



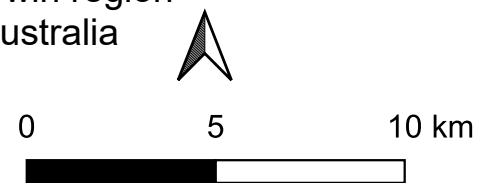
Figure 3-17. Distribution of Bare-rumped Sheathtail Bat habitat in the Darwin region and (insets) records in the Darwin region, Top End of the NT and in Australia

Legend

- Lot 1817 boundary
- LANDUNIT\_25K\_SURVEY\_DATA\_polygon
- Forest and woodland habitats

Insets: Source Atlas of Living Australia

- All records
- Records 2010-2020



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 date: 21/07/2020  
 CRS: GDA94 MGA Zone 52  
 basemap: ESRI

### 3.3 SPECIES POSSIBLY OCCURRING IN THE STUDY AREA

Threatened species that possibly occur within the Study Area are:

- Fawn Antechinus (*Antechinus bellus*) (VU under the EPBC Act, EN under the TPWC Act)
- Ghost Bat (*Macroderma gigas*) (VU under the EPBC Act)
- Mertens Water Monitor (*Varanus mertensi*) (VU under the TPWC Act)

Species listed as Mi under the EPBC Act that possibly occur in the Study Area are:

- Barn Swallow (*Hirundo rustica*)
- Sharp-tailed Sandpiper (*Calidris acuminata*)
- Pectoral Sandpiper (*Calidris melanotos*)
- Oriental pranicole (*Glareola maldivarum*)
- Oriental Plover (*Charadrius veredus*)
- Ruddy turnstone (*Arenaria interpres*)
- Sanderling (*Calidris alba*)
- Red-necked Stint (*Calidris ruficollis*)
- Long-toed Stint (*Calidris subminuta*)
- Little Ringed Plover (*Charadrius dubius*)
- Asian Dowitcher (*Limnodromus semipalmatus*)
- Black-tailed Godwit (*Limosa limosa*)
- Little Curlew (*Numenius minutus*)
- Pacific Golden Plover (*Pluvialis fulva*)
- Grey Plover (*Pluvialis squatarola*)
- Wood Sandpiper (*Tringa glareola*)
- Marsh Sandpiper (*Tringa stagnatilis*)
- Terek Sandpiper (*Xenus cinereus*)

Each of these species are discussed in further detail below.

#### 3.3.1 *Antechinus bellus* – Fawn Antechinus

##### 3.3.1.1 Description

*Antechinus bellus* is a small (30-60 g) dasyurid, lacking a true pouch in females. It is pale to medium grey-brown above and cream or light grey below, with a white chin and feet, and pale eye-ring. The tail is brown and slightly shorter than the head-body length (Young, 2012).

##### 3.3.1.2 Ecology

*Antechinus bellus* is a terrestrial, or partly arboreal, dasyurid. It is crepuscular, and shelters in tree hollows or fallen logs. As such, it prefers habitat exposed to cooler and less frequent fires during the dry season, when much of its habitat burns. This species is primarily insectivorous, although it may also consume small geckos.

This species breeds in mid-June to late-August when litters of up to 10 young are raised. This species exhibits male semelparity, known as male die-off, where all males die after a highly synchronised breeding season. Females may survive to breed again the following year, with some surviving to breed in a third year. During the breeding season, males often have chest fur stained yellow to brown from a gland (TSSC, 2015a; Young, 2012)

### 3.3.1.3 Distribution and Habitat

This species is endemic to the monsoonal tropics of the Northern Territory, where it is largely restricted to the mainland, including Garig Gunak, Kakadu, and Lichfield National Parks (**Figure 3-18**). It inhabits savannah woodlands and tall open forests dominated by Darwin Woollybutt (*Eucalyptus miniata*) and Darwin Stringybark (*E. tetradonta*), preferentially with a relatively dense shrubby understorey (TSSC, 2015a; Young, 2012). It has been recorded several times within the Darwin Region (**Figure 3-18**; DENR, 2019).

### 3.3.1.4 Suitable Habitat in Relation to the Project Area

Across three systematic fauna surveys initiated by TNG, Fawn Antechinus has not been recorded in Lot 1817.

Fawn Antechinus has been recorded less than two km from the Project area in the neighbouring Lot 1902 (two records in the NT Fauna Atlas (DENR, 2019)), and less than one km away in Lot 1816, south of the Project area (two records in the NT Fauna Atlas) from systematic surveys in 2001.

Suitable habitat exists in the in the remnant Eucalypt Woodland habitat type in Lot 1817.

**Figure 3-18** shows the potentially suitable habitat for Fawn Antechinus in the Darwin Region. The Eucalypt Woodland areas of Lot 1817 are potentially suitable habitat however lack of records from the fauna surveys initiated by TNG in 2016, 2018 and 2019 indicates there is a low likelihood of this species occurring in Lot 1817.

The Eucalypt Woodland habitat in Lot 1817 occurs in various condition across the site. Small areas of remnant woodland are in Very Good condition, some areas where the woodland is regenerating following disturbance are in Good condition but the majority of the Lot has been cleared for former use by extractive industries and is in Degraded to Completely Degraded condition.

Fawn Antechinus uses tree hollows for shelter. The NT Land Clearing Guidelines indicate tree hollows are particularly prevalent in trees with a diameter at breast height (DBH)  $\geq 50$  cm. All trees in Lot 1817 were systematically measured for DBH. Four small pockets of trees totalling 3.7 ha were found to have the required density of trees with DBH  $\geq 50$  cm to be considered as significant habitat. The remaining remnant Eucalypt woodland contains trees of a smaller size and thus less likely to have developed a significant tree hollow availability.

Disturbances at Lot 1817 that have reduced the quality of habitat for *A. bellus* are:

- historic extraction industry activity that has disturbed 315 ha or 64.5 % of Lot 1817
- historic extraction industry activity has altered the surface hydrology and large areas of shallow water are available for breeding cane toads in the wet season
- 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 fire risk and intensity

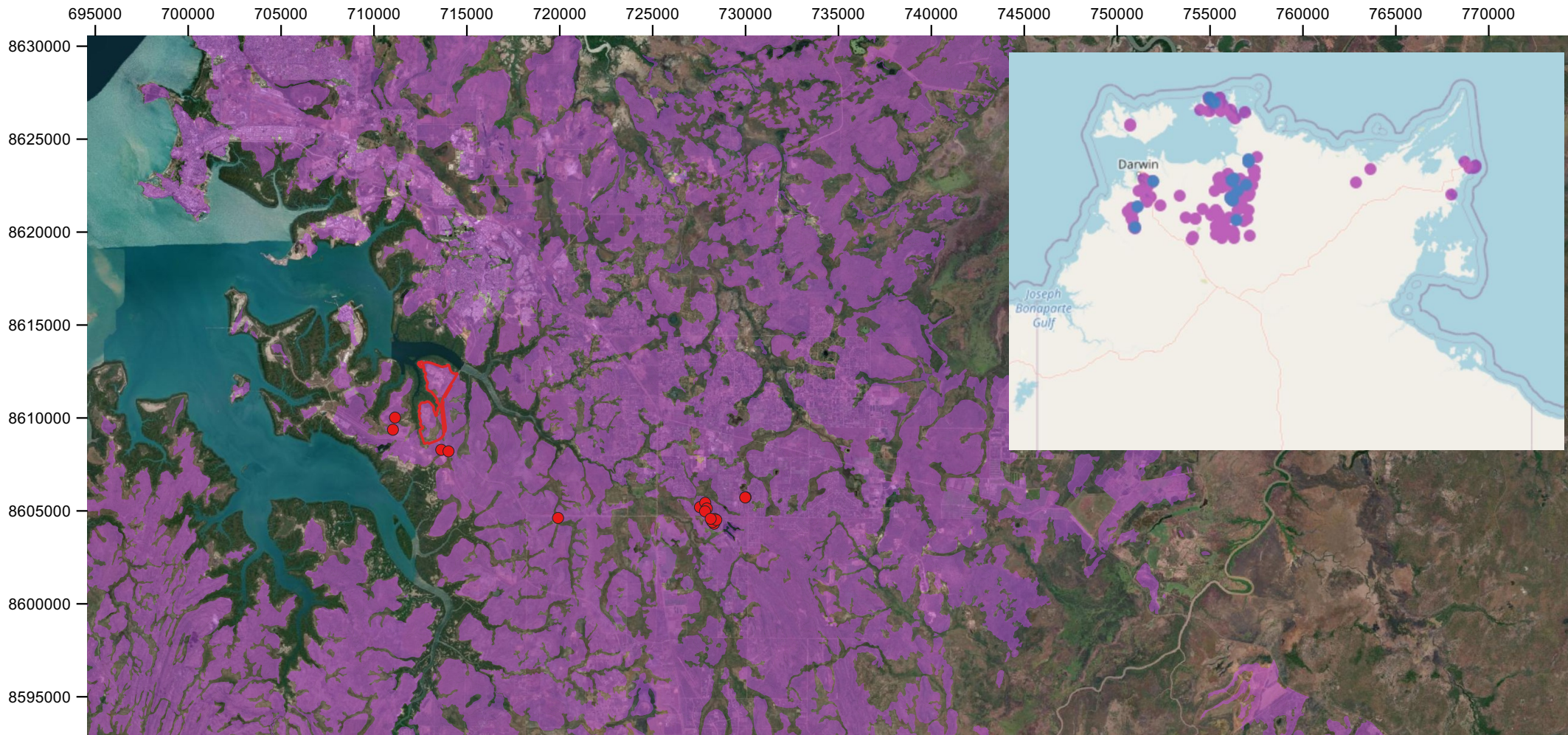


Figure 3-18. Distribution of Fawn Antechinus records in the Darwin Region and (inset) in the NT.

Legend

NT Fauna Atlas records

● Fawn Antechinus

□ Lot 1817 boundary

LANDUNIT\_25K\_SURVEY\_DATA

■ Forest and woodland dominated by Eucalyptus miniata and E. tetradonta

Inset: Source Atlas of Living Australia

● All records

● Records 2010-2020



0 2.5 5 km



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- the presence of introduced fauna, such as Black Rats, Cats and Dogs, that compete for prey and pose risks to *A. bellus*
- Restricted access to tree hollows leading to high competition for available hollows.

#### 3.3.1.5 Threatening Processes

The key threats facing *A. bellus* are predation by Feral Cats, *Felis catus*, inappropriate fire regimes, and habitat loss and fragmentation. Potential threats to this species include exotic invasive grasses, including Gamba Grass (*Andropogon gayanus*), which affect *A. bellus*'s ability to forage effectively on the ground and potentially increase the frequency and intensity of fires; poisoning from preying on Cane Toads (*Rhinella marina*); and Black Rats (*Rattus rattus*) which may spread disease. All threats facing *A. bellus* are likely to act synergistically. It is important to consider NT mammal species in the context of the broader declines of this group in the state. Correspondingly, it has been suggested that mammal species in the NT are in an extinction vortex, where declines have previously been gradual but have now passed a threshold from which persistence or recovery is unlikely (TSSC, 2015a).

### 3.3.2 *Varanus mertensi* – Mertens' Water Monitor

#### 3.3.2.1 Description

*Varanus mertensi* is a medium to large (up to 1 m total length) monitor. On the dorsal surface, it is dark brown or olive grey to black, with small, dark-edged pale spots. On the ventral surface, it is white to yellowish, with grey patterns on the throat and chin. The lower lip is yellowish, speckled or barred with grey. It has a strongly laterally-compressed tail, which provides power when swimming. The tail is approximately 1.5 times the length of the head-body (Ward *et al.*, 2006).

#### 3.3.2.2 Distribution and Habitat

This species has a broad range across the north of Australia, from the Kimberley region of WA to the west side of Cape York Peninsula (**Figure 3-19**). In the NT, it has been recorded across much of the Top End and Gulf regions, including all of the Top End river systems (**Figure 3-19**; Ward *et al.*, 2006). It occurs in coastal and inland waters, inhabiting the edge of watercourses and lagoons (Wilson and Swan, 2010). In the Darwin Region it widely distributed with many recent records, including in the Territory Wildlife Park-Berry Springs Nature Park (Ward *et al.*, 2006).

#### 3.3.2.3 Suitable Habitat in Relation to the Project Area

Mertens' Water Monitor has not been recorded in Lot 1817 in the 3 terrestrial fauna surveys initiated by TNG in 2017, 2018 and 2019, or by the recent unpublished fauna surveys of Middle Arm by the DEPWS Flora and Fauna Division (DEPWS communication). The closest record on the Atlas of Living Australia is 15 km from Lot 1817.

Potentially suitable habitat exists in the Project area at the edge of temporary water bodies however these are a product of the historic disturbance on the site and not natural water bodies.

As the species has not been recorded in recent survey efforts and the habitat is disturbed the likelihood of an important population of Mertens' Water Monitor within Lot 1817 is low. The habitat suitability is moderate.

Disturbances at Lot 1817 that have reduced the quality of habitat are:

- historic extraction industry activity that has disturbed 315 ha or 64.5 % of Lot 1817
- historic extraction industry activity has altered the surface hydrology and large areas of temporary shallow water are present in the wet season that are partially vegetated with native plant species
- the creation of large areas of suitable Cane Toad breeding habitat

- 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 fire risk and intensity.
- the presence of introduced fauna, such as cane toads, that compete for prey and pose risks to *Varanus mertensi*

#### 3.3.2.4 Ecology

*Varanus mertensi* is a semi-aquatic monitor and is rarely far from water. It forages extensively in water and is carnivorous, preying on fish, frogs, carrion, as well as insects and small terrestrial vertebrates. It also has a strong sense, which it uses to locate buried freshwater turtle eggs. It is both a strong swimmer and climber. It can remain submerged for long periods of time. Individuals typically lay eggs in burrows in the early dry season (Ward *et al.*, 2006; Wilson and Swan, 2010).

#### 3.3.2.5 Threatening Processes

*Varanus mertensi* is highly susceptible to Cane Toad toxin, and this constitutes the key threat facing the Monitor. Declines from poisoning are likely exacerbated by a depletion of prey resources for juvenile Monitors, as there is an overlap in diet between these individuals and Cane Toads (Ward *et al.*, 2006).

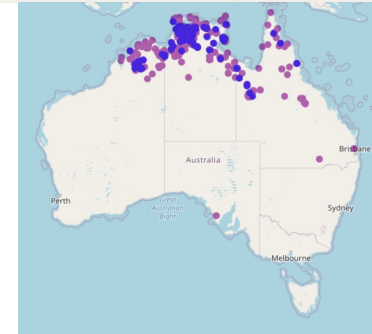
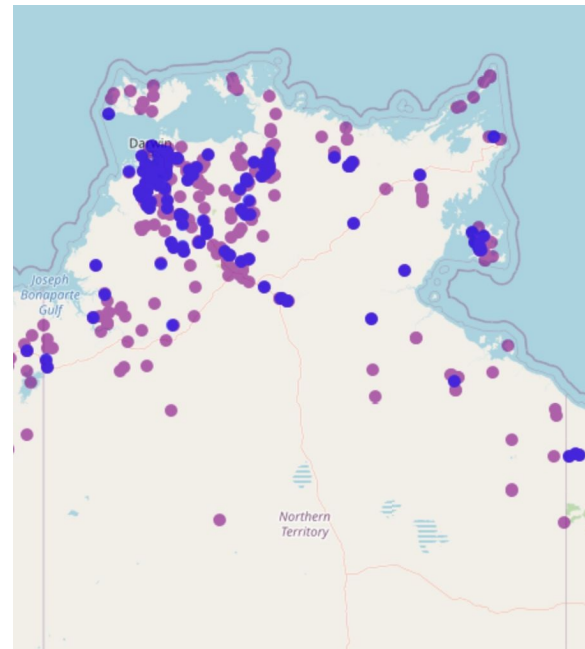
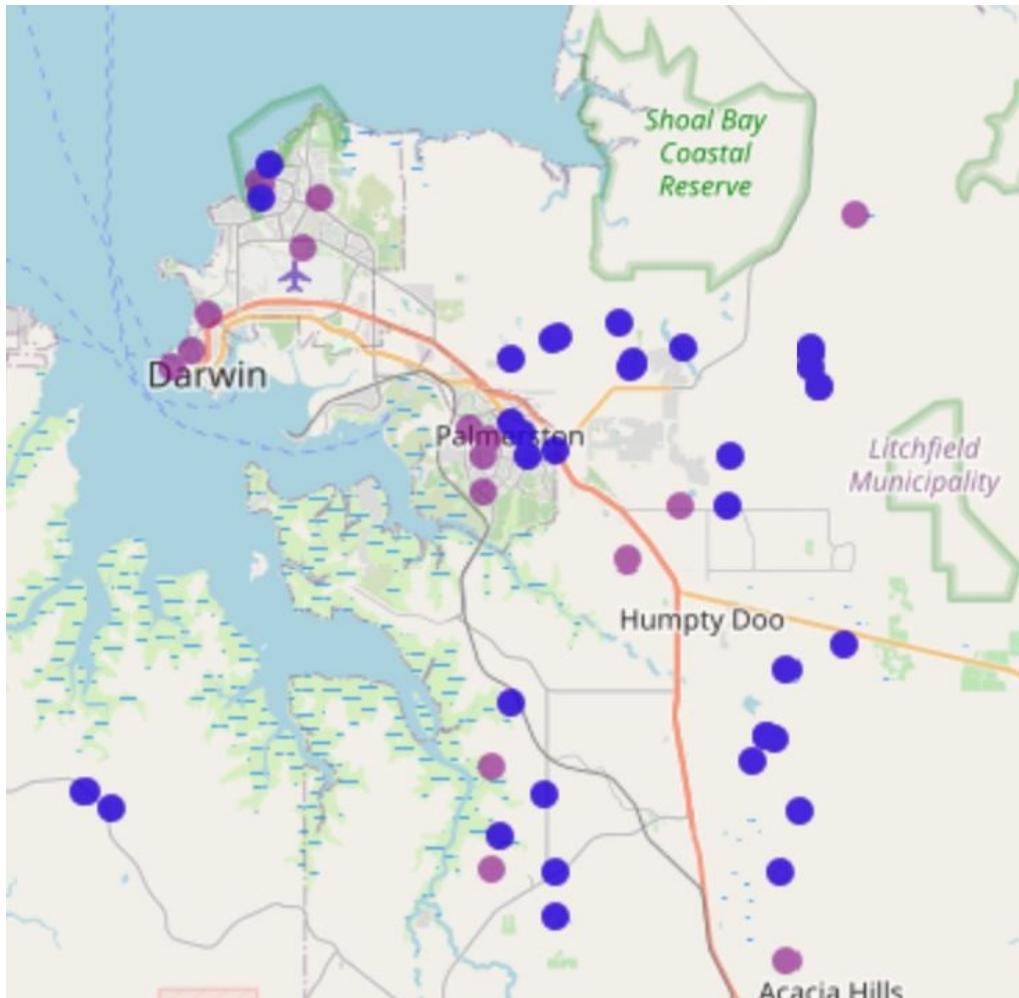


Figure 3-19. Distribution of *Mertensia*<sup>™</sup> Water Monitor records in the Darwin Region and in the Top End of the NT and in Australia

Legend

Source Atlas of Living Australia

- All records
- Records 2010-2020



### 3.3.3 Migratory species possibly occurring in the Study area

The migratory species that may possibly occur in the study area are listed in **Table 3-2** with descriptions of their distribution, habitat and socialness and the suitability of the Project site.

**Table 3-2. Migratory species possibly occurring in the Study area**

Scientific (common) name	Distribution, Habitat, Socialness	Suitability of Project site
<p>Barn Swallow <i>Hirundo rustica</i></p>	<p><b>Distribution:</b> Nonbreeding visitor to coastal regions of northern Australia</p> <p><b>General Habitat:</b> Inhabits open country and agricultural land, often near water</p> <p><b>Foraging Habitat:</b> Feeds on insects caught in flight</p> <p><b>Socialness:</b> Can occur in large flocks, particularly prior to migration</p>	<p><b>Possible:</b> Records on NT Fauna Atlas within 10 km of the Study Area. Suitable habitat occurs near the site.</p>
<p>Ruddy Turnstone <i>Arenaria interpres</i></p>	<p><b>Distribution:</b> widespread in Australia. Found in coastal regions, with infrequent records inland.</p> <p><b>General habitat:</b> preferentially inhabits rocky shores or beaches, where there are large deposits of rotting seaweed. Less frequently, it is found on sand, coral, or shell beaches, shoals, cays, and dry ridges of sand or coral. In the NT, it may prefer mudflats.</p> <p><b>Foraging habitat:</b> forages among banks of stranded seaweed and other tide-wrack, and may feed on mangrove mudflats.</p> <p><b>Roosting habitat:</b> roosts on beaches, above the tidelines, among rocks, shells, beach-cast seaweed, or other debris. It may also roost on rocky islets among grassy tussocks, and on mudflats and sandflats.</p> <p><b>Socialness:</b> seen singly, although, it is more commonly, seen in loose groups of 20 to 100 individuals. Typically, it flies in tight, coordinated flocks when moving locally, but in loose lines when migrating. It has a tendency not to congregate with other species, although it will feed in close association with other waders, e.g. <i>Calidris alba</i>, <i>C. ferruginea</i>, and <i>C. ruficollis</i> (DAWE 2020).</p>	<p><b>Possible:</b> During the GHD 2016 survey, it was recorded 82 times in the Greater Darwin area. Suitable general, foraging, and roosting habitat exists in the mudflats and samphire areas adjacent to the site. All available habitat is high quality. Non-breeding adults and immature individuals are likely to use the site during the non-breeding season (September – April), while immature individuals may remain at the site throughout the austral winter (<i>i.e.</i> year-round until they sexually mature).</p>
<p>Sharp-tailed Sandpiper <i>Calidris acuminata</i></p>	<p><b>Distribution:</b> widespread in Australia, but most common in the southeast. It occurs in both coastal and inland regions. In the NT, it occurs mostly along the northern coast, generally east to Groote Eylandt and Gove Peninsula, as well as to McArthur River and east of Borroloola. It is widely, but sparsely, scattered inland.</p> <p><b>General habitat:</b> inhabits muddy edges of shallow fresh, or brackish, wetlands, with inundated or emergent sedges, grasses, saltmarsh, or other low vegetation. It uses intertidal mudflats in sheltered bays, inlets, estuaries, or seashores, and swamps and creeks lined with mangroves. Tends to occupy coastal mudflats after ephemeral terrestrial wetlands have dried out.</p> <p><b>Foraging habitat:</b> forages at the edge of water, either on bare, wet mud or sand, or in shallow water. It may forage on coastal mudflats at low tide, and move to freshwater wetlands near the coast to feed at high tide.</p>	<p><b>Possible.</b> There are records on NR Maps Fauna Atlas within 10 km of the Study Area, including from East Arm Wharf; however, there have been no records of this species within the Project area.</p> <p>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 (September – April).</p>

	<p><b>Roosting habitat:</b> roosts at the edge of wetlands, on wet open mud or sand, in shallow water, or in short, sparse vegetation. Previously recorded roosting in mangroves.</p> <p><b>Socialness:</b> migrates in flocks of less than 1,000 individuals (DAWE 2020).</p>	
<p><i>Calidris alba</i> (Sanderling)</p>	<p><b>Distribution:</b> coastal areas of Australia, with infrequent records inland (likely, migrating individuals). In the NT, it occurs around Darwin, as well as Melville Island, shores of Van Diemen Gulf, and Groote Eylandt.</p> <p><b>General habitat:</b> inhabits open, sandy beaches exposed to sea-swell, as well as exposed sandbars and spits. Less common on sheltered sandy shorelines of, for example, harbours.</p> <p><b>Foraging habitat:</b> forages among rotting seaweed.</p> <p><b>Roosting habitat:</b> roosts on bare sand high on the beach, clumps of washed up kelp, coastal dune, or rocky reefs and ledges.</p> <p><b>Socialness:</b> Very gregarious. Typically, occurs in small to large flocks, including groups of several hundred in optimal locations. Forms mixed species flocks with other waders, but roosts high on beaches away from these species (DAWE 2020).</p>	<p><b>Possible.</b> There were 20 records of this species during the GHD 2016 survey of the Greater Darwin area.</p> <p>Suitable general, and potentially suitable roosting, habitat exists in the mudflats 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 (September – May).</p>
<p><i>Calidris ruficollis</i> (Red-necked Stint)</p>	<p><b>Distribution:</b> most of the Australian coastline, with highest densities in Victoria and Tasmania.</p> <p><b>General habitat:</b> mostly inhabits coastal areas, including sheltered inlets, bays, and estuaries with intertidal mudflats, often near spits, islets, and banks. Sometimes occur on exposed or ocean beaches.</p> <p><b>Foraging habitat:</b> forages on bare wet mud on intertidal mudflats or sandflats, on in very shallow water. During high tide, sometimes forages in non-tidal wetlands. May forage in samphire and, rarely, in mud below mangroves.</p> <p><b>Roosting habitat:</b> roosts on sheltered beaches, spits, and banks or islets of sand, mud, coral, or shingle. Large numbers occasionally roost on ocean beaches, although it is probably not preferred habitat.</p> <p><b>Socialness:</b> likely to travel in flocks, and has also been recorded feeding in dense flocks. Often feeds in mixed flocks, especially with <i>C. acuminata</i> and <i>C. ferruginea</i> (DAWE 2020).</p>	<p><b>Possible.</b> There are records on NR Maps Fauna Atlas within 10 km of the Study Area, including from East Arm Wharf; There was one recorded individual of this species in the Project area in 2016.</p> <p>Suitable general, foraging, and roosting habitat exists in the mudflats, samphire, 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>i.e.</i> year-round until they sexually mature).</p>
<p><i>Calidris subminuta</i> (Long-toed Stint)</p>	<p><b>Distribution:</b> sparsely distributed along coast, especially in the east of Australia. In the NT, it has been recorded around Darwin, and at Harrison Dam, Daly Waters, Alice Springs Sewage Farm, and Lake Sylvester.</p>	<p><b>Possible.</b> There are records on NR Maps Fauna Atlas within 10 km of the Study Area, including from Lot 1111; however, there have been no records of this species within the Project area.</p>

	<p><b>General habitat:</b> occurs in a variety of terrestrial wetlands, preferentially inhabiting freshwater or brackish wetlands, including lakes, swamps, river floodplains, streams, lagoons, and sewage ponds. Also common on muddy fringes of drying ephemeral lakes and swamps, and in permanent artificial lakes.</p> <p><b>Foraging habitat:</b> forages on wet mud or in shallow water, often among low vegetation.</p> <p><b>Roosting habitat:</b> roosts in sparse vegetation at the edges of wetlands and on damp mud near shallow water.</p> <p><b>Socialness:</b> feeds singly or in small flocks (DAWE 2020).</p>	<p>Suitable general, foraging, and roosting habitat exists in the mudflats and samphire 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 (October – April), while immature individuals may remain at the site throughout the austral winter (<i>i.e.</i> year-round until they sexually mature).</p>
<p><i>Charadrius dubius</i> (Little Ringed Plover)</p>	<p><b>Distribution:</b> regular, but uncommon visitor to Australia (CoA, 2015).</p> <p><b>General habitat:</b> inhabits muddy margins or mudflats of tidal and freshwater wetlands, including estuaries, lagoons, lakes, dams, and ponds (Morcombe, 2010).</p>	<p><b>Possible.</b> While this species is uncommon in Australia, one record exists in the NR Maps database from Darwin Harbour (East Arm). Suitable habitat exists in the mudflats adjacent to the site.</p>
<p><i>Charadrius veredus</i> (Oriental Plover)</p>	<p><b>Distribution:</b> occurs in coastal and inland areas of Australia. Most records are from the northwest coast, with scattered records from other areas, such as the Top End, NT.</p> <p><b>General habitat:</b> in coastal areas, it inhabits estuarine mudflats and sandbanks, on sandy or rocky ocean beaches, or in near-coastal grasslands.</p> <p><b>Foraging habitat:</b> forages among short grass or on hard, stony, bare ground, as well as on mudflats or among beach-cast seaweed.</p> <p><b>Roosting habitat:</b> in coastal areas, it roosts on soft wet mud or in shallow water of beaches and tidal mudflats.</p> <p><b>Socialness:</b> gregarious. Often seen in large mixed flocks of several hundred or thousand individuals, and may forage in loose, mixed flocks (DAWE 2020).</p>	<p><b>Possible.</b> There are records on NR Maps Fauna Atlas within 10 km of the Study Area, including from East Arm Wharf and Lot 1111; however, there have been no records of this species within the Project area.</p> <p>Suitable general, foraging, and roosting habitat exists in the mudflats 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 (September – April).</p>
<p><i>Limnodromus semipalmatus</i> (Asian Dowitcher)</p>	<p><b>Distribution:</b> regular, but uncommon visitor to northwest Australia, especially between Port Hedland and Broome. In the NT, it is found in Darwin and Arnhem Land.</p> <p><b>General habitat:</b> occurs in sheltered coastal environments, including embayments, coastal lagoons, estuaries, and tidal creeks. Inhabits exposed mudflats or sandflats.</p> <p><b>Foraging habitat:</b> forages on intertidal mudflats (DAWE 2020).</p>	<p><b>Possible.</b> There are records on NR Maps Fauna Atlas within 10 km of the Study Area, including from East Arm Wharf; however, there have been no records of this species within the Project area.</p> <p>Suitable general and foraging habitat exists in the mudflats adjacent to the Project area. All available habitat is high quality. Non-breeding</p>

		adults and immature individuals are likely to use the site during the non-breeding season (September – April).
<i>Limosa limosa</i> (Black-tailed Godwit)	<p><b>Distribution:</b> found around coastal areas of Australia, especially between Darwin and Weipa.</p> <p><b>General habitat:</b> commonly found in sheltered bays, estuaries, and lagoons with large intertidal mudflats or sandflats.</p> <p><b>Foraging habitat:</b> forages on wide intertidal mudflats or sandflats, in soft mud or shallow water. It is known to also forage among mangroves.</p> <p><b>Roosting habitat:</b> roosts in low banks of mud, sand, or shell bars, islets, and beaches in sheltered areas, as well as on saltflats behind mangroves.</p> <p><b>Socialness:</b> associates with other waders, and is often seen on the edges of mixed flocks. It may be seen in flocks of up to several hundred individuals (DAWE 2020).</p>	<p><b>Possible.</b> There were six records of this during the GHD 2016 survey of the Greater Darwin area. Additional records of this species on NR Maps Fauna Atlas occur at East Arm Wharf and Lot 1111.</p> <p>Suitable general, foraging, and roosting habitat exists in the mudflats, samphire, 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).</p>
<i>Numenius minutus</i> (Little Curlew)	<p><b>Distribution:</b> found predominantly in northern Australia. In the NT, it is widespread in the Top End, from Keep River NP, east to Gove Peninsula and Groote Eylandt, and south to Kidman Springs. It has also been recorded in Alice Springs and the Tanami Desert.</p> <p><b>General habitat:</b> congregates around pools, river beds, and water-filled tidal channels, and shallow water at the edge of billabongs during the heat of the day.</p> <p><b>Foraging habitat:</b> forages in short, dry grassland and sedgeland, including dry floodplains and blacksoil plains, with scattered, shallow freshwater pools or areas seasonally inundated. It also uses coastal swamps, mudflats or sandflats of estuaries or beaches on sheltered coasts, among a wide range of other areas.</p> <p><b>Roosting habitat:</b> roosts within 5 km of feeding habitat, moving between grassland and wetland.</p> <p><b>Socialness:</b> gregarious. Moves in flocks of several thousand individuals, and can be seen in dense flocks of several hundreds or thousands during the non-breeding season (DAWE 2020).</p>	<p><b>Possible.</b> There are records on NR Maps Fauna Atlas within 10 km of the Study Area, including from Lot 1111; however, there have been no records of this species within the Project area.</p> <p>Suitable general and foraging habitat, and potentially suitable roosting habitat, exists in the mudflats 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 (October – April).</p>
<i>Pluvialis fulva</i> (Pacific Golden Plover)	<p><b>Distribution:</b> widespread in coastal regions of Australia, with scattered records inland. It is most common along the eastern coast. In the NT, it is regularly recorded in coastal areas of the Top End.</p> <p><b>General habitat:</b> typically, inhabits beaches, mudflats, and sandflats, sometimes in mangroves, low saltmarsh, or beds of seagrass, of sheltered areas, such as harbours, estuaries, and lagoons.</p>	<p><b>Possible.</b> There are records on NR Maps Fauna Atlas within 10 km of the Study Area, including from Lot 1111 and East Arm Wharf; There were 5 records from Lot 1817 in 2019 and 10 in 2016.</p>

	<p><b>Foraging habitat:</b> forages on sandy or muddy shores (including mudflats and sandflats), or margins of sheltered areas, among vegetation, such as saltmarsh, mangroves, or in pastures.</p> <p><b>Roosting habitat:</b> roosts near foraging areas, on sandy beaches and spits, sometimes among or below vegetation, such as mangroves.</p> <p><b>Socialness:</b> most commonly seen in flocks of 20-50 birds, although it may forage singly or in flocks of up to several hundred birds. It roosts in areas near, but separate, to other shorebirds (DAWE 2020).</p>	<p>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 (September – May).</p>
<p><i>Pluvialis squatarola</i> (Grey Plover)</p>	<p><b>Distribution:</b> it has been recorded along the coast of all states in Australia, especially the western and southern coasts. In the NT, small numbers are regularly seen in the Top End.</p> <p><b>General habitat:</b> inhabits sheltered embayments, estuaries, and lagoons with mudflats or sandflats.</p> <p><b>Foraging habitat:</b> usually forages on large areas of exposed mudflats and beaches of sheltered coastal shores. It also occasionally feeds in pastures and at the muddy margins of inland wetlands, including lakes and bores.</p> <p><b>Roosting habitat:</b> preferentially roosts in sandy areas, such as unvegetated sandbanks.</p> <p><b>Socialness:</b> usually seen singly, or in small flocks; however, it forms large, mixed flocks at communal roosts (DAWE 2020).</p>	<p><b>Possible.</b> There were 30 records of this species in the Greater Darwin area during the GHD 2016 surveys. There are also records from Lot 1111 and East Arm Wharf on NT Fauna Atlas.</p> <p>Suitable general and foraging, and potentially suitable roosting, habitat exists in the mudflats 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), while immature individuals may remain at the site throughout the austral winter (<i>i.e.</i> year-round until they sexually mature).</p>
<p><i>Tringa glareola</i> (Wood Sandpiper)</p>	<p><b>Distribution:</b> occurs around Australia but is most common in northwest Australia. All areas of national importance are in WA. In the NT, there are scattered inland records from Keep River, east to Victoria River and Ngukurr, and south to Alice Springs, with coastal records from the Darwin area.</p> <p><b>General habitat:</b> inhabits well-vegetated, shallow, freshwater wetlands. It rarely uses brackish wetlands, and never uses coastal flats. It is known to use artificial wetlands, including open sewage ponds, reservoirs, large farm dams, and bore drains.</p> <p><b>Foraging habitat:</b> forages on moist or dry mud at the edges of wetlands, whether along shores, among open, scattered vegetation, or in clear, shallow water.</p> <p><b>Roosting habitat:</b> roosts low in trees, and perches on fences. It is known to loaf in low, grassy hillocks.</p> <p><b>Socialness:</b> seen singly, in pairs, small flocks, or, less frequently, in flocks of several hundred individuals (DAWE 2020).</p>	<p><b>Possible.</b> There are records on NR Maps Fauna Atlas within 10 km of the Study Area, including from Lot 1111 and East Arm Wharf; however, there have been no records of this species within the Project area.</p> <p>Potentially suitable general, foraging, and roosting habitat exists in the mudflats and samphire 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).</p>
<p><i>Tringa stagnatilis</i> (Marsh Sandpiper)</p>	<p><b>Distribution:</b> found in coastal and inland wetlands across Australia. There are scattered records from the NT.</p>	<p><b>Possible.</b> There are records on NR Maps Fauna Atlas within 10 km of the Study Area, including</p>

	<p><b>General habitat:</b> inhabits intertidal mudflats from permanent and ephemeral wetlands of varying salinity, including swamps, lagoons, billabongs, and estuaries. In northern Australia, it prefers intertidal mudflats, although records from Kakadu NP indicate a preference for shallow freshwater lakes over tidal areas.</p> <p><b>Foraging habitat:</b> forages in shallow water at the edge of wetlands.</p> <p><b>Roosting habitat:</b> roosts on tidal mudflats, near low saltmarsh, and around inland swamps.</p> <p><b>Socialness:</b> occurs singly, or in small to large flocks, and is often associated with other waders (DAWE 2020).</p>	<p>from Lot 1111 and East Arm Wharf; however, there have been no records of this species within the Project area.</p> <p>Suitable general, foraging, and roosting habitat exists in the mudflats 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 (September – April), while immature individuals may remain at the site throughout the austral winter (<i>i.e.</i> year-round until they sexually mature).</p>
<p><i>Xenus cinereus</i> (Terek Sandpiper)</p>	<p><b>Distribution:</b> primarily occurs around the coast of Australia, with occasional records inland. It is more widespread in the north and east. In the NT, it occurs from Darwin, north to Melville Island, and east to the Gulf of Carpentaria. Lilleyman <i>et al.</i> (2020) recorded a Nationally Significant Aggregation of this species in the Middle Arm of Darwin Harbour in November 2019.</p> <p><b>General habitat:</b> inhabits intertidal mudflats, and sheltered estuaries, embayments, harbours, or lagoons. It also inhabits islets, mudbanks, sandbanks, and spits near mangroves and, occasionally, samphire.</p> <p><b>Foraging habitat:</b> forages in open areas, on soft, wet mud. Birds are seldom near the edge of the water, although they do occasional wade into the water.</p> <p><b>Roosting habitat:</b> roosts in or among mangroves. It may perch on branches or roots up to 2 m off the ground, or beneath them in the shade on hot days.</p> <p><b>Socialness:</b> usually seen singly and in small flocks when migrating, but in large, mixed flocks while foraging and roosting (DAWE 2020).</p>	<p><b>Possible.</b> There are records on NR Maps Fauna Atlas within 10 km of the Study Area, including from Lot 1111 and East Arm Wharf; In the surveys by GHD and APM in 2016, 2018 and 2019 a total of 61 individuals were recorded in the habitats within and adjacent to Lot 1817. The maximum count from a single survey was 9 individuals.</p> <p>Suitable general, foraging, and roosting habitat exists in the mudflats, samphire, 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>i.e.</i> year-round until they sexually mature).</p>

### 3.4 FAUNA HABITATS

Nine habitat types occur across the Study Area:

- Mixed woodland
- Monsoon closed forest
- Native grasslands
- Melaleuca woodland
- Temporary water bodies
- Disturbed areas
- Mangroves
- Saltpan
- Intertidal mudflats

The distribution of fauna habitats is shown in **Figure 3-20**.