



TOONDAH HARBOUR

CHAPTER 25 MIGRATORY SPECIES SIGNIFICANT IMPACT ASSESSMENT



25. Migratory Species Significant Impact Assessment

25.1. Introduction

Migratory species are those animals that migrate to Australia and its external territories or pass through or over Australian waters during their annual migrations and are listed in the Convention on the Conservation of Wild Animals ((CMS), also known as the Bonn Convention), the China-Australia Migratory Bird Agreement (CAMBA), the Japan-Australia Migratory Bird Agreement (JAMBA) and the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA). Listed migratory species also include any native species identified in international agreements.

The Significant Impact Guidelines state that an action is likely to have a significant impact on a migratory species if there is a real chance or possibility that it will:

- Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species;
- Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species; or
- Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species.

An area of 'important habitat' for a migratory species is defined as:

- a. Habitat utilised by a migratory species occasionally or periodically within a region that supports an ecologically significant proportion of the population of the species; and/or
- b. Habitat that is of critical importance to the species at particular life-cycle stages; and/or
- c. Habitat utilised by a migratory species which is at the limit of the species range; and/or
- d. Habitat within an area where the species is declining.

Assessment of the significance of the Project footprint and surrounds to eastern osprey, oriental cuckoo and rufous fantail is assisted by the draft Referral guideline for 14 birds listed as migratory species under the EPBC Act (DOE 2015).

As the significant impact criteria for migratory species is similar to those for threatened species (and threatened species criteria generally has a lower 'threshold' for what is considered a significant impact) migratory species that are also listed as threatened under the EPBC Act and assessed in Chapter 24 are not included in this Chapter. Assessment against the migratory species significant impact criteria for these species is included as Appendix 3-A.

25.2. Terrestrial Migratory (Non-Shorebird) Species Significant Impact Assessment

The following sections provide assessment of impacts against the relevant criteria for the terrestrial, migratory species that are not defined as shorebirds, including:

Terrestrial migratory species known to occur or with the potential to occur in Project footprint and surrounds include:

- Eastern osprey;
- Gull-billed tern;
- Caspian tern;
- Little tern;
- Crested tern
- White-winged black tern;
- Common tern;
- Oriental cuckoo;
- Rufous fantail.

25.2.1 Eastern Osprey Migratory Species Significant Impact Assessment

Eastern osprey (*Pandion cristatus*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 15, which provides detailed information on existing eastern osprey populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.2.1.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice or Recovery Plan for this species.

25.2.1.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to eastern osprey from Project activities are addressed in Section 15.4.6 with adaptive management and monitoring measures outlined in Section 15.5. Assessment against the EPBC Act significant impact criteria for threatened species is provided in Table 25-1.

Eastern osprey (38 local Wildlife Online records) was recorded in 2014/15 foraging for fish over open waters in the Project footprint (averaging 0.08 birds present over all surveys that season). An eastern osprey nest was recorded in September 2020, located on a telecommunications antenna on the roof of a high-rise residential building just outside of the western boundary of the PDA. While the species is known to use the same nesting site year after year, this is the first record of a nest site proximate to the PDA since ecological investigations of the site began in 2013.

The Project will not result in a significant impact on the eastern osprey.

Table 25-1: Assessment of the Eastern Osprey Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for a Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering	The habitat within the PDA does not support an ecologically significant population of the species. The habitat is not of critical importance to the species at any particular life stage. The species is not at the limit of its range within the PDA.

Significant Impact Criteria for a Migratory Species	Assessment Summary
hydrological cycles), destroy or isolate an area of important habitat for a migratory species?	<p>Dennis and Clancy (2014) reported that in tropical and subtropical regions the Australasian osprey populations are regarded as secure. The species is listed as Special Least Concern in Queensland under the NC Act.</p> <p>The action will not affect an area of important habitat for the species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?	<p>The PDA is urban in nature with the koala habitat present occurring within landscaped gardens and parkland that are regularly maintained. Therefore, there will be no opportunity for invasive species to establish in these environments. The Project would not introduce invasive species to the location that would harm eastern osprey.</p>
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species?	<p>The coastal habitats of the PDA are included in the DOE (2015) description of important habitat for the species. To represent a nationally ecologically significant proportion of a population of eastern osprey DOE (2015) indicates a threshold of 24 birds would be present.</p> <p>Eastern osprey was recorded feeding over open water in the Project footprint once in 2014 and once in 2015 during shorebird surveys over a five-year period. There is a recent (2020) nesting record outside of the western boundary of the PDA on a communications antenna atop a high-rise residential building.</p> <p>The PDA does not support an ecologically significant population of the species.</p>

25.2.2 Gull-billed Tern Migratory Species Significant Impact Assessment

Gull-billed tern (*Gelochelidon nilotica*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 15, which provides detailed information on existing Gull-billed Tern populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.2.2.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice or Recovery Plan for this species.

25.2.2.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to gull-billed tern from Project activities are addressed in Section 15.4.6 with adaptive management and monitoring measures outlined in Section 15.5. Assessment against the EPBC Act significant impact criteria for threatened species is provided in Table 25-2.

While specific threats to the sub-species are not described in the literature, breeding activity is likely to be impacted by habitat degradation, human disturbance and feral animal predation, particularly in locations close to human habitation. It is ascribed the conservation status of 'least concern' globally by IUCN and its conservation status in Queensland is 'special least concern'.

Gull-billed tern (130 local Wildlife Online records) has been recorded feeding over open waters and intertidal mudflats in and adjacent to the Project footprint and roosting on mudflats in the PDA during four seasonal surveys. It has been

recorded roosting rarely at Nandeebie Claypan and roosts regularly at Oyster Point. There is no breeding habitat for this species recorded or known from the Project footprint or surrounds.

The project will not result in a significant impact on the gull-billed tern.

Table 25-2: Assessment of the Gull Billed Tern Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for a Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species?	<p>A maximum of 30 birds have been recorded at any one time within the PDA. The PDA does not support an ecologically significant population of the species. Roosts at Nandeebie Claypan rarely, and not in the past two years. There is no breeding habitat present within the PDA and feeding and roosting is not in significant numbers. The species is not at the limit of its range within the PDA. The species population range and size are very large, and it is evaluated as least concern Red List Category (Birdlife International, 2020). Wetlands International Waterbird Population Estimates (WPE5) indicates the population trend is fluctuating.</p> <p>The action will not affect an area of important habitat for the species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?	<p>The PDA is not important habitat for the species. The Project would not introduce invasive species to the location that would harm gull-billed tern.</p>
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species?	<p>Gull-billed tern has been recorded feeding over open waters and intertidal mudflats in (maximum 30 birds) and adjacent to the PDA during five seasonal surveys. It has been recorded roosting rarely at Nandeebie Claypan (maximum 32 birds) although this area no longer provides suitable roosting habitat. it roosts regularly in small numbers at Oyster Point. There is no breeding habitat present.</p>

25.2.3 Caspian Tern Migratory Species Significant Impact Assessment

Caspian tern (*Hydroprogne caspia*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 15, which provides detailed information on existing caspian tern populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.2.3.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice or Recovery Plan for this species.

25.2.3.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to caspian tern from Project activities are addressed in Section 15.4.6 with adaptive management and monitoring measures outlined in section 15.5. Assessment against the EPBC Act significant impact criteria for threatened species is provided in Table 25-3.

Caspian tern are mostly found alone or in small groups, except during the breeding season when large groups form (ALA, 2020). Collar (2014) states caspian terns are generally thought of as a species with low breeding site fidelity because of the ephemeral nature of their preferred nesting habitat; however, the results of this Master of Science research on a large breeding colony the Oregon portion of the Columbia River USA found a degree of nest site fidelity that is not usually

attributed to the species. No such large nesting groups have been reported from the PDA or surrounds. Caspian tern inhabits sheltered coastal embayments but also forages in open wetlands far inland, including lakes, dams and rivers, but prefers wetlands with clear water to those with muddy water (Higgins and Davies 1996), mainly eating fish, but also feeding on bird eggs and invertebrates as well as carrion (ALA, 2020). In a study of distribution and foraging by non-breeding caspian terns in south-western Australia, Stockwell *et al.* (2021) reported some foraging site fidelity and shifting roost locations.

Threats to the species relevant to Toondah Harbour are entanglement of birds in fishing line and nets and exposure to contaminants through the food chain. It is ascribed the conservation status of 'least concern' globally by IUCN and its conservation status in Queensland is 'special least concern'.

Caspian tern (154 local Wildlife Online records) has been recorded feeding over open waters and intertidal mudflats in (maximum two birds) and adjacent to the Project footprint and roosting rarely at Nandeebie Claypan (maximum 14 roosting birds) and roosts regularly at Oyster Point. There is no breeding habitat for this species recorded or known from the Project footprint or surrounds.

The Project will not result in a significant impact on the caspian tern.

Table 25-3: Assessment of the Caspian Tern Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for a Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species?	<p>A maximum of two birds have been recorded at any one time within the PDA. The PDA does not support an ecologically significant population of the species. Roosts at Nandeebie Claypan rarely, and never in the past five years. There is no breeding habitat present within the PDA and feeding and roosting is not in significant numbers. The species is not at the limit of its range within the PDA.</p> <p>The species population range and size are very large, and it is evaluated as least concern Red List Category (Birdlife International, 2020)). Wetlands International Waterbird Population Estimates (WPE5) indicates the population trend may be stable.</p> <p>The action will not affect an area of important habitat for the species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?	<p>The Project would not introduce invasive species to the location that would harm caspian tern.</p>
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species?	<p>Caspian tern has been recorded feeding over open waters and intertidal mudflats in (maximum two birds) and adjacent to the PDA during five seasonal surveys. It has been recorded roosting rarely at Nandeebie Claypan (maximum 14 birds) although not recently, and roosts regularly at Oyster Point. There is no breeding habitat present.</p>

25.2.4 Little Tern Migratory Species Significant Impact Assessment

Little tern (*Sterna albifrons*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 15, which provides detailed information on existing little tern populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.2.4.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice or Recovery Plan for this species.

25.2.4.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to little tern from Project activities are addressed in Section 15.4.6 with adaptive management and monitoring measures outlined in Section 15.5. Assessment against the EPBC Act significant impact criteria for threatened species is provided in Table 25-4.

Little tern occurs in Europe, Asia and Australasia. Within Australia, the species occurs along the coastal regions of eastern Australia, south to Tasmania, and across northern Australia, west to northern parts of Western Australia, with breeding scattered on islands and coasts, mostly in colonies (Higgins and Davies, 1996). (Higgins and Davies 1996). Pairs are monogamous and nest on sand containing shell grit, with less than 5% vegetation cover. Nests are generally located in elevated areas 5 m from the HWM and consist of a scrape in the substrate. The species does not forage far from its breeding sites (JNCC, 2021).

Threats to the species in Australia are both natural (native predators, flooding of nesting sites and adverse weather conditions), and human-induced (human disturbance, introduced predators, increased presence of silver gulls near human settlements, development and degradation of estuarine habitats) (DAWE, 2021b). Many of these threats are already present at Toondah Harbour, and with the lack of suitable, exposed and sandy locations for nesting, it is not suitable for little tern breeding. It is ascribed the conservation status of 'least concern' globally by IUCN and its conservation status in Queensland is 'special least concern'.

Little tern (37 local Wildlife Online records) feeds over open waters and has been recorded roosting on a sand bar in (seven birds) and adjacent to the PDA during four seasonal surveys. It is known to roost at Oyster Point but has not previously been recorded roosting at Nandeebie Claypan. There is no breeding habitat for this species recorded or known within the Project footprint and surrounds.

The Project will not result in a significant impact on little tern.

Table 25-4: Assessment of the Little Tern Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for a Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species?	<p>A maximum of seven birds have been recorded at any one time within the PDA and the species has been mostly absent from the Project footprint during multiple surveys. The PDA does not support an ecologically significant population of the species. Not recorded roosting at Nandeebie Claypan. There is no breeding habitat present within the PDA and feeding is not in significant numbers. The species is not at the limit of its range within the PDA.</p> <p>The species population range and size are very large, and it is evaluated as least concern Red List Category (Birdlife International, 2020). Wetlands International Waterbird Population Estimates (WPE5) indicates the population trend of the migratory subspecies is in decline, whereas the non-migratory subspecies is potentially increasing.</p> <p>The action will not affect an area of important habitat for the species.</p>

Significant Impact Criteria for a Migratory Species	Assessment Summary
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?	The Project would not introduce invasive species to the location that would be harmful to little tern.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species?	Little tern has been recorded feeding over open waters and intertidal mudflats in the PDA (maximum seven birds) during five seasonal surveys. It has not been recorded roosting at Nandeebie Claypan. There is no breeding habitat present.

25.2.5 Crested Tern Migratory Species Significant Impact Assessment

Crested tern (*Thalasseus bergii*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 15, which provides detailed information on existing crested tern populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.2.5.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice or Recovery Plan for this species.

25.2.5.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to crested tern from Project activities are addressed in Section 15.4.6 with adaptive management and monitoring measures outlined in Section 15.5. Assessment against the EPBC Act significant impact criteria for threatened species is provided in Table 25-5.

The subspecies *Sterna bergii gwendolinae* breeds in western and north-western Australia, while the subspecies *Sterna bergii cristata* includes eastern Australia in its breeding range. Crested tern is widespread in all coastal regions of Australia, rarely up to 150 km inland, with breeding in dense colonies (Dec-Jul in Queensland) scattered on islands and coasts - the nest comprising a depression in sand (Higgins and Davies, 1996). There is no nesting recorded for the Project footprint or surrounds.

The crested tern diet includes small fish and occasional prawns and squid and is likely to occur as a regular visitor feeding over open waters within the Project footprint and surrounds. McLeay *et al.* (2008) describe a specific threat to the species as fisheries stock collapses of foraging resources. It is ascribed the conservation status of 'least concern' globally by IUCN and its conservation status in Queensland is 'special least concern'.

Crested tern (59 local Wildlife Online records) feeds over open waters and has been recorded previously roosting once on a sandbar in the PDA during four seasonal surveys. It may occur as a regular visitor, feeding on fish over open waters. There is no breeding habitat recorded or known within the PDA.

The Project will not result in a significant impact on the crested tern.

Table 25-5: Assessment of the Crested Tern Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for a Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species?	<p>One bird has been recorded within the PDA over multiple surveys (roosting on a sand bar). The PDA does not support an ecologically significant population of the species. Not recorded roosting at Nandeebie Claypan. There is no breeding habitat present within the PDA. The species is not at the limit of its range within the PDA.</p> <p>The species population range and size are very large, and it is evaluated as least concern Red List Category (Birdlife International, 2020). Wetlands International Waterbird Population Estimates (WPE5) indicates the population trend of the subspecies that breeds in eastern Australia is static or increasing.</p> <p>The action will not affect an area of important habitat for the species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?	The Project would not introduce invasive species to the location that would be harmful to crested tern.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species?	One crested tern has been recorded roosting on a sand bar in the PDA during four seasonal surveys. It has not been recorded roosting at Nandeebie Claypan. There is no breeding habitat present.

25.2.6 White-winged Black Tern Migratory Species Significant Impact Assessment

White-winged black tern (*Chlidonias leucopterus*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 15, which provides detailed information on existing white-winged black tern populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.2.6.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice or Recovery Plan for this species.

25.2.6.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to white-winged black tern from Project activities are addressed in Section 15.4.6 with adaptive management and monitoring measures outlined in Section 15.5. Assessment against the EPBC Act significant impact criteria for threatened species is provided in Table 25-6.

White-winged black tern breed in Europe and eastern Asia. The northern hemisphere winter is spent in tropical Africa, south-east Asia, Indonesia and Australasia. They occur along the shorelines of Moreton Bay, particularly at Luggage Point and Lytton (Low 1995). White-winged black tern occur on freshwater lakes, sewage ponds and swamps near the coast. Breeding occurs from May to August, and it feeds on small fish, frogs, crustaceans and insects (Pringle 1987).

Any local populations are potentially susceptible to increases in human activity along the coastline, possible changes in the structure of rivers, creeks and wetlands due to altered hydrology, changes in the abundance of mangroves, and possible pollution decreasing intertidal invertebrate abundance and diversity. It is ascribed the conservation status of 'least concern' globally by IUCN and its conservation status in Queensland is 'special least concern'.

White-winged black tern (one local record) has not been recorded previously from the Project footprint. There is no breeding habitat recorded or known within the Project footprint or the surrounding area.

The Project will not result in a significant impact on the white-winged black tern.

Table 25-6: Assessment of the White-winged Black Tern Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for a Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species?	<p>The species has not been recorded within the PDA during multiple surveys. The PDA does not support an ecologically significant population of the species. Not recorded roosting at Nandeebie Claypan. The species does not breed in Australia. The species is not at the limit of its range within the PDA.</p> <p>The species population range and size are extremely large, and it is evaluated as least concern Red List Category (Birdlife International, 2020). Wetlands International Waterbird Population Estimates (WPE5) indicates the population trend for Asia and Australasia is unknown.</p> <p>The action will not affect an area of important habitat for the species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?	<p>The Project would not introduce invasive species to the location that would be harmful to white-winged black tern.</p>
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species?	<p>Species has not been recorded from the PDA or roosting at Nandeebie Claypan. There is no breeding habitat present. It may occur as a rare seasonal visitor.</p>

25.2.7 Common Tern Migratory Species Significant Impact Assessment

Common tern (*Sterna hirundo*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 15, which provides detailed information on existing common tern populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.2.7.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice or Recovery Plan for this species.

25.2.7.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to common tern from Project activities are addressed in Section 15.4.6 with adaptive management and monitoring measures outlined in Section 15.5. Assessment against the EPBC Act significant impact criteria for threatened species is provided in Table 25-7.

In eastern Australia, the Caloundra and Noosa sandbanks, in south-eastern Queensland, are major sites for the species (with counts of up to 38 000 birds at Caloundra sandbanks within the Moreton Bay Ramsar site) (DAWE, 2021b) as stopover sites for terns migrating in a southward and in a northward direction (Chan and Denning, 2007). Available information regarding threats is related to breeding sites, which are outside of Australia. It is ascribed the conservation status of 'least concern' globally by IUCN and its conservation status in Queensland is 'special least concern'.

Common tern (five local Wildlife Online records) has not been recorded previously from the Project footprint. There is no breeding habitat recorded or known within the Project footprint or surrounds.

The Project will not result in a significant impact for common tern.

Table 25-7: Assessment of the Common Tern Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for a Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species?	<p>The species has not been recorded within the PDA during multiple surveys. The PDA does not support an ecologically significant population of the species. Not recorded roosting at Nandeebie Claypan. The species does not breed in Australia. The species is not at the limit of its range within the PDA.</p> <p>The species population range and size are extremely large, and it is evaluated as least concern Red List Category (Birdlife International, 2020). In eastern Australia, the Caloundra and Noosa sandbanks, in south-eastern Queensland, are major sites for the species (with counts of 38 000 birds) (DAWE, 2021b). Wetlands International Waterbird Population Estimates (WPE5) indicates there is no clear population trend for roosts in Australia.</p> <p>The action will not affect an area of important habitat for the species.</p>
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?	The Project would not introduce invasive species to the location that would be harmful to common tern.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species?	Species has not been recorded from the PDA or roosting at Nandeebie Claypan.

25.2.8 Oriental Cuckoo Migratory Species Significant Impact Assessment

Oriental cuckoo (*Cuculus optatus*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 15, which provides detailed information on existing oriental cuckoo populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.2.8.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice or Recovery Plan for this species.

25.2.8.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to oriental cuckoo from Project activities are addressed in Section 15.4.6 with adaptive management and monitoring measures outlined in Section 15.5. Assessment against the EPBC Act significant impact criteria for threatened species is provided in Table 25-8.

Oriental cuckoo is an insectivorous, brood-laying parasitic bird species. It breeds from Siberia to the Himalayas, across Southeast Asia, southern China, Korea, Japan and Taiwan, overwintering in the Malay Peninsula, Indonesia, the Philippines, New Guinea, the Solomon Islands and northern and eastern Australia. In Australia it occurs mostly on northern and eastern coasts and is widespread on tablelands and eastern slopes of the Great Divide from near Cooktown to the NSW border (Higgins, 1999).

There are currently no known threats to the species (Birdlife International, 2021). It is ascribed the conservation status of 'least concern' globally by IUCN and its conservation status in Queensland is 'special least concern'.

Oriental cuckoo has not been recorded previously in the local area (within 3 km of Toondah Harbour) and has not been recorded during and site surveys.

The Project will not result in a significant impact on the oriental cuckoo.

Table 25-8: Assessment of the Oriental Cuckoo Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for a Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species?	DOE (2015) describes important habitat for the species as monsoonal rainforest, vine thickets, wet sclerophyll forest or open casuarina, acacia or eucalyptus woodlands. The habitats of the PDA would be marginal for the species, and it may occur as a rare seasonal visitor. The habitat of the PDA is not of critical importance to the species at any particular life stage. The species is not at the limit of its range within the PDA. The action will not affect an area of important habitat for the species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?	The Project would not introduce invasive species to the location that would be harmful to oriental cuckoo.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species?	DOE (2015) indicates that 1,000 birds would represent a nationally ecologically significant proportion of a population of oriental cuckoo. The species has not been recorded from the PDA and the available habitat is marginal. The Project footprint does not support an ecologically significant population of the species.

25.2.9 Rufous Fantail Migratory Species Significant Impact Assessment

Rufous fantail (*Rhipidura rufifrons*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 15, which provides detailed information on existing rufous fantail populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.2.9.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice or Recovery Plan for this species.

25.2.9.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to rufous fantail from Project activities are addressed in Section 15.4.6 with adaptive management and monitoring measures outlined in Section 15.5. Assessment against the EPBC Act significant impact criteria for threatened species is provided in Table 25-9.

Rufous fantail has breeding populations in Australia from the South Australia-Victoria border to east of the Great Divide in NSW and north to about the NSW-Queensland border while *Rhipidura rufifrons intermedia* has breeding populations on and east of the Great Divide from the NSW-Queensland border, north to the Cairns-Atherton region (Higgins *et al.* 2006) where they are known to be both altitudinal migrants and latitudinal migrants with some populations travelling as far north as the Torres Strait and southern Papua New Guinea during the winter. In east and south-east Australia, it mainly inhabits wet sclerophyll forests, often in gullies; usually with a dense shrubby understorey often including ferns. It also occurs in subtropical and temperate rainforests (Higgins *et al.* 2006). Foraging is mainly in the low to middle strata of forests, sometimes in or below the canopy or on the ground; in northern Australia they also forage in mangroves (Higgins *et al.* 2006).

Threats to populations of the species are associated with fragmentation and loss of core breeding habitat, especially along migratory routes, including logging practices (DAWE, 2021b). It is ascribed the conservation status of 'least concern' globally by IUCN and its conservation status in Queensland is 'special least concern'.

Rufous fantail has not been recorded previously in the local area (within 3 km of Toondah Harbour) and was not recorded during surveys or by incidental sighting. While there are no local records of the species, suitable mangrove habitat occurs in the Project footprint, and it may occur as a rare seasonal visitor.

The Project will not result in a significant impact on the rufous fantail.

Table 25-9: Assessment of the Rufous Fantail Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for a Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species?	<p>DOE (2015) describes important habitat for the species as Moist, dense habitats, including mangroves, rainforest, riparian forests and thickets, and wet eucalypt forests with a dense understorey. While the majority of the site has marginal habitat for the species, the mangrove forest at the southwestern boundary of the PDA will be retained in parkland and the species may occur there as a rare seasonal visitor.</p> <p>The habitat of the PDA is not of critical importance to the species at any particular life stage. The species is not at the limit of its range within the PDA.</p>

Significant Impact Criteria for a Migratory Species	Assessment Summary
	The action will not affect an area of important habitat for the species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species?	DOE (2015) lists black rat and invasive vines as species that can be harmful to rufous fantail. Both black rats and invasive vines are already present in the urbanised landscape. The Project would not introduce further invasive species to the location.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species?	DOE (2015) indicates that over 1,000 birds would represent a nationally ecologically significant proportion of a population of rufous fantail. The species has not been recorded from the PDA and the available habitat is marginal. The Project footprint does not support an ecologically significant population of the species.

25.3. Migratory (Non-threatened) Shorebirds Significant Impact Assessment

The following sections provide assessment of impacts against the relevant criteria for the non-threatened migratory shorebird species known to occur in and around the Project footprint, including:

- Grey-tailed tattler;
- Whimbrel;
- Terek sandpiper;
- Pacific golden plover;
- Red-necked stint;
- Common greenshank;
- Ruddy turnstone;
- Grey plover;
- Sharp-tailed sandpiper;
- Double-banded plover;
- Black-tailed godwit; and
- Little curlew.

Assessment tables for the migratory shorebirds also listed as threatened species (and therefore addressed in Chapter 24) are included in Appendix 3-A.

25.3.1 Grey-tailed Tattler Migratory Species Significant Impact Assessment

Grey-tailed tattler (*Tringa brevipes*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 17, which provides detailed information on existing grey-tailed tattler populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.3.1.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice under the EPBC Act for grey-tailed tattler, listed as migratory under the EPBC Act.

25.3.1.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to grey-tailed tattler from Project activities are addressed in Section 17.4 with adaptive management and monitoring measures outlined in Section 17.5. Assessment against the EPBC Act significant impact criteria for the migratory species is provided in Table 25-10.

Important habitats used by grey-tailed tattler within or adjacent to the Project footprint include tidal flat feeding habitat and two roost sites: the mangroves fringing Cassim Island and Oyster Point located 400 m south-west of the Project footprint. Tidal flat habitat within or adjoining the Project footprint was used by an average of 12.5 (maximum of 78) grey-tailed tattler at any point in time for feeding during the summer months within the past five years. The Cassim Island roost site was used by an average of 655 (maximum of 1,100) grey-tailed tattler during the non-breeding season. Over the past five years, grey-tailed tattler was recorded roosting at Oyster Point on 1% of non-breeding season high tide surveys, with a maximum of one bird when present. Grey-tailed tattler has not been recorded using roost sites at Nandeebie Claypan or the sandbank 2 km east of the Project footprint.

Assessment of the likelihood of significant residual impacts of the Project on grey-tailed tattler in accordance with significant impact criteria for a migratory species is summarised in Table 25-10. The Project will result in the loss of 28.9 ha of feeding habitat, which corresponds to 0.29 % of the approximately 10,000 ha of important tidal flat habitat within Moreton Bay (Fuller *et al.* 2021).

The Project is likely to have a significant residual impact on grey-tailed tattler by removing an area of important feeding habitat and disrupting the feeding behaviour of an ecologically significant proportion of the population of grey-tailed tattler.

Table 25-10: Assessment of the Grey-tailed Tattler Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Dredging and reclamation will destroy 28.9 ha of tidal flat feeding habitat within the Project footprint that is characterised as important habitat for grey-tailed tattler because it is used by grey-tailed tattler and is located within the MBRS, which supports an important population of the species. The modelling reported in BMT (2022) predicts a small area of scouring due to increased currents over tidal flats adjacent to the Project footprint. However, there is unlikely to be a significant increase in turbidity or sedimentation and therefore no significant impact on benthic invertebrate communities (shorebird food) in tidal flats adjacent to the Project footprint is predicted. Consequently, degradation of important feeding habitat leading to a substantial reduction in migratory shorebirds using feeding habitat adjacent to the Project footprint is unlikely to occur. The Project will have no direct impact on any roost site and is unlikely to substantially modify, destroy or isolate roosting habitat for the species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	No pathways have been identified for an invasive species that is harmful to grey-tailed tattler becoming established in an area of important habitat.

Significant Impact Criteria for Migratory Species	Assessment Summary
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	<p>The loss of 28.9 ha of tidal flat feeding habitat is expected to cause disruption to the feeding behaviour of an average of 12 and a maximum of 78 grey-tailed tattler, corresponding to a maximum of 0.11% of the EAAF population, which is an ecologically significant proportion of the population, as explained in Section 17.4. The Project has potential to disrupt roosting behaviour through increased disturbance of an average of 655 and a maximum of 1,100 grey-tailed tattler, corresponding to a maximum of 1.6% of the EAAF population, which is an ecologically significant proportion of the population.</p> <p>While short-term disruption of roosting behaviour from noise and activity is possible during the dredging and reclamation, particularly revetment wall construction, the risk of disruption will be minimised by scheduling revetment wall construction and activities generating noise levels exceeding 60 dB(A) in the receiving environment of the high-density roost areas to the winter months when fewer migratory shorebirds are present. Disruption from long-term operational activities is unlikely if the recommended mitigation measures are successfully implemented, particularly the exclusion of non-motorised watercraft from entering the Cassim Island roost site.</p>

25.3.2 Whimbrel Migratory Species Significant Impact Assessment

Whimbrel (*Numenius phaeopus*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 17, which provides detailed information on existing whimbrel populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.3.2.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice under the EPBC Act for whimbrel, listed as migratory under the EPBC Act.

25.3.2.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to whimbrel from Project activities are addressed in Section 17.4, with adaptive management and monitoring measures outlined in Section 17.5. Assessment against the EPBC Act significant impact criteria for migratory species is provided in Table 25-11.

Important habitats used by whimbrel within or adjacent to the Project footprint include tidal flat feeding habitat and three roost sites: the mangroves fringing Cassim Island located approximately 50 m from the eastern boundary of the Project footprint, Nandeebie Claypan located 100 m south-west of the Project footprint and Oyster Point located 400 m south-west of the Project footprint at their closest points. Whimbrels also roost on a sandbank 2 km east of the Project footprint. Tidal flat habitat within or closely adjoining the Project footprint was used by an average of 7.6 (maximum of 14) whimbrel at any point in time for feeding during the summer months within the past five years. The Cassim Island roost site was used by an average of 159 (maximum of 190) whimbrel during the summer months over the past five years. Over the past five years, Whimbrel was recorded roosting at Oyster Point on 4% of summer high tide surveys, with an average of one and a maximum of two birds when present.

Assessment of the likelihood of significant residual impacts of the Project on whimbrel in accordance with significant impact criteria for a migratory species is summarised in Table 25-11. The Project will result in the loss of 28.9 ha of feeding habitat, which corresponds to 0.29 % of the approximately 10,000 ha of important tidal flat habitat within Moreton Bay (Fuller *et al.* 2021).

The Project is likely to have a significant residual impact on whimbrel by removing an area of important feeding habitat.

Table 25-11: Assessment of the Whimbrel Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Dredging and reclamation will destroy 28.9 ha of tidal flat feeding habitat that is characterised as important habitat for whimbrel because it is used by whimbrel and is located within the MBRS, which supports an important population of the species. The modelling reported BMT (2022) predicts a small area of scouring due to increased currents over tidal flats adjacent to the Project footprint. However, there is unlikely to be a significant increase in turbidity or sedimentation and therefore no significant impact on benthic invertebrate communities (shorebird food) in tidal flats adjacent to the Project footprint is predicted. Consequently, degradation of important feeding habitat leading to a substantial reduction in migratory shorebirds using feeding habitat adjacent to the Project footprint is unlikely to occur. The Project will have no direct impact on any roost site and is unlikely to substantially modify, destroy or isolate roosting habitat for the species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	No pathways have been identified for an invasive species that is harmful to whimbrel becoming established in an area of important habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	<p>The loss of 28.9 ha of tidal flat feeding habitat is expected to cause disruption to the feeding behaviour of an average of 7.6 and a maximum of 14 whimbrel, corresponding to a maximum of 0.02% of the EAAF population, which is not an ecologically significant proportion of the population, as explained in Section 17.4.</p> <p>The Project has potential to disrupt the roosting behaviour through increased disturbance of an average of 138 and a maximum of 190 whimbrel roosting in the mangroves fringing Cassim Island, corresponding to a maximum of 0.3% of the EAAF population, which is an ecologically significant proportion of the population. While short-term disruption of roosting behaviour from noise and activity is possible during the dredging and reclamation, particularly revetment wall construction, the risk of disruption will be minimised by scheduling revetment wall construction and activities that generate noise levels exceeding 60 dB(A) in the receiving environment to the winter months when fewer migratory shorebirds are present.</p> <p>Long-term disruption from operational activities to resting shorebirds at Cassim Island roost site is unlikely if the recommended mitigation measures are successfully implemented, particularly the exclusion of non-motorised watercraft from entering the Cassim Island roost site.</p>

25.3.3 Terek Sandpiper Migratory Species Significant Impact Assessment

Terek sandpiper (*Xenus cinereus*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for vulnerable species.

This section should be read in conjunction with Chapter 17, which provides detailed information on existing terek sandpiper populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.3.3.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice under the EPBC Act for terek sandpiper, listed as migratory under the EPBC Act.

25.3.3.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to terek sandpiper from Project activities are addressed in Section 17.4 with adaptive management and monitoring measures outlined in Section 17.5. Assessment against the EPBC Act significant impact criteria for migratory species is provided in Table 25-12.

Important habitats used by terek sandpiper within or adjacent to the Project footprint include tidal flat feeding habitat and two roost sites, the mangroves fringing Cassim Island located approximately 50 m from the eastern boundary of the Project footprint, and Oyster Point located 400 m south-west of the Project footprint at their closest points. Tidal flat habitat within or closely adjoining the Project footprint was used by an average of 4.6 (maximum of 36) terek sandpiper at any point in time for feeding during the summer months within the past five years. The Cassim Island roost site was used by an average of 32 (maximum of 50) terek sandpiper during summer over the past five years. Terek sandpiper has not been recorded roosting at Oyster Point over the past five years, but has been recorded roosting there rarely in small numbers in prior years. Terek Sandpiper has not been recorded roosting at Nandeebie Claypan or the sandbank 2 km east of the Project footprint.

Assessment of the likelihood of significant residual impacts of the Project on terek sandpiper in accordance with significant impact criteria for a migratory species is summarised in Table 25-12. The Project will result in the loss of 28.9 ha of feeding habitat, which corresponds to 0.29 % of the approximately 10,000 ha of important tidal flat habitat within Moreton Bay (Fuller *et al.* 2021).

The Project is likely to have a significant residual impact on terek sandpiper by removing an area of important feeding habitat.

Table 25-12: Assessment of the Terek Sandpiper Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Dredging and reclamation will destroy 28.9 ha of tidal flat feeding habitat that is characterised as important habitat for terek sandpiper because it is used by terek sandpiper and is located within the MBRS, which supports an important population of the species. The modelling reported in BMT (2022) predicts a small area of scouring due to increased currents over tidal flats adjacent to the Project footprint. However, there is unlikely to be a significant increase in turbidity or sedimentation and therefore no significant impact on benthic invertebrate communities (shorebird food) in tidal flats adjacent to the Project footprint is predicted. Consequently, degradation of important feeding habitat leading to a substantial reduction in migratory shorebirds using feeding habitat adjacent to the Project footprint is unlikely to occur. The Project will have no direct impact on any roost site and is unlikely to substantially modify, destroy or isolate roosting habitat for the species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	No pathways have been identified for an invasive species that is harmful to terek sandpiper becoming established in an area of important habitat.

Significant Impact Criteria for Migratory Species	Assessment Summary
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	<p>The loss of 28.9 ha of tidal flat feeding habitat is expected to cause disruption to the feeding behaviour of an average of 4.6 and a maximum of 36 terek sandpiper, corresponding to a maximum of 0.07% of the EAAF population, which is not an ecologically significant proportion of the population, as explained in Section 17.4. The Project has potential to disrupt the roosting behaviour through increased disturbance of an average of 33 and a maximum of 50 terek sandpiper roosting in the mangroves fringing Cassim Island, corresponding to a maximum of 0.1% of the EAAF population, which is an ecologically significant proportion of the population.</p> <p>While short-term disruption of roosting behaviour from noise and activity is possible during the dredging and reclamation, particularly revetment wall construction, the risk of disruption will be minimised by scheduling revetment wall construction and activities generating noise levels exceeding 60 dB(A) in the receiving environment to the winter months when fewer migratory shorebirds are present. Long-term disruption from operational activities to resting shorebirds at Cassim Island roost site is unlikely if the recommended mitigation measures are successfully implemented, particularly the exclusion of non-motorised watercraft from entering the Cassim Island roost site.</p>

25.3.4 Pacific Golden Plover Migratory Species Significant Impact Assessment

Pacific golden plover (*Pluvialis fulva*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 17, which provides detailed information on existing Pacific golden plover populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.3.4.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice under the EPBC Act for Pacific golden plover, listed as migratory under the EPBC Act.

25.3.4.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to Pacific golden plover from Project activities are addressed in Section 17.4 with adaptive management and monitoring measures outlined in Section 17.5. Assessment against the EPBC Act significant impact criteria for migratory species is provided in Table 25-13.

Pacific golden plover has not been recorded foraging within the Project footprint. There is only one record of Pacific golden plover roosting at Nandeebie Claypan, a single bird in October 1998, and no recorded roosting at Oyster Point or Cassim Island. The species regularly roosts on an offshore sandbank 2 km east of the Project footprint, with up to 17 birds present, representing up to 0.01% of the flyway population of the species.

Assessment of the likelihood of significant residual impacts of the Project on Pacific golden plover in accordance with significant impact criteria for a migratory species is summarised in Table 25-13.

The Project will not result in a significant impact on Pacific golden plover.

Table 25-13: Assessment of the Pacific Golden Plover Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Dredging and reclamation will destroy 28.9 ha of tidal flat shorebird feeding habitat. While this habitat is characterised as important habitat for migratory shorebirds, it is not used by Pacific golden plover, a species that uses other areas of Moreton Bay. The modelling reported in BMT (2022) predicts a small area of scouring due to increased currents over tidal flats adjacent to the Project footprint. However, there is unlikely to be a significant increase in turbidity or sedimentation and therefore no significant impact on benthic invertebrate communities (shorebird food) in tidal flats adjacent to the Project footprint is predicted. Consequently, degradation of important feeding habitat leading to a substantial reduction in migratory shorebirds using feeding habitat adjacent to the Project footprint is unlikely to occur. The Project will have no direct or indirect impacts that could modify, destroy or isolate roosting habitat used by Pacific golden plover.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	No pathways have been identified for an invasive species that is harmful to Pacific golden plover becoming established in an area of important habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	Project is unlikely to seriously disrupt the feeding behaviour of Pacific golden plover since the species does not feed in the Project footprint. The Project is unlikely to seriously disrupt the roosting behaviour of Pacific golden plover if the recommended mitigation measures are successfully implemented, also noting that the small numbers recorded roosting at an offshore sandbank 2 km east of the Project footprint do not represent an ecologically significant proportion of the population.

25.3.5 Red-necked Stint Migratory Species Significant Impact Assessment

Red-necked stint (*Calidris ruficollis*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 17, which provides detailed information on existing red-necked stint populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.3.5.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice under the EPBC Act for red-necked stint, listed as migratory under the EPBC Act.

25.3.5.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to red-necked stint from Project activities are addressed in Section 17.4 with adaptive management and monitoring measures outlined in Section 17.5. Assessment against the EPBC Act significant impact criteria for migratory species is provided in Table 25-14.

Red-necked stint was rarely recorded feeding on the tidal flats within the Project footprint, with between two and three birds recorded on 6% of summer-season surveys. There is only one record of red-necked stint roosting at Nandeebie Claypan since 1995: a flock of 35 birds in August 2016, and only two records of one and eight birds roosting at Oyster

Point in 2019. There is a single record of 29 birds roosting on an offshore sandbank 2 km east of the Project footprint in April 2014, representing 0.006% of the flyway population of the species. The species does not roost at Cassim Island.

Assessment of the likelihood of significant residual impacts of the Project on red-necked stint in accordance with significant impact criteria for a migratory species is summarised in Table 25-14. The Project will result in the loss of 28.9 ha of feeding habitat, which corresponds to 0.29 % of the approximately 10,000 ha of important tidal flat habitat within Moreton Bay reported by Fuller *et al.* (2021).

The Project is likely to have a significant impact on red-necked stint by removing an area of important feeding habitat that is used rarely by between two and three birds.

Table 25-14: Assessment of the Red-necked Stint Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Significant residual impact likely. Dredging and reclamation will destroy 28.9 ha of tidal flat feeding habitat that is characterised as important habitat for red-necked stint because it is located within the MBRS, which supports an important population of the species, and is used by red-necked stint, albeit rarely. The modelling reported in BMT (2022) predicts a small area of scouring due to increased currents over tidal flats adjacent to the Project footprint. However, there is unlikely to be a significant increase in turbidity or sedimentation and therefore no significant impact on benthic invertebrate communities (shorebird food) in tidal flats adjacent to the Project footprint is predicted. Consequently, degradation of important feeding habitat leading to a substantial reduction in migratory shorebirds using feeding habitat adjacent to the Project footprint is unlikely to occur. The Project will have no direct impacts that could modify, destroy or isolate roosting habitat used by red-necked stint.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	Significant residual impact unlikely. No pathways have been identified for an invasive species that is harmful to red-necked stint becoming established in an area of important habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	Significant residual impact unlikely. The Project is unlikely to seriously disrupt the feeding behaviour of red-necked stint since the species so rarely feeds in the Project footprint. The Project is unlikely to seriously disrupt the roosting behaviour of red-necked stint if the recommended mitigation measures are successfully implemented, also noting that the roost sites are used occasionally by up to 0.006% of the EAAF population, which is not an ecologically significant proportion of the population, as explained in Section 17.4.

25.3.6 Common Greenshank Migratory Species Significant Impact Assessment

Common greenshank (*Tringa nebularia*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for vulnerable species.

This section should be read in conjunction with Chapter 17, which provides detailed information on existing common greenshank populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.3.6.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice under the EPBC Act for common greenshank, listed as migratory under the EPBC Act.

25.3.6.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to common greenshank from Project activities are addressed in Section 17.4 with adaptive management and monitoring measures outlined in Section 17.5. Assessment against the EPBC Act significant impact criteria for migratory species is provided in Table 25-15.

Common greenshank was rarely recorded feeding on the tidal flats of the Project footprint, with a group of four birds recorded on a single survey of Bush (2017), which represents a frequency of occurrence of 3% of summer-season surveys. Small numbers of common greenshank have roosted occasionally at Cassim Island (two records of 1-4 birds) and rarely at Oyster Point (five records of 1-4 birds since 2001). The species has not been recorded roosting at Nandeebie Claypan or a sandbank 2 km east of the Project footprint.

Assessment of the likelihood of significant residual impacts of the Project on common greenshank in accordance with significant impact criteria for a migratory species is summarised in Table 25-15. The Project will result in the loss of 28.9 ha of feeding habitat, which corresponds to 0.29 % of the approximately 10,000 ha of important tidal flat habitat within Moreton Bay reported by Fuller *et al.* (2021).

The Project is likely to have a significant impact on common greenshank by removing an area of important feeding habitat which is used rarely by up to four birds.

Table 25-15: Assessment of the Common Greenshank Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Dredging and reclamation will destroy 28.9 ha of tidal flat feeding habitat that is characterised as important habitat for common greenshank because it is located within the MBRS, which supports an important population of the species, and is used by common greenshank, albeit rarely. The modelling reported in BMT (2022) predicts a small area of scouring due to increased currents over tidal flats adjacent to the Project footprint. However, there is unlikely to be a significant increase in turbidity or sedimentation and therefore no significant impact on benthic invertebrate communities (shorebird food) in tidal flats adjacent to the Project footprint is predicted. Consequently, degradation of important feeding habitat leading to a substantial reduction in migratory shorebirds using feeding habitat adjacent to the Project footprint is unlikely to occur. The Project will have no direct or indirect impacts that could modify, destroy or isolate roosting habitat used by common greenshank.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	No pathways have been identified for an invasive species that is harmful to common greenshank becoming established in an area of important habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	The Project is unlikely to seriously disrupt the feeding behaviour of common greenshank since the species so rarely feeds in the Project footprint. The Project is unlikely to seriously disrupt the roosting behaviour of common greenshank if the recommended mitigation measures are successfully implemented, also noting that the roost sites are used rarely by up to 0.004% of the EAAF population, which is not an ecologically significant proportion of the population, as explained in Section 17.4.

25.3.7 Ruddy Turnstone Migratory Species Significant Impact Assessment

Ruddy turnstone (*Arenaria interpres*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 17, which provides detailed information on existing ruddy turnstone populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.3.7.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice under the EPBC Act for ruddy turnstone, listed as migratory under the EPBC Act.

25.3.7.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to ruddy turnstone from Project activities are addressed in Section 17.4 with adaptive management and monitoring measures outlined in Section 17.5. Assessment against the EPBC Act significant impact criteria for migratory species is provided in Table 25-16.

Ruddy turnstone has not been recorded foraging on the tidal flats within the Project footprint. Ruddy turnstone have roosted at Cassim Island and rarely at Oyster Point. Cassim Island was used throughout the summer months and supported an average of 22 and maximum of 50 birds over the past five years, representing up to 0.16% of the flyway population. Oyster Point was used rarely by up to two birds. Similarly, the sandbank 2 km to the east of the Project footprint was used once by two birds. The species has not been recorded roosting at Nandeebie Claypan.

Assessment of the likelihood of significant residual impacts of the Project on ruddy turnstone in accordance with significant impact criteria for a migratory species is summarised in Table 25-16.

The Project will not result in a significant impact on ruddy turnstone.

Table 25-16: Assessment of the Ruddy Turnstone Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Dredging and reclamation will destroy 28.9 ha of tidal flat shorebird feeding habitat. While this habitat is characterised as important habitat for migratory shorebirds, it is not used by ruddy turnstone. The species uses other areas of Moreton Bay, which supports an important population of the species. The modelling reported in BMT (2022) predicts a small area of scouring due to increased currents over tidal flats adjacent to the Project footprint. However, there is unlikely to be a significant increase in turbidity or sedimentation and therefore no significant impact on benthic invertebrate communities (shorebird food) in tidal flats adjacent to the Project footprint is predicted. Consequently, degradation of important feeding habitat leading to a substantial reduction in migratory shorebirds using feeding habitat adjacent to the Project footprint is unlikely to occur. The Project will have no direct or indirect impacts that could modify, destroy or isolate roosting habitat used by the species.
Result in an invasive species that is harmful to the migratory species becoming established in	No pathways have been identified for an invasive species that is harmful to ruddy turnstone becoming established in an area of important habitat.

Significant Impact Criteria for Migratory Species	Assessment Summary
an area of important habitat for the migratory species	
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	<p>The Project is unlikely to seriously disrupt the feeding behaviour of ruddy turnstone since the species does not feed in the Project footprint. The Project has potential to disrupt the roosting behaviour through increased disturbance of an average of 22 and a maximum of 50 ruddy turnstone roosting in the mangroves fringing Cassim Island, corresponding to a maximum of 0.16% of the EAAF population, which is an ecologically significant proportion of the population. While short-term disruption of roosting behaviour from noise and activity is possible during the dredging and reclamation, particularly revetment wall construction, the risk of disruption will be minimised by scheduling revetment wall construction and activities that generate noise levels exceeding 60 dB(A) in the receiving environment to the winter months when fewer migratory shorebirds are present. Long-term disruption from operational activities to resting shorebirds at the Cassim Island roost site is unlikely if the recommended mitigation measures are successfully implemented, particularly the exclusion of non-motorised watercraft from entering the Cassim Island roost site.</p>

25.3.8 Grey Plover Migratory Species Significant Impact Assessment

Grey plover (*Pluvialis squatarola*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 17, which provides detailed information on existing grey plover populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.3.8.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice under the EPBC Act for grey plover, listed as migratory under the EPBC Act.

25.3.8.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to grey plover from Project activities are addressed in Section 17.4, with adaptive management and monitoring measures outlined in Section 17.5. Assessment against the EPBC Act significant impact criteria for migratory species is provided in Table 25-17.

Grey plover has not been recorded foraging within the Project footprint, but a single bird was occasionally recorded feeding on adjoining tidal flats. The species has not been recorded roosting at any of the roost sites adjacent to the Project footprint.

Assessment of the likelihood of significant residual impacts of the Project on grey plover in accordance with significant impact criteria for a migratory species is summarised in Table 25-17.

The Project will not result in a significant impact on grey plover.

Table 25-17: Assessment of the Grey Plover Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Dredging and reclamation will destroy 28.9 ha of tidal flat shorebird feeding habitat. While this habitat is characterised as important habitat for migratory shorebirds, it is not used by grey plover, a species that uses other areas of Moreton Bay. The modelling reported in BMT (2022) predicts a small area of scouring due to increased currents over tidal flats adjacent to the Project footprint. However, there is unlikely to be a significant increase in turbidity or sedimentation and therefore no significant impact on benthic invertebrate communities (shorebird food) in tidal flats adjacent to the Project footprint is predicted. Consequently, degradation of important feeding habitat leading to a substantial reduction in migratory shorebirds using feeding habitat adjacent to the Project footprint is unlikely to occur. The Project will have no direct or indirect impacts that could modify, destroy or isolate roosting habitat used by the species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	No pathways have been identified for an invasive species that is harmful to grey plover becoming established in an area of important habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	The Project is unlikely to seriously disrupt the feeding behaviour of grey plover since the species does not feed in the Project footprint. The Project is unlikely to seriously disrupt the roosting behaviour of grey plover since the species does not use roost sites adjacent to the Project footprint.

25.3.9 Sharp-tailed Sandpiper Migratory Species Significant Impact Assessment

Sharp-tailed sandpiper (*Calidris acuminata*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 17, which provides detailed information on existing sharp-tailed sandpiper populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.3.9.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice under the EPBC Act for sharp-tailed sandpiper, listed as migratory under the EPBC Act.

25.3.9.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to sharp-tailed sandpiper from Project activities are addressed in Section 17.4, with adaptive management and monitoring measures outlined in Section 17.5. Assessment against the EPBC Act significant impact criteria for migratory species is provided in Table 25-18.

Sharp-tailed sandpiper has not been recorded foraging within the Project footprint. Sharp-tailed sandpiper have roosted occasionally at Oyster Point, with up to 28 birds over the past five years, representing up to 0.03% of the flyway population of the species.

Assessment of the likelihood of significant residual impacts of the Project on sharp-tailed sandpiper in accordance with significant impact criteria for a migratory species is summarised in Table 25-18.

The Project will not result in a significant impact on sharp-tailed sandpiper.

Table 25-18: Assessment of the Sharp-tailed Sandpiper Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Sharp-tailed sandpiper does not use tidal flat feeding habitat in the Project footprint. The species uses other areas of Moreton Bay. The Project will have no direct or indirect impacts that could modify, destroy or isolate roosting habitat used by the species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	No pathways have been identified for an invasive species that is harmful to sharp-tailed sandpiper becoming established in an area of important habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	The Project is unlikely to seriously disrupt the feeding behaviour of sharp-tailed sandpiper since the species does not feed in the Project footprint. The Project is unlikely to seriously disrupt the roosting behaviour of sharp-tailed sandpiper if the recommended mitigation measures to reduce the risk of increased disturbance to the Oyster Point roost are successfully implemented, also noting that this roost site is not used by an ecologically significant proportion of the population of the species.

25.3.10 Double-banded Plover Migratory Species Significant Impact Assessment

Double-banded plover (*Charadrius bicinctus*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 17, which provides detailed information on existing double-banded plover populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.3.10.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice under the EPBC Act for double-banded plover, listed as migratory under the EPBC Act.

25.3.10.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to double-banded plover from Project activities are addressed in Section 17.4, with adaptive management and monitoring measures outlined in Section 17.5. Assessment against the EPBC Act significant impact criteria for migratory species is provided in Table 25-19.

Double-banded plover has not been recorded foraging within the Project footprint or adjacent tidal flats and was last recorded roosting at Oyster Point nearly 30 years ago. The species has not been recorded roosting at Cassim Island, Nandeebie Claypan or the sandbank 2 km east of the Project footprint.

Assessment of the likelihood of significant residual impacts of the Project on double-banded plover in accordance with significant impact criteria for a migratory species is summarised in Table 25-19.

The Project will not result in a significant impact on double-banded plover.

Table 25-19: Assessment of the Double-banded Plover Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Dredging and reclamation will destroy 28.9 ha of tidal flat shorebird feeding habitat. While this habitat is characterised as important habitat for migratory shorebirds, it is not used by double-banded plover; the species uses other areas of Moreton Bay.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	No pathways have been identified for an invasive species that is harmful to double-banded plover becoming established in an area of important habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	The Project is unlikely to seriously disrupt the feeding behaviour of double-banded plover since the species does not feed in the Project footprint. The Project is unlikely to seriously disrupt the roosting behaviour of double-banded plover if the recommended mitigation measures are successfully implemented, also noting that double-banded plover has not used roost sites adjacent to the Project within the past 29 years.

25.3.11 Black-tailed Godwit Migratory Species Significant Impact Assessment

Black-tailed godwit (*Limosa limosa*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 17, which provides detailed information on existing black-tailed godwit populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.3.11.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice under the EPBC Act for black-tailed godwit, listed as migratory under the EPBC Act.

25.3.11.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to black-tailed godwit from Project activities are addressed in Section 17.4 with adaptive management and monitoring measures outlined in Section 17.5. Assessment against the EPBC Act significant impact criteria for migratory species is provided in Table 25-20.

Black-tailed godwit has not been recorded foraging within the Project footprint or adjacent tidal flats. There is a single record of a flock of 115 birds roosting at Nandeebie Claypan in December 1999, 23 years ago. The species has not been recorded roosting at Cassim Island, Oyster Point or the sandbank 2 km east of the Project footprint.

Assessment of the likelihood of significant residual impacts of the Project on black-tailed godwit in accordance with significant impact criteria for a migratory species is summarised in Table 25-20.

The Project will not result in a significant impact on black-tailed godwit.

Table 25-20: Assessment of the Black-tailed Godwit Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Dredging and reclamation will destroy 28.9 ha of tidal flat shorebird feeding habitat. While this habitat is characterised as important habitat for migratory shorebirds, it is not used by black-tailed godwit; the species uses other areas of Moreton Bay.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	No pathways have been identified for an invasive species that is harmful to black-tailed godwit becoming established in an area of important habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	The Project is unlikely to seriously disrupt the feeding behaviour of black-tailed godwit since the species does not feed in the Project footprint. The Project is unlikely to seriously disrupt the roosting behaviour of black-tailed godwit if the recommended mitigation measures are successfully implemented, also noting that black-tailed godwit has not used roost sites adjacent to the Project within the past 23 years.

25.3.12 Little Curlew Migratory Species Significant Impact Assessment

Little curlew (*Numenius minutus*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 17, which provides detailed information on existing Little Curlew populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.3.12.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice under the EPBC Act for little curlew, listed as migratory under the EPBC Act.

25.3.12.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to little curlew from Project activities are addressed in Section 17.4, with adaptive management and monitoring measures outlined in Section 17.5. Assessment against the EPBC Act significant impact criteria for migratory species is provided in Table 25-21.

Little curlew has not been recorded foraging within the Project footprint or adjacent tidal flats. There is a single record of two birds roosting at Nandeebie Claypan in October 2000, 22 years ago. The species has not been recorded roosting at Cassim Island, Oyster Point or the sandbank 2 km east of the Project footprint.

Assessment of the likelihood of significant residual impacts of the Project on little curlew in accordance with significant impact criteria for a migratory species is summarised in Table 25-21.

The Project will not result in a significant impact on little curlew.

Table 25-21: Assessment of the Little Curlew Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Impact Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Dredging and reclamation will destroy 28.9 ha of tidal flat shorebird feeding habitat. While this habitat is characterised as important habitat for migratory shorebirds, it is not used by little curlew; the species is a vagrant to SEQ.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	No pathways have been identified for an invasive species that is harmful to little curlew becoming established in an area of important habitat.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	The Project is unlikely to seriously disrupt the feeding behaviour of little curlew since the species does not feed in the Project footprint. The Project is unlikely to seriously disrupt the roosting behaviour of little curlew if the recommended mitigation measures are successfully implemented, also noting that little curlew has not used roost sites adjacent to the Project within the past 22 years.

25.4. Marine Migratory Species Significant Impact Assessment

The following sections provide assessment of impacts against the relevant criteria for the migratory marine species known to occur in and around the Project footprint, including:

- Humpback whale
- Australian humpback dolphin
- Dugong

Assessment tables for the southern right whale, loggerhead turtle, green turtle and hawksbill turtle are included in Appendix 3-A.

25.4.1 Humpback Whale Migratory Species Significant Impact Assessment

Humpback whale (*Megaptera novaeangliae*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 16, which provides detailed information on existing Humpback Whale populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.4.1.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice or recovery plan under the EPBC Act for humpback whale, listed as migratory under the EPBC Act.

25.4.1.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to humpback whale from Project activities are addressed in Section 16.5, with adaptive management and monitoring measures outlined in Section 16.6. Assessment against the EPBC Act significant impact criteria for migratory species is provided in Table 25-22.

Humpback whales occur in two separate populations within Australian waters, the west and east coast populations. Sightings along both coasts are seasonal and coincide with the annual migration between breeding areas in tropical waters and Antarctic feeding grounds. Australia's east coast population experiences one of the world's largest humpback whale migration (Meynecke *et al.* 2013). Humpback whales in the eastern population migrate annually between subtropical breeding grounds along the north-east coast of Australia and high-latitude feeding areas in the Antarctic (Stack *et al.* 2020). The migratory pathway of humpback whales is on the eastern side of the large sand islands that separate Moreton Bay and the Pacific Ocean. During the southward spring migration in particular, individuals may enter Moreton Bay through the northern entrance and can occur as far into the bay as the shallow waters around Peel and Green Islands (Lanyon *et al.* 2019). The shallow water in the vicinity of the MIA is unsuitable habitat for this species.

Assessment of the likelihood of significant residual impacts of the Project on humpback whale in accordance with significant impact criteria for a migratory species is summarised in Table 25-22.

The Project will not result in a significant residual impact on humpback whale.

Table 25-22: Assessment of the Humpback Whale Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Moreton Bay is identified as a BIA for humpback whales resting on migration. While northern areas of Moreton Bay are important to humpback whales, the predominantly intertidal and shallow habitats of the Project footprint do not offer suitable habitat for resting humpback whales. The Project will not substantially modify the habitat of this species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	The Project will not result in the introduction of an invasive species that is harmful to this species.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	The MIA is rarely used by humpback whales, and the predominantly intertidal and shallow habitats of the Project footprint do not offer suitable habitat for resting humpback whales. The Project will not seriously disrupt the lifecycle of an ecologically significant proportion of the humpback whale population that migrates up the east coast of Australia.

25.4.2 Australian Humpback Dolphin Migratory Species Significant Impact Assessment

Australian humpback dolphin (*Sousa sahulensis*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 16, which provides detailed information on existing Australian humpback dolphin populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.4.2.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice or recover plan under the EPBC Act for this species, listed as migratory under the EPBC Act.

25.4.2.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to Australian humpback dolphin from Project activities are addressed in Section 16.5, with adaptive management and monitoring measures outlined in Section 16.6. Assessment against the EPBC Act significant impact criteria for migratory species is provided in Table 25-23.

Australian humpback dolphin (*Sousa sahulensis*) use the tropical and sub-tropical waters of Australia, with the core habitat of the Moreton Bay population in the central west of the bay, primarily around the Port of Brisbane.

Assessment of the likelihood of significant residual impacts of the Project on Australian humpback dolphin in accordance with significant impact criteria for a migratory species is summarised in Table 25-23.

The Project will not result in a significant impact on Australian humpback dolphin.

Table 25-23: Assessment of the Humpback Dolphin Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Using the definition of important habitat in the Guidelines, the MIA does not provide important habitat for this species as it does not support an ecologically significant proportion of the population, the habitat is not of critical importance at a particular life-cycle stage, it is not at the limit of the species range, and the population of this species is not declining in the MIA or Moreton Bay. Further, the Project will not significantly impact any habitat used by this species. Areas frequented by humpback dolphins in Moreton Bay include the central-western side of the bay, the mouth of the Brisbane River and Port of Brisbane, Pulan (Amity Point), Jercuruba (Peel Island) and Bribie Island. While these dolphins may occasionally use the area in the vicinity of the Project, it is not important habitat for this migratory species.
Result in an invasive species that is harmful to the migratory species becoming established in an area of important habitat for the migratory species	The Project is unlikely to result in an invasive species becoming established, nor is the area important habitat for Australian humpback dolphin populations.
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant	The Project will not seriously disrupt the lifecycle of Australian humpback dolphin populations around the Project footprint or in Moreton Bay.

Significant Impact Criteria for Migratory Species	Assessment Summary
proportion of the population of a migratory species	

25.4.3 Dugong Migratory Species Significant Impact Assessment

Dugong (*Dugong dugon*) is listed as migratory under the EPBC Act therefore is required to be assessed against significant impact criteria for migratory species.

This section should be read in conjunction with Chapter 16, which provides detailed information on existing dugong populations at the Project footprint, potential impacts resulting from the Project and proposed management measures.

25.4.3.1 Relevant Conservation Advice and Recovery Plans

There is no approved Conservation Advice or recovery plan under the EPBC Act for dugong, listed as migratory under the EPBC Act.

25.4.3.2 Assessment Against the EPBC Act Significant Impact Assessment Criteria

Potential impacts to dugong from Project activities are addressed in Section 16.5, with adaptive management and monitoring measures outlined in Section 16.6. Assessment against the EPBC Act significant impact criteria for migratory species is provided in Table 25-24.

Moreton Bay is home to a good population of dugong which utilise seagrass habitats for their primary food source. While dugongs are known to utilise the habitats within the Project footprint, it is unlikely to have a significant impact on the species, with the majority of activity occurring on the Eastern Banks of Moreton Bay.

Assessment of the likelihood of significant residual impacts of the Project on dugong in accordance with significant impact criteria for a migratory species is summarised in Table 25-24.

The Project will not result in a significant impact on dugong.

Table 25-24: Assessment of the Dugong Against the Migratory Species Significant Impact Criteria.

Significant Impact Criteria for Migratory Species	Assessment Summary
Substantially modify (including by fragmenting, altering fire regimes, altering nutrient cycles or altering hydrological cycles), destroy or isolate an area of important habitat for a migratory species	Using the definition of important habitat in the Guidelines, the MIA does not provide important habitat for this species as it does not support an ecologically significant proportion of the population, the habitat is not of critical importance at a particular life-cycle stage, it is not at the limit of the species range, and the population of this species is not declining in the MIA or Moreton Bay. Further, the Project will not significantly impact any habitat used by this species. While dugongs use the area in the vicinity of the proposed Project, the Eastern Banks habitat of Moreton Bay consistently has the highest density of dugongs and is considered to be the most important area for dugongs in the bay. The Project will not substantially modify, destroy or isolate an area of important habitat for dugongs.
Result in an invasive species that is harmful to the migratory species becoming established in	The Project is unlikely to result in an invasive species becoming established, nor is the area important habitat for dugong populations with the majority of the population found on the Eastern Banks

Significant Impact Criteria for Migratory Species	Assessment Summary
an area of important habitat for the migratory species	
Seriously disrupt the lifecycle (breeding, feeding, migration or resting behaviour) of an ecologically significant proportion of the population of a migratory species	The Project footprint is not important breeding, feeding, migratory or resting habitat for dugongs, and is therefore unlikely to seriously disrupt the lifecycle of a significant proportion of the dugong population.

25.5. Summary of Significant Residual Impacts to Migratory Species

Assessment against the relevant criteria for the migratory species MNES found the following species are likely to be significantly impacted by the Project:

- Grey-tailed tattler;
- Whimbrel;
- Terek sandpiper;
- Red-necked stint; and
- Common greenshank.

Similar to the threatened species all five migratory species considered likely to be significantly impacted are migratory shorebirds. The dominant migratory species observed at Toondah Harbour were the Grey-tailed tattler and Whimbrel. Both species were observed consistently feeding on the mudflats within the Project footprint in low numbers (average of 12.5 and 7.6 when present for the grey-tailed tattler and whimbrel respectively) and both used Cassim Island as roosting habitat. Cassim Island is a significant roosting site for Grey-tailed tattler in particular with an average of 655 birds observed whenever they were present. An average of 159 whimbrels and 32 terek sandpipers were also observed when present at Cassim Island. Based on these observations the roost site is considered internationally significant for grey-tailed tattler, and nationally significant for whimbrel and terek sandpiper.

While short-term disruption of roosting behaviour from noise and activity is possible at Cassim Island during construction, particularly revetment wall construction, the risk of disruption will be minimised by scheduling activities generating noise levels exceeding 60 dB(A) in the receiving environment of the high-density roost areas to the winter months when fewer migratory shorebirds are present. Disruption from long-term operational activities is unlikely once mitigation measures are successfully implemented, particularly the exclusion of non-motorised watercraft from entering the Cassim Island roost site.

The Project will result in the loss of 28.9 ha of feeding habitat for these species, which corresponds to 0.29% of the approximately 10,000 ha of important tidal flat habitat within Moreton Bay (Fuller *et al.* 2021). The loss of this habitat and potential for significant impacts on these species will be offset through a range of projects delivered through the Environmental Offsets Strategy (Chapter 29). These projects will be required to demonstrate a conservation benefit to the matter being impacted.