prior to disturbance, however some small scale sandsheet heath areas may have occurred. The combination of these factors makes the likelihood of the Howard River Toadlet at Lot 1817 a Low likelihood.

The disturbance by the former extractive industries has made significant changes to the substrate and hydrology of the lot and no suitable habitat for the Howard Springs Toadlet is currently present.

3.1.5.4 Ecology

Uperoleia daviesae is poorly known. Typically, males are found calling in small numbers amongst choruses of other more common frogs. It is nocturnal and terrestrial (Ward, Young, & Hill, 2012).

3.1.5.5 Threatening Processes

As it is understudied, threats facing this species are not well understood. However, the Elizabeth and Howard River Catchments, where the species seems to be confined, are threatened by urban expansion and sand mining (Ward, Young, & Hill, 2012).

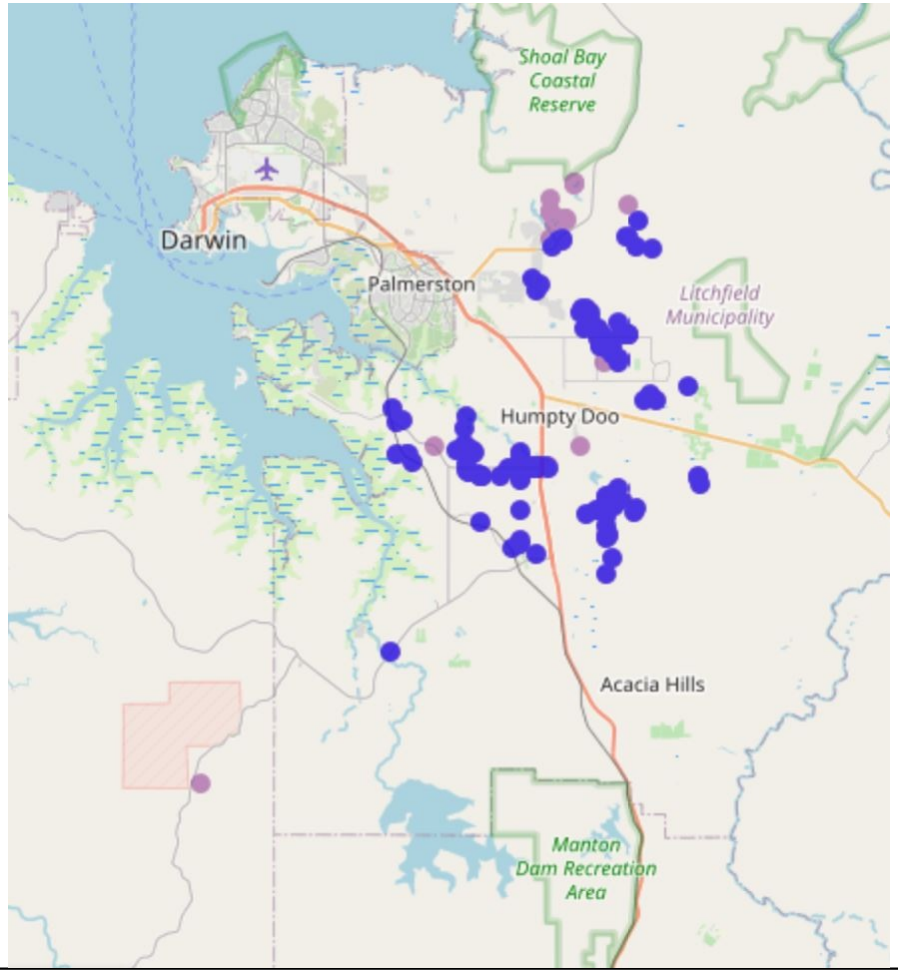

Figure 3-9.Distribution of Howard River Toadlet records in the Darwin Region and in the Top End of the NR

Legend

Source Atlas of Living Australia

- All records
- Records 2010-2020

eleanor@animalplantmineral.com.au
date: 21/07/2020
CRS: GDA94 MGA Zone 52

3.1.6 Migratory species

The migratory species that have been recorded in the study area are listed in **Table 3-1** with descriptions of their distribution, habitat and socialness and the suitability of the Project site.

Table 3-1. Migratory species recorded in the Study area

Scientific (common) name	Distribution, Habitat, Socialness	Suitability of Project site
Fork-tailed Swift *Apus pacificus*	**Distribution:** non-breeding migrant to all states and territories of Australia. Widespread, but scattered, records in the north of the NT, as well as some isolated records further south. **General habitat:** almost exclusively aerial. It occurs over inland plains, and sometimes above coastal areas. It mostly occurs over dry or open habitats, including riparian woodland and tea-tree swamps, low scrub, heathland, or saltmarsh. It is also found over treeless grasslands and sandplains covered with spinifex, open farmland, and coastal sand-dunes. **Foraging habitat:** forages aerially on insects above open areas or over water, and occasionally among tree-tops in open forest. Large flocks often precede or follow low pressure systems in search of food. **Roosting habitat:** probably roosts aerially but has occasionally been observed to land. It is known to sometimes loaf in the air by allowing strong winds to support it. **Socialness:** gregarious. It is often recorded feeding in flocks of 10 to 1,000 birds (DAWE 2020).	**Present.** An individual was recorded in the Project area during the APM 2019 survey. Suitable habitat exists over the site and adjacent water.
Common Sandpiper *Actitis hypoleucos*	**Distribution**: coastlines of Australia, and inland. Populations are concentrated in northern and western Australia. Darwin area was previously a nationally significant site, but not with the updated estimates. **General habitat**: wetlands of varying salinity levels. Found around muddy margins or rocky shores, and rarely on mudflats. The muddy margins are often narrow and may be steep. It is often associated with mangroves and is sometimes found in areas of mud littered with rocks. **Foraging habitat**: forages in shallow water and on bare soft mud at the edges of wetlands, often where obstacles project from the substrate, e.g. mangrove roots. **Roosting habitat**: roosts on rocks or in roots or branches of vegetation, especially mangroves. Known to perch on posts, jetties, and other artificial structures. **Socialness**: often found singly or in small groups; it will form flocks of up to 200 individuals before migration. It avoids congregations of the more gregarious waders (DAWE 2020).	**Present**. During APM and GHD surveys in 2016, 2018, and 2019, this species was recorded 116 times. Additionally, there were 26 records of this species in the Darwin area from the GHD 2016 survey. Suitable general habitat exists on the site. There is limited foraging habitat but plentiful roosting habitat. All available habitat is high quality. Non-breeding adults and immature individuals are likely to use the site during the non-breeding season (July – May).
Whimbrel *Numenius phaeopus*	**Distribution**: found around the coast of Australia, predominantly in the north, with scattered inland records. In the NT, it is found around the coast of the Top End, and sometimes follows rivers inland. Lilleyman *et al.* (2020) recorded a Nationally Significant Aggregation of this species in the Middle Arm of Darwin Harbour in November and December of 2019.	**Present**. There were 34 records of this species within the Project area during APM and GHD 2016 and 2018 surveys, as well as 20 records from the Greater Darwin area in the GHD 2016 survey.

Scientific (common) name	Distribution, Habitat, Socialness	Suitability of Project site
	General habitat: inhabits intertidal mudflats of sheltered coasts, as well as harbours, lagoons, estuaries, and river deltas, especially those with mangroves or open, unvegetated mudflats. **Foraging habitat**: forages on intertidal mudflats, along the muddy banks of estuaries and in coastal lagoons, either in open, unvegetated areas or among mangroves. **Roosting habitat**: it is one of a small group of shorebirds that regularly roost in mangroves and other structures flooded at high tide. It often roosts in the branches of mangroves around mudflats, and may also roost on the ground under mangroves (DAWE 2020).	An additional record exists from habitat adjacent to the site, as well as Lot 1111 and East Arm Wharf on NR Maps Fauna Atlas. Suitable general, foraging, and roosting habitat exists in the mudflats and mangroves adjacent to the Project area. All available habitat is high quality. Non-breeding adults and immature individuals are likely to use the site during the non-breeding season (August – April), while immature individuals may remain at the site throughout the austral winter (*i.e.* year-round until they sexually mature).
Common Greenshank *Tringa nebularia*	**Distribution**: known to have the widest distribution of any migratory shorebird in Australia. In the NT, it is sparsely scattered throughout most of the state. **General habitat**: inhabits a wide variety of inland wetlands and sheltered coastal habitats of varying salinity. In coastal areas, it prefers large mudflats, with saltmarsh, mangroves, or seagrass in embayments, harbours, river estuaries, deltas, and lagoons. It also uses artificial wetlands, including sewage farms and saltworks dams. **Foraging habitat**: forages at the edges of wetlands, in soft mud of mudflats, or in shallows around the edges of water among mangroves or other sparse, emergent, or fringing vegetation. **Roosting habitat**: roosts and loafs around wetlands, in shallow pools and puddles, or slightly elevated on rocks, sandbanks, or muddy islets. **Socialness**: seen singly, or in small to large flocks, up to several hundred individuals (DAWE 2020).	**Present**. There were 19 records of this species in the Project area during the APM and GHD 2016, 2018, and 2019 surveys, as well as nine records during the 2016 survey of the Greater Darwin area. There are also records from Lot 1111 and East Arm Wharf on NR Maps Fauna Atlas. Suitable general, foraging, and roosting habitat exists in the mudflats and mangroves adjacent to the Project area. All available habitat is high quality. Non-breeding adults and immature individuals are likely to use the site during the non-breeding season (August – May).
Little Tern *Sternula albifrons*	**Distribution:** The Little Tern has a worldwide range, and in Australia there are three separate populations: one which breeds on beaches on the coasts of eastern and south-eastern Australia, another which breeds in northern Australia (Cape York Peninsula and the Top End), and a third which breeds in Asia, and then migrates to spend its non-breeding season in Australia, where it may intermingle with local birds.	**Present:** Two records in 2018 from within the Study Area. Suitable foraging habitat in the Elizabeth River. No suitable breeding habitat.

Scientific (common) name	Distribution, Habitat, Socialness	Suitability of Project site
	General Habitat: The Little Tern is mainly coastal, being found on beaches, sheltered inlets, estuaries, lakes, sewage farms, lagoons, river mouths and deltas **Foraging Habitat:** All populations of Little Terns forage by plunging into shallow water, taking small fish from on or just below the water's surface. **Roosting habitat:** The nest is a shallow scrape in sand or shingle, usually just above the high tide mark on sandy shores **Socialness:** The Little Tern breeds in small colonies.	
Oriental Cuckoo *Cuculus optatus*	**Distribution**: The Oriental Cuckoo is found throughout coastal regions of northern and eastern Australia. This species is a regular non-breeding migrant in northern Australia from September to May but is uncommon. **General Habitat:** monsoon forests and rainforest edges, river flats, roadsides, and mangroves. **Foraging habitat:** Forages in the upper to mid-levels of mixed woodland forests.	**Present.** 1 record in 2018. Suitable foraging habitat exists in the mangroves and Eucalypt woodland habitats. No suitable breeding habitat.
Eastern Osprey *Pandion cristatus*	**Distribution:** widespread around northern coast of Australia, from Esperance, WA to NSW, and scattered records in Victoria and Tasmania. The breeding range extends around the north of Australia from Albany, WA to Lake Macquarie, NSW, with an isolated population on the coast of SA. **General habitat:** occurs in littoral and coastal habitats, and terrestrial wetlands of tropical and temperate Australia. It requires extensive areas of open fresh, brackish, or saline water for foraging. It frequents a variety of wetland habitats, including inshore waters, reefs, bays, coastal cliffs, beaches, estuaries, mangrove swamps, broad rivers, reservoirs, and large lakes and waterholes. Also known to occur over habitats such as heath, woodland, or forest when travelling to and from foraging sites. **Foraging habitat:** typically forages by soaring, quartering, or circling above a body of water and scanning below for fish. Also occasionally searches for prey from perches and may snatch birds in flight. **Nesting habitat**: nests in dead or partly dead trees or bushes on cliffs, rocks, rock stacks, islets, or on the ground on rocky headlands, coral cays, deserted beaches, sandhills, or saltmarshes, and on artificial nest platforms, including cranes, navigation towers, and pylons. Mature adults are mostly resident or sedentary around breeding territories. **Socialness**: breeds in monogamous pairs.	**Present**. There was one record of this species in the Project area during the APM 2018 survey, as well as one record during the GHD 2016 survey of the Greater Darwin area. There are also records from Lot 1111, East Arm Wharf, and Channel Island Road Bridge on NT Fauna Atlas. Suitable general and nesting habitat exists in the Project area.
Saltwater Crocodile *Crocodylus porosus*	**Distribution:** Occur on the coast of WA, the NT and Qld with the southern distribution limited by temperature. There is estimated to be over 100,000 saltwater crocodiles in the NT. **General habitat:** The saltwater crocodile is a mostly aquatic animal that spends little time on dry land. Saltwater crocodiles inhabit coastal rivers and wetlands, the open sea and island	**Present.** One record in 2016 from the marine environment within the Study Area.

Scientific (common) name	Distribution, Habitat, Socialness	Suitability of Project site
	shorelines, and extend well inland via major rivers and floodplain billabongs into freshwater rivers, creeks and swamps. **Foraging habitat:** Estuaries, ocean, rivers, mangroves. **Nesting habitat:** Females build nests in Riparian areas.	

3.2 SPECIES LIKELY TO OCCUR IN THE STUDY AREA

Other species of conservation significance may occur in the Study Area despite not having yet been recorded. Based on the occurrence of nearby records and the types of habitats present in the Study Area, a further 7 species of conservation significance identified in the desktop reviews (APM 2019, O2M 2019) are considered "Likely" to occur within the Study Area. These are:

- Red Knot (*Calidris canutus)* (EN and Mi under the EPBC Act, VU under the TPWC Act)
- Curlew Sandpiper (*Calidris ferruginea*) (CR and Mi under the EPBC Act, VU under the TPWC Act)
- Great Knot (*Calidris tenuirostris)* (CR and Mi under the EPBC Act, VU under the TPWC Act)
- Lesser Sand Plover (*Charadrius mongolus)* (EN and Mi under the EPBC Act, VU under the TPWC Act)
- Bar Tailed Godwit (Mi under the EPBC Act, VU under the TPWC Act)
- Northern Quoll (*Dasyurus hallucatus)* (EN under the EPBC Act, CR under the TPWC Act)
- Yellow Spotted Monitor (*Varanus panoptes)* (VU under the TPWC Act)

The Bare-rumped Sheath-tailed Bat (*Saccolaimus saccolaimus nudicluniatus*; VU under the EPBC Act) was considered Unlikely to occur, as suitable habitat is present but no records had been made of the species within a 10 km radius. Subsequent to the Biological survey report (APM 2019), correspondence with the DEPWS Flora and Fauna Division identified that the species has been recently recorded on Middle Arm. The species is now considered Likely to occur.

Each of these species are discussed in further detail below.

3.2.1 *Calidris canutus* – Red Knot

3.2.1.1 Description

Calidris canutus is a small to medium charadriiform bird, reaching 25 cm in length, a wingspan up to 54 cm, and weight of 120 g. It is a robust shorebird, with a short neck and relatively long wings. The non-breeding plumage is brown-grey on the upper body, with dark markings on the head and neck, and white colouration on the underbody. The breeding plumage is varied, differing between subspecies, but is largely rufous in colour. In all plumages, there is an obvious white bar on the wing, and light patch on the rump and upper tail.

3.2.1.2 Distribution and Habitat

This species occurs globally and has an extensive range. Breeding populations occur in North America, Russia, and Greenland, while non-breeding populations reach most continents. Australia hosts the majority of the population during the non-breeding period. In Australia, eight sites of international importance have been identified, including Roper River area in the NT (TSSC, 2016a).

Calidris canutus is common around the Australian coast, where suitable habitat exists. This species typically inhabits intertidal mudflats, sandflats, and sandy beaches of sheltered coasts. It has also been recorded on sandy ocean beaches, shallow pools on exposed rock platforms, and terrestrial wetlands near the coast. During low

tide, it forages in exposed soft substrate on intertidal mudflats and sandflats. At high tide, it forages at nearby lakes, sewage ponds, and floodwaters. The species roosts on sandy beaches, spits and islets, and mudflats, preferentially in open areas (to avoid ambush by predators) near feeding areas (TSSC, 2016a).

This species is considered likely to be an occasional visitor to the suitable habitat in the Elizabeth River adjacent to the Project. The species was not recorded in the Study Area during avifauna surveys by APM in 2018 and 2019. The NT Fauna Atlas includes 24 records within the Darwin Harbour, shown in **Figure 3-10**, the closest records being at the Palmerston Sewage Treatment Ponds 4 km north of Lot 1817. Lilleyman *et al.* (2018) recorded the species across the Darwin Harbour Proper as part of the 'small birds' collection which included 167 combined records of 10 species.

The EAAF population is estimated as 110,000 birds, the Australian population is estimated at 61,000 birds and the NT population estimated as 24,200 birds (Table 2-2). BirdLife Australia (2020) report the annual monitoring from five locations between East Point and Lee Point-Buffalo Creek as part of the National Shorebird Monitoring (former Shorebirds 2020 Project). They report a maximum of 36 records for the species from a single survey period. It is unlikely that the Darwin Harbour is a nationally significant aggregation of this species.

3.2.1.3 Suitable habitat in relation to the Project area

The intertidal mudflats and sandflats in the Elizabeth River adjacent to Lot 1817 are suitable foraging habitat for *C. canutus*. While not specifically recorded as doing so, this species may roost in saltpan areas, such as those present in Lot 1817, due to a lack of preferred roosting habitat in the Darwin Harbour. *Calidris canutus* does not breed in Australia, so there is no suitable breeding habitat. Given recent survey data (BirdLife Australia, 2020; Lilleyman *et al.*, 2018), aggregations (*i.e*. occurrences of ≥ 0.1 % of the total global population) are unlikely to occur in the Darwin Harbour.

Habitat in the intertidal mudflats and sandflats in Darwin Harbour Proper are considered to be in pristine condition. The saltpan area within Lot 1817 is intact, however it is unknown how the condition has been previously impacted by the historic use of Lot 1817 for extractive industries and the unregulated access of humans, dogs, motorbikes and invasive fauna such as cats and pigs. The site hydrology has been altered by the former extractive industry where the upper lateritic aquifer material has been removed and soil bunding has been left in many places which is likely to have altered the natural surface and subsurface hydrological processes on the site.

3.2.1.4 Life History and Migration Patterns

The species can breed by 2 years of age and live more than 18 years. Breeding occurs in northern Siberia and Alaska during the boreal summer. During this time, individuals lay 3-4 eggs, which are incubated for 21-22 days. Fledging occurs after 18-20 days. It is gregarious and is often recorded in mixed-species flocks (TSSC, 2016a).

At the conclusion of the breeding season, the species migrates south, along the EAAF, to areas approximately 50 °S. The EAAF is a migratory corridor connecting 22 countries between Alaska and Siberia in the north, and Australia and New Zealand in the south. Typically, only a few staging areas are utilised on the migration southwards; the species is capable of flying non-stop between northeast China and northern Australia. Although, notably, the Yellow Sea is considered critical stopover habitat for the species during migration periods. Most individuals reach the northwest coast of Australia during late August. Some individuals continue moving south, arriving in southwest Australia around September. The return to breeding grounds begins in Tasmania, from February to May, followed by aggregations in southeast Australia, from late February to early April. Aggregations depart northwest Australia from late March to late April. Some individuals overwinter in Australia, largely in the north (TSSC, 2016a).

3.2.1.5 Diet and Feeding Behaviour

Calidris canutus is omnivorous, with worms, bivalves, gastropods, and echinoderms forming its primary diet in Australia. It is both diurnal and nocturnal (TSSC, 2016a). Feeding behaviour is influenced by the tide, with limited foraging immediately before and after high tide and has been recorded following the receding tide-edge while