Rockhampton Ring Road

Report - Migratory Bird Survey

1167108-DJV-0EN10-RPT-000006 | 02

22 October 2021

Department of Transport and Main Roads

Rockhampton Ring Road

Project No:	1167108
Document Title:	Report – Migratory Bird Survey
Document No.:	1167108-DJV-0EN10-RPT-000006
Revision:	01
Date:	22 October 2021
Client Name:	Department of Transport and Main Roads
Client No:	
Project Manager:	Darren Leeson
Authors:	T Jenkins, D Weller
File Name:	

159 Denison St
Rockhampton QLD 4700

Document history and status

Revision	Date	Description	Author	Reviewer	Approver
01	21.07.2021	Report – Migratory Bird Survey	T. Jenkins	D. Weller M. Zulpo	E. Van Dyk
02	01.11.2021	Report – Migratory Bird Survey	D. Weller J. Diflo	M. Zulpo	E. Van Dyk

Contents

List of Figures

List of Tables

1. Introduction

1.1 Project Description

The Rockhampton Ring Road Project (RRR) is the key piece of road infrastructure recommended in the Fitzroy River Floodplain and Road Planning Study, which investigated long-term solutions for flooding impacts on freight, road and rail transport in and around the city of Rockhampton.

The RRR will provide a western road link of the Bruce Highway to the west of Rockhampton, with key linkages into the city at the Capricorn Highway, West Rockhampton, Alexandra Street and Yaamba Road (Rockhampton – Yeppoon Road).

The RRR alignment will integrate with major infrastructure already completed, including Yeppen North and Yeppen South, as well as current works in development including the Rockhampton Northern Access Upgrade and Capricorn Highway Duplication (Rockhampton – Gracemere).

The RRR commences on the Capricorn Highway approximately 2 km west of the intersection of the Bruce and Capricorn Highways at the Yeppen Roundabout and its alignment traverses north through the Western Yeppen Floodplain, sweeping around the Rockhampton Airport at Pink Lily and connecting to West Rockhampton near Ridgelands Road before crossing the Fitzroy River north of Limestone Creek. After crossing the Fitzroy River, the RRR intersects Alexandra Street in Parkhurst and connects with the Bruce Highway at the Bruce Highway and Rockhampton - Yeppoon Road intersection.

The total combined length of the Project is 17 km (including the West Rockhampton Connector Road). The length of the Project from the Capricorn Highway intersection to the Yeppoon Road intersection is 14.7 km (excluding the West Rockhampton Connector Road). Refer to Figure 1 for the project layout.

Figure 1-1 – Project Layout

The project is a joint initiative of the Australian and State governments and intends to:

- Improve road safety and provide strength to the region's economy by improving freight efficiency and flood resilience
- Strengthen connectivity between key employment, leisure, tourism and residential growth areas of Rockhampton and the wider region
- Provide job opportunities for residents of Central Queensland and surrounding regions, along with providing opportunities for local businesses to help deliver the Project.

1.2 Project Aims and Objectives

The aim of the migratory shorebird assessment was to document the presence, abundance, behaviour and habitat utilization of the target species during the 2021 visitation period. The survey replicates previous survey effort from 2019 (AECOM, 2020a) and 2020 (AECOM, 2020b) and was aimed at augmenting the data from these surveys. The aims of this survey were to:

- Review existing relevant data for the Project Area
- Develop and implement a targeted survey methodology based on the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (Department of the Environment and Energy, 2017).
- Identify the presence or potential presence of the targeted species
- Identify the presence of "important habitat" for migratory shorebirds
- Identify and characterise the extent of potential habitat within the Project Area and broader Survey Area
- Provide the required level of survey information to adequately inform the Significant Impact Assessment process on EPBC Act-listed migratory bird species, detailed in the Rockhampton Ring Road Preliminary Documentation (Jacobs SMEC Design Joint Venture, 2021).

1.3 Project Area and Survey Area

The ***Project Area*** generally aligns with the gazetted road corridor for the Rockhampton Ring Road and with the proposed corridor for the Rockhampton Connector Road. It is the area proposed to be disturbed, altered, or used for the construction or operation of the Rockhampton Ring Road. The total combined length of the Project is 17 km (including the Rockhampton Connector Road). The length of the Project from the Capricorn Highway intersection to the Yeppoon Road intersection is 14.7 km (excluding the Rockhampton Connector Road).

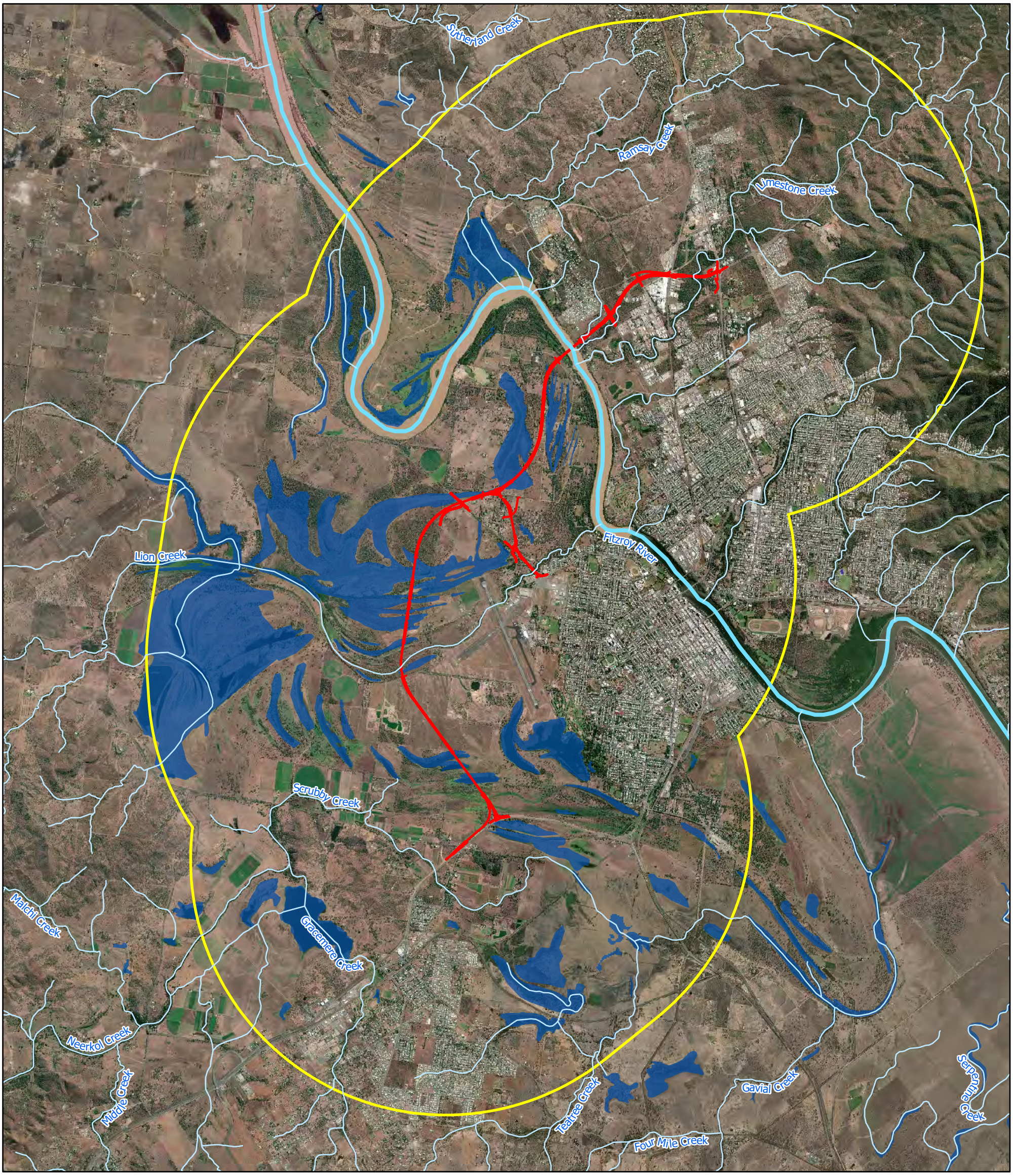
The ***Survey Area*** encompasses all wetland habitat and other potential migratory shorebird habitat within 6 km of the Project Area, however field survey focused on the areas of potential habitat rather than the entire Survey Area.

Consideration of habitat usage at both the local and regional scale is important for migratory bird species that frequent dynamic inland wetland areas as they are particularly responsive to changes in habitat conditions. A key defining feature of the National Migratory Shorebird Program (formerly Shorebirds 2020) run by BirdLife Australia is the notion of a 'Shorebird Area'. Following Clemens et al. (Clemens, Weston, Haslem, Silcocks, & Ferris, 2010) a shorebird area is defined as: the geographic area that has been used by the same group of shorebirds over the main non-breeding period, which is effectively the home range of the local shorebird population when present. Shorebird areas may include multiple roosting and feeding habitats. While most migratory shorebird areas will represent contiguous habitat, non-contiguous habitats may be included as part of the same area where there is evidence of regular bird movement between them. Designated migratory Shorebird Areas therefore often extend beyond the boundaries of a property or project area, and may also extend beyond Ramsar site boundaries for internationally important areas due to Ramsar site boundaries, in some areas, not encapsulating an entire wetland area, or habitat areas utilised by migratory birds on a daily basis,

Previous ecological surveys identified areas of potential migratory shorebird habitat but were largely restricted to the Project Area (AECOM, 2020a) (AECOM, 2020b). In order to assess the relative importance of wetlands present within the Project Area, migratory bird surveys were conducted at all wetland areas within 6 km of the Project Area. This is herein referred to as the Survey Area (Figure 1.2). Survey methodology and survey area extent are further detailed in Chapter 4.

It should be noted that survey effort was subject to land access approval under TMR's Notice of Entry process. This required landowners to be notified by mail in advance of surveys being undertaken, and identification of potentially suitable habitat areas by reviewing aerial imagery to inform this process. All areas identified as part of this desktop habitat identification process were able to be visited and surveyed as part of the current migratory shorebird assessment.

Figure 1-1 (Project Locality)



Legend

- Major Watercourse
- Minor Watercourse
- Project Alignment
- Wetlands
- Survey Area

Jacobs does not warrant that this document is definitive nor free of errors and does not accept liability for any loss caused or arising from reliance upon information provided herein.

GDA 1994 MGA Zone 56

A3 1:75,000

N

0 1 2

Kilometres

Jacobs SMEC

Jacobs SMEC Design Joint Venture

Rockhampton Ring Road

Source: DNRME: Roads, Watercourses (2020; Metromap: Imagery (2020)

C:\Users\bannisri\Desktop\Projects\IW243700\Spatial\ArcGIS\Figures\RRR_Environment.aprx Produced: 12/04/2021 Author: BannisRI

2. Regulatory Framework

2.1 Environment Protection and Biodiversity Conservation Act 1999

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) provides the legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places. These are defined under the EPBC Act as 'Matters of National Environmental Significance' (MNES). Under the provisions of the EPBC Act, an action that is likely to have a significant impact on a MNES requires the approval of the Minister for Environment.

The Act identifies nine MNES:

1. World Heritage properties
2. National heritage places
3. Wetlands of international importance (Ramsar wetlands)
4. Nationally listed threatened species and communities
5. Listed migratory species
6. Protection of the environment from nuclear actions
7. Commonwealth marine environment
8. The Great Barrier Reef Marine Park
9. A water resource, in relation to coal seam gas development and large coal mine development.

The MNES relevant to this report is 'listed migratory species'.

Migratory shorebirds routinely visiting Australia travel through the East-Asian Australasian Flyway (EAAF). Many of these species breed as far north as Siberia and Alaska during the boreal (northern hemisphere) summer and migrate to non-breeding grounds in Australia and New Zealand to avoid the northern winter and take advantage of energy rich food sources in the southern hemisphere. Migrating shorebirds arrive in northern Australia between August and early November. Many birds remain in the northern hemisphere, but others disperse southwards for the austral summer.

The EPBC Act includes a list of migratory shorebird species, comprising:

- Migratory species which are native to Australia and are included in the appendices to the Bonn Convention
- Migratory species included in annexes established under the Japan-Australia Migratory Bird Agreement (JAMBA) and the China-Australia Migratory Bird Agreement (CAMBA)
- Native, migratory species identified in a list established under an international agreement such as the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA).

3. Migratory shorebird species

There are 37 species of regular migratory shorebird that visit Australia on a regular and predictable basis. The following 29 migratory shorebird species have previously been recorded in the vicinity of the Project Area (10 km buffer). Most of these records relate to coastal intertidal environs. Of these species, six have been previously recorded in proximity to the Project Area, mainly from Murray Lagoon:

- Black-tailed Godwit
- Common Greenshank
- Curlew Sandpiper
- Latham's Snipe
- Marsh Sandpiper
- Sharp-tailed Sandpiper

The following 37 species of migratory shorebird were targeted during the 2021 survey program:

Table 3-1: Targeted Migratory Shorebird species listed under the EPBC Act

Scientific Name	Common Name
Actitis hypoleucos	Common sandpiper
Arenaria interpres	Ruddy turnstone
Calidris acuminate	**Sharp-tailed sandpiper**
Calidris alba	Sanderling
Calidris canutus	Red Knot*
Calidris ferruginea	**Curlew sandpiper***
Calidris melanotos	**Pectoral sandpiper**
Calidris ruficollis	**Red-necked stint**
Calidris subminuta	Long-toed stint
Calidris tenuirostris	Great Knot*
Charadrius bicinctus	Double-banded plover
Charadrius dubius	Little ringed plover
Charadrius leschenaultii	Greater sand plover*
Charadrius mongolus	Lesser sand plover*
Charadrius veredus	Oriental plover
Gallinago hardwickii	**Latham's snipe**
Gallinago megala	Swinhoe's snipe
Gallinago stenura	Pin-tailed snipe
Glareola maldivarum	Oriental pratincole
Limicola falcinellus	Broad-billed sandpiper
Limnodromus semipalmatus	Asian dowitcher
Limosa lapponica	Bar-tailed godwit*
Limosa limosa	**Black-tailed godwit**
Numenius madagascariensis	Eastern Curlew*
Numenius minutus	**Little curlew**

Scientific Name	Common Name
Numenius phaeopus	Whimbrel
Phalaropus lobatus	Red-necked phalarope
Philomachus pugnax	Ruff
Pluvialis fulva	Pacific golden plover
Pluvialis squatarola	Grey plover
Tringa brevipes	Grey-tailed tattler
Tringa glareola	**Wood sandpiper**
Tringa incana	Wandering tattler
Tringa nebularia	**Common greenshank**
Tringa stagnatilis	**Marsh sandpiper**
Tringa tetanus	Common redshank
Xenus cinereus	Terek sandpiper

* Species also listed as threatened under the EPBC Act

Species shown in bold text are those expected to utilise habitat within the Project Area and surrounds, based on habitat assessment, review of database records, and observers' experience with migratory shorebird conservation ecology and monitoring.

4. Assessment Methodology

Migratory shorebird assessment methodology was developed in accordance with the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (Department of the Environment and Energy, 2017). Two existing survey events had been undertaken prior to the two events detailed in this assessment, detailed below (AECOM 2020a, 2020b). The additional surveys undertaken as part of the current assessment meet the requirements outlined in the EPBC Act Policy Statement 3.21, which stipulate a minimum of four migratory bird surveys be undertaken to assess the importance of a given area for migratory birds. In areas which support Important Habitat, or numbers of migratory bird species in excess of their respective 0.1 or 1.0% flyway population thresholds, a fifth survey is also a requirement, however, in the context of the habitats available in the Rockhampton region, there are no species exceeding these thresholds in the Austral spring summer period, with the exception of Latham's Snipe. Based on available bird observation data, given most migratory birds recorded in the region occur in low numbers during the austral spring/summer, or overwintering period, it is highly unlikely that any of these species would occur in numbers exceeding the thresholds in the Austral winter. This is well documented in the vast majority of Australian shorebird monitoring areas, where the winter population of a given species can be up to 70% less than the summer population, owing to the fact that the majority of birds observed in summer are on migration or in breeding areas in the northern hemisphere. Latham's Snipe is the only species for which an important population had been identified prior to this assessment. Latham's Snipe depart Australia for their breeding areas in Japan and far south-eastern Russia between late March and April each year. It is widely understood and well documented that the entire population of Latham's Snipe migrate each season, regardless of their age, such that observations of Latham's Snipe over the Austral winter are extremely rare. For the above reasons, it was deemed unnecessary to undertake a winter migratory bird survey for the RRR Project as the likelihood of recording any migratory bird species in numbers that would constitute an important population was extremely low.

4.1 AECOM February 2019 Survey

In February 2019, two targeted migratory shorebird surveys were undertaken by AECOM to identify areas of potential important habitat and to identify migratory shorebirds that may be impacted by the Project. The surveys were undertaken over two five-day periods from 4-8 February 2019 and 11-15 February 2019. Replicate surveys were recommended following the 2019 survey in order to measure population variability within the Project Area. Further details can be found in the Terrestrial Fauna and Migratory Birds Technical Report Rockhampton Ring Road (AECOM, 2020a).

4.2 AECOM March 2020 Survey

A second targeted migratory shorebird survey was undertaken by AECOM in March 2020 to identify the shorebird species and their habitat within the Project Area. The survey replicated the February 2019 methods and was conducted over five days from 16-20 March by four ecologists. Target species were those listed as Migratory under the EPBC Act. Due to the 2019 survey yielding a high abundance of Latham's Snipe, this species was specifically targeted, with additional survey techniques utilised during the March 2020 survey. Further details can be found in the Migratory Shorebird Survey Report (AECOM, 2020b).

4.3 SMEC March 2021 Surveys

Two additional migratory shorebird surveys were undertaken in addition to those previously completed by AECOM in February 2019 and March 2020.

These surveys replicated and built on the methods used by AECOM.

4.3.1 Site Selection

As prescribed by the EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (Department of the Environment and Energy, 2017), all possible wetlands and watercourses were identified within the Survey Area to assess areas of potential important habitat for migratory shorebirds. Wetlands were selected based on their proximity to the Project Area, the habitat values observed and recorded during the previous migratory shorebird surveys (AECOM, 2020a) (AECOM, 2020b), and a review of historical database records of migratory bird species in the broader Rockhampton region.

4.3.2 Survey Timing

Migratory shorebird abundance varies during the Austral spring and summer, particularly in the north of the country, due to higher numbers of shorebirds during southward (August-November) and northward (March-May) migration periods at the beginning and end of the non-breeding season. Timing for migratory shorebird surveys must consider this population fluctuation in addition to the suitability of habitat conditions in ephemeral areas i.e. when water is present with a minimally vegetated, exposed margin (Department of the Environment and Energy, 2017).

The survey timing followed the *EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species* (Department of the Environment and Energy, 2017). The field surveys were undertaken in two separate survey events: 8-11 March and 24-26 March. These surveys coincided with the end of the spring and summer period for visiting migratory shorebirds immediately prior to their departure to their northern hemisphere breeding areas. These surveys include replicates of the two previous surveys undertaken in February 2019 and March 2020, providing an indication of habitat use over three Austral summer seasons.

Climatic conditions leading up to the February 2019 were relatively dry, with the majority of wetlands across the Fitzroy River Floodplain not holding any water. Rockhampton had significant rainfall in February and March of 2020 which created good survey conditions for the March 2020 survey event (AECOM, 2020b), although habitat conditions at the majority of the wetlands within the Project Area were less than ideal due to their being an overabundance of water and limited muddy margins and shallow verges for migratory shorebird foraging. Summer rainfall prior to the March 2021 survey was extremely lacking and as such wetlands within the survey area provided limited habitat for migratory shorebird species, with only a small number of mapped wetland areas holding water, and an even smaller number providing suitable migratory bird habitat.

Whilst water levels and habitat conditions varied substantially between each of the surveys, they demonstrate the dynamic nature of the Fitzroy River floodplain wetland mosaic and subsequent highly variable habitat availability and suitability afforded to visiting migratory waterbird and shorebird species.

4.3.3 Survey Techniques

Multiple survey techniques were employed to maximise detection of migratory shorebirds utilising habitat within the Survey Area, and to assess the relative importance of habitat for these species within the Project Area. Given the results from previous surveys in 2019 yielding a high abundance of Latham's Snipe, this species was specifically targeted with additional techniques including the implementation of flushing transects through suitable wetland and wetland margin habitats.

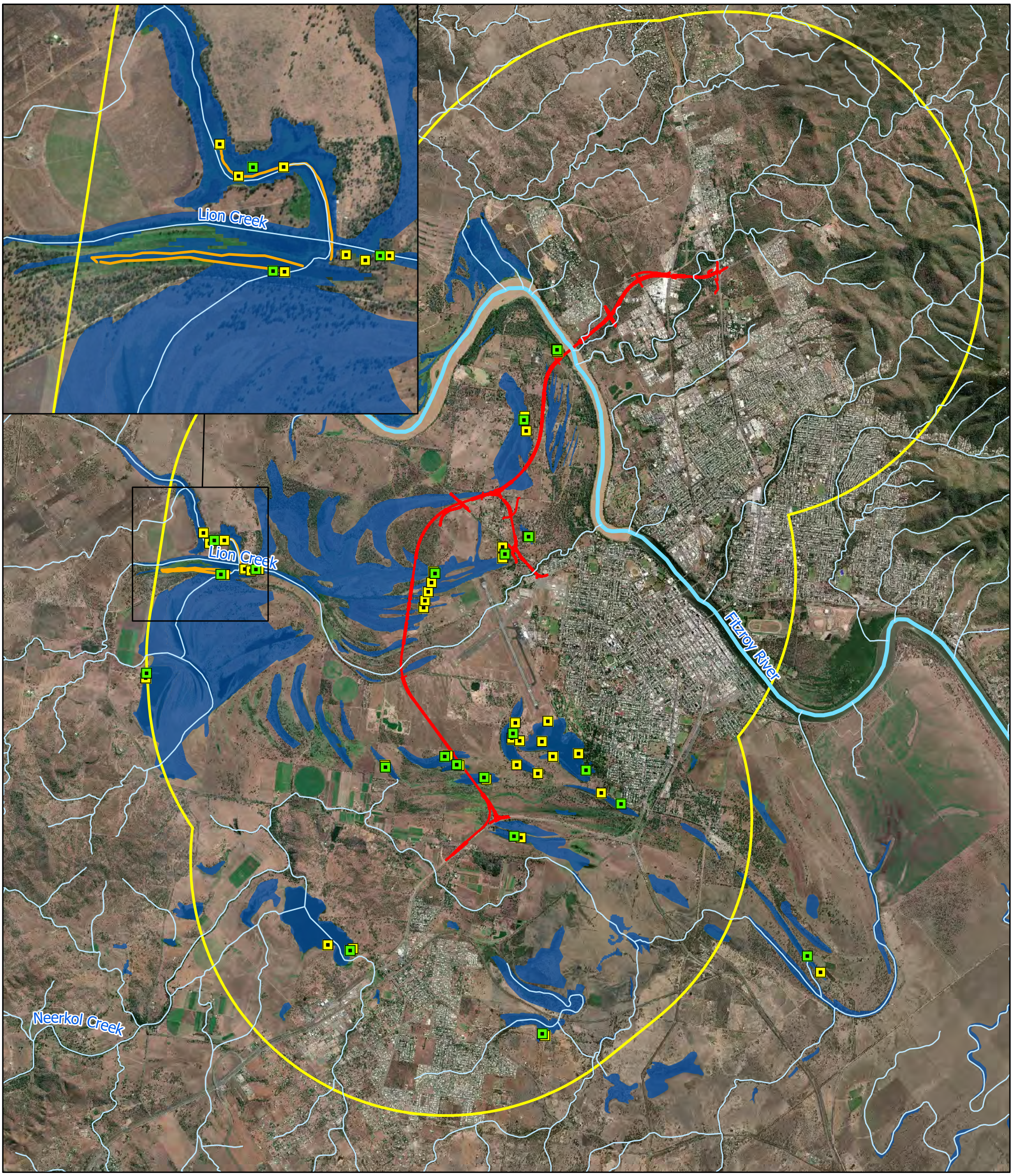
The survey techniques included:

- **Point count surveys** – This technique involved recording the presence and abundance of each species detected at a series of specified locations. Sampling points were systematically pre-determined within the Survey Area and were scheduled for visits at different times throughout daylight hours. Spotting scopes were used to visually identify species from a distance, and record abundance, behaviours and species' richness. Time allocated at each point was a minimum of 20 minutes, however this was regularly significantly extended where it was considered to be necessary (i.e. when bird abundance and diversity was high). A total of 70 point count surveys were conducted as part of the March 2021 surveys.
- **Flushing transects** – This involved a group of observers walking parallel at 3-5 meter (m) spacing, across an area of suitable habitat. This technique was employed to target Latham's snipe as the species typically utilises fringing vegetation for cover and can be difficult to detect by point count surveys. A total of four flushing transects were completed at wetlands which supported fringing vegetation in which Snipe were found to be seeking refuge. Most wetlands had notably low water levels which resulted in this methodology not being required.
- **Habitat assessment** – A total of 21 habitat assessments were undertaken to characterise the habitat values for migratory shorebirds within the Survey Area. Habitat attributes recorded during the habitat assessments include:
    - A description of the soil and the wetland features (i.e. wetted width, shape, depth)
    - Presence of habitat features necessary for shorebirds e.g. muddy margins, fringing vegetation, riparian vegetation
    - Presence and abundance waterbirds and shorebirds
    - Habitat suitability for wading shorebirds

- Habitat suitability for Latham's snipe
- Disturbance
- Survey conditions
- Any other significant habitat features or values present.

The locations of the point count surveys, flushing transects and habitat assessments are shown on

Figure 3-1 (Survey Locations)



Rockhampton Ring Road

Source: DNRME: Roads, Watercourses (2020; Metromap: Imagery (2020)

C:\Users\bannisri\Desktop\Projects\IW243700\Spatial\ArcGIS\Figures\RRR_Environment.aprx Produced: 12/04/2021 Author: BannisRI

4.3.4 Survey Effort

Increased survey effort was undertaken at large wetlands or wetlands with greater ecological value for migratory birds as identified during previous surveys. All wetlands within the Survey Area are non-tidal and as such the survey coverage, survey timing and minimum data requirements relating to non-tidal areas were considered when developing the methodology, as defined in EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (Department of the Environment and Energy, 2017).

Surveyed wetlands are shown in Figure 4-2 and the timing and effort of survey at each wetland is described in Table 4-1. Each wetland was targeted at different times throughout the day wherever possible, including dawn and dusk to observe diurnal and crepuscular habits, as well as avoiding the hottest part of the day when birds are least active and visibility is poor.

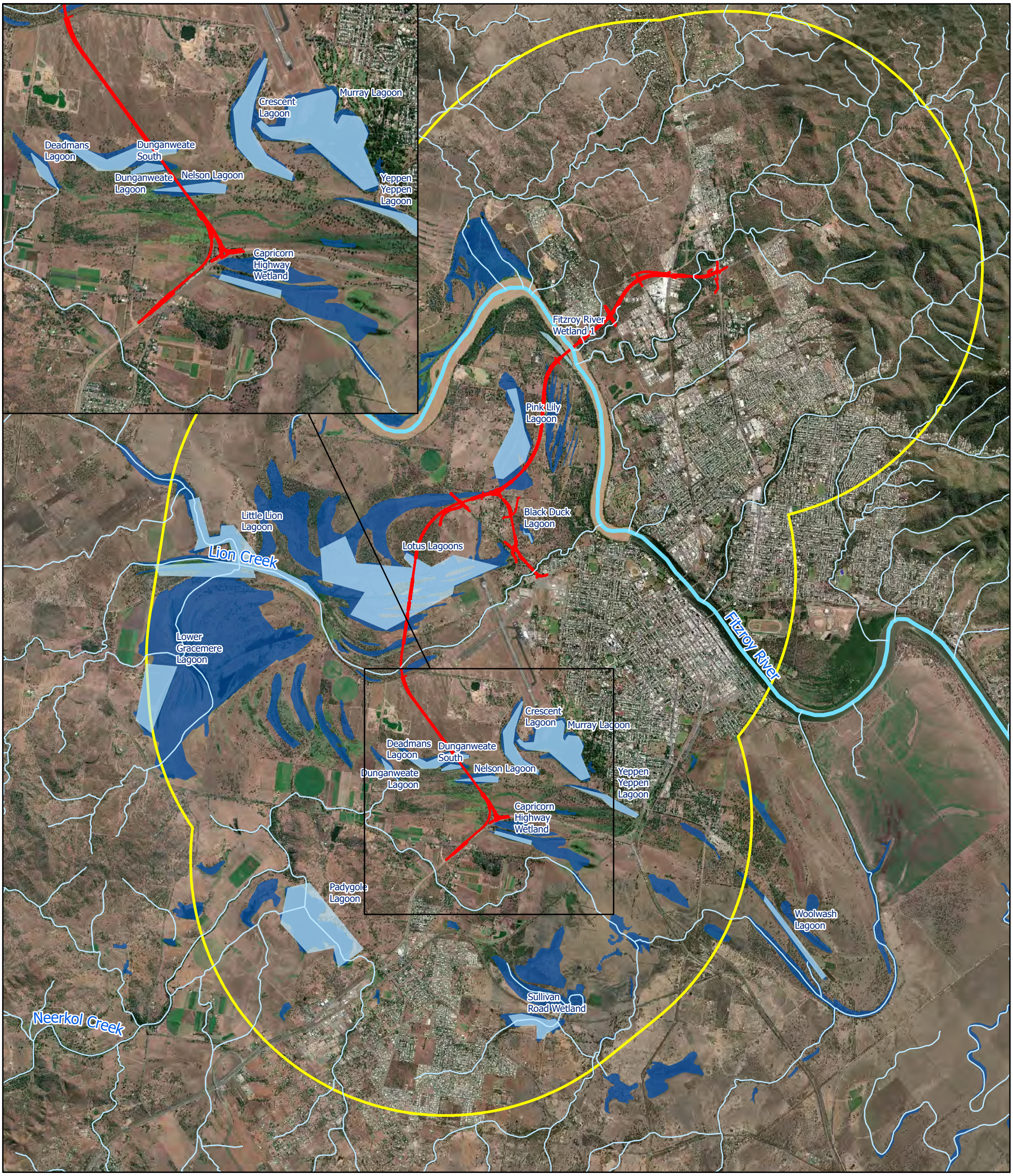
Table 4-1: Surveyed Wetlands

Reference ID	Wetland Name	Coordinates	Survey Date	Survey Effort
1	Murray Lagoon	-23.3971, 150.4812 -23.3992, 150.4884 -23.3997, 150.4881	9/3/2021 11/3/2021 25/3/2021	7 point count surveys
2	Crescent Lagoon	-23.3979, 150.4755 -23.3979, 1503.4755	9/3/2021 25/3/2021	5 point count surveys
3	Lower Gracemere Lagoon	-23.3843, 150.4051 -23.3846, 150.4055	10/3/2021 25/3/2021	2 point count surveys
4	Padygole Lagoon	-23.4326, 150.443	9/3/2021 10/3/2021 26/3/2021	2 point count surveys
5	Little Lion Lagoon	-23.3591, 150.4172 -23.3665, 150.4209	10/3/2021 25/3/2021 10/3/2021 25/3/2021	4 flush transects 16 point count surveys
6	Dunganweate Lagoon	-23.3993, 150.4631	10/3/2021 25/3/2021	2 point count surveys
7	Nelson Lagoon	-23.4034, 150.4718 -23.4036, 150.4704	10/3/2021 25/3/2021	2 point count surveys
8	Dunganweate South Lagoon	-23.401, 150.4652	10/3/2021 25/3/2021	2 point count surveys
9	Deadmans Lagoon	-23.3995, 150.4503 -23.4008, 150.451	10/3/2021 25/3/2021	2 point count surveys
10	Yeppen Yeppen Lagoon	-23.4063, 150.4923	9/3/2021 24/3/2021	2 point count surveys

Reference ID	Wetland Name	Coordinates	Survey Date	Survey Effort
11	Capricorn Lagoon	-23.4127, 150.4735 -23.414, 150.478	9/3/2021 25/3/2021	2 point count surveys
12	Woolwash Lagoon	-23.4387, 150.5337	9/3/2021 24/3/2021	2 point count surveys
13	Fitzroy River South Bank	-23.3282, 150.885	9/3/2021 24/3/2021	6 point count surveys
14	Sullivan Road Wetland	-23.4491, 150.4807	9/3/2021 26/3/2021	2 point count surveys
15	Pink Lily Lagoon[1]	-23.3421, 150.4792 -23.3391, 150.4784	9/2/2021 24/3/2021	2 point count surveys
16	Lotus Lagoon[1]	-23.3667, 150.4610 -23.3686, 150.4605 -23.3700, 150.4604 -23.3718, 150.4592 -23.3730, 150.4589 -23.3625, 150.4742 -23.3644, 150.4742	10/3/2021 24/3/2021 25/3/2021	12 point count surveys
17	Black Duck Lagoon[1]	-23.3608, 150.4794 -23.3607, 150.4790	9/3/2021 24/3/2021	2 point count surveys

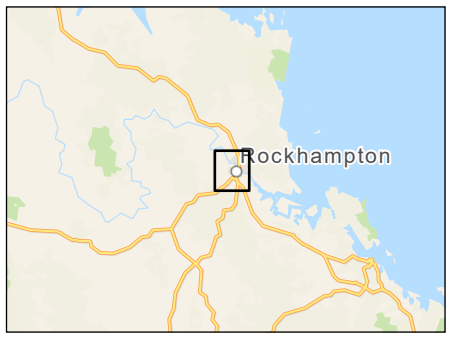
[1]Species results for these wetlands are not included in Section 5 due to the lack of water present during surveys.

Figure 3-2 (Surveyed Wetlands)



Legend

- Major Watercourse
- Minor Watercourse
- Project Alignment
- Survey Area
- Surveyed wetlands
- Wetlands



Jacobs does not warrant that this document is definitive nor free of errors and does not accept liability for any loss caused or arising from reliance upon information provided herein.

GDA 1994 MGA Zone 56

A3 1:75,000

N

0 1 2

Kilometres

Jacobs SMEC

Jacobs SMEC Design Joint Venture

Rockhampton Ring Road

Source: DNRME: Roads, Watercourses (2020; Metromap: Imagery (2020)

C:\Users\bannisri\Desktop\Projects\IW243700\Spatial\ArcGIS\Figures\RRR_Environment.aprx Produced: 12/04/2021 Author: BannisRI

4.4 Limitations

The field surveys were undertaken in two separate survey events: 8-11 March and 24-26 March. These surveys coincided with the end of the spring and summer period for visiting migratory shorebirds immediately prior to their departure to their northern hemisphere breeding areas. These surveys are replicates of the two previous surveys undertaken in February 2019 and March 2020, providing an indication of habitat use over three austral summer seasons.

The climatic conditions and lack of rain prior to and during the March 2021 surveys resulted in several of the large wetlands being completely dry during the survey period. Under different conditions, i.e. wetlands holding more water, or water being more available across the landscape, numbers of migratory birds are likely to vary. This is due to their ability to adapt and respond to local conditions and opportunistically seek out and colonise wetlands that provide adequate water levels, foraging resources, and roosting sites to support them until they depart northwards around the end of March each year. For species such as Latham's Snipe, which are known to demonstrate a high degree of site fidelity (i.e. return to the same areas each year), the local population is expected to be roughly consistent overall, but will be concentrated in and around wetlands which are providing suitable habitat conditions at that time.

Due to the dry conditions at the time of the surveys, flushing transects were limited to lagoons that held suitable habitat values for the Latham's Snipe.

5. Assessment Results

5.1 Climatic Conditions

The migratory shorebird surveys were undertaken over two three-day periods between 8 and 11 March 2021 and 24 and 26 March 2021. Weather conditions over these periods consisted of warm days with moderate to high humidity and mild nights.

A review of the daily weather observations sourced from the Bureau of Meteorology (BOM) Rockhampton Weather Station (Station 4102) recorded the minimum and maximum temperatures during the first survey as 20.9 °C and 35.1 °C (recorded on 10 March 2021) respectively and 19.8°C and 35.3°C (recorded on 26 March and 24 March) respectively for the second survey.

A total of 4.4 mm of rainfall was recorded on 8 March 2021 and a total of 7.8 mm and 10.6 mm on the 24 and 25 March 2021 (Bureau of Meteorology, 2021).

5.2 Wetland Values

Migratory shorebird species are known to utilise a wide variety of wetland habitats for foraging. Typical foraging habitat is either in or near water, with long-legged species wading up to a depth of 15 cm. Intertidal mudflats, ocean beaches and rocky coastlines are utilised by shorebirds in marine habitats with river estuaries including saltmarsh and mangroves making up coastal wetland habitats. Shorebirds also utilise freshwater wetland habitats such as marshes and the margins of lagoons and along creeks (Department of the Environment, 2015). Urbanised areas such as parks with open grassland and golf courses, may also be utilised as potential habitat by migratory shorebirds.

Non-tidal wetlands such as the inland floodplain wetland systems within the Survey Area tend to provide highly productive food sources for migratory shorebirds. Climatic variability however, results in many of these inland wetlands exhibiting an ephemeral hydroperiod and only able to provide suitable habitat every few years (Department of the Environment and Energy, 2017). Additionally, climatic variation can also cause significant and relatively sudden changes to the availability of suitable habitat for migratory shorebirds. For example, periods of drought may reduce suitable fringing vegetation in which species such as the Latham's Snipe, rely on for refuge.

The wetlands within the Survey Area consisted of both permanent and ephemeral waterbodies, most also exhibiting signs of degradation, largely as result of unhindered livestock access. Leading up to the March 2021 surveys, the Rockhampton region had experienced an unseasonably dry summer, resulting in some of the most extensive wetlands (Pink Lily Lagoon and Lotus Lagoon) containing no water and also lacking any aquatic or semi-aquatic fringing vegetation that was present at most other wetlands.

Wetlands within the Survey Area are all part of the Fitzroy River Floodplain and Delta Important Bird Area or Key Biodiversity Area. The majority of these wetlands are highly variable in terms of their size, depth, bank profile, vegetative characteristics and surrounding land use, but are all recharged by local catchment runoff or riverine flooding, or a combination of both under certain conditions. As a result, the habitat conditions they each provide is also highly variable, largely driven by the availability and amount of water they each hold, particularly during the austral summer when most migratory shorebird populations are in Australia. This is particularly evident by reviewing wetland conditions and resultative bird diversity and abundances observed over the course of the migratory bird survey program (February 2019 – one survey (AECOM, 2020a), March 2020 – one survey (AECOM, 2020b), March 2021 – two surveys (this assessment).

Given the dynamic nature of wetland habitat within and adjacent to the Project Area, their respective importance to migratory birds is also highly variable between years and within seasons. In a local and regional landscape context, the Fitzroy River floodplain wetland mosaic affords visiting migratory shorebirds an abundance of options when they begin arriving from August each year, and their ability to adapt and respond to local conditions allows them to seek out and colonise wetlands that provide adequate water levels, foraging resources, and roosting sites to support them until they depart northwards around the end of March each year. At the local and regional landscape scale, based on historical database records and the survey program assessment results, the wetlands in the Fitzroy River Floodplain collectively comprise important habitat for a number of migratory bird species. At the local and regional landscape scale, the wetlands in the Fitzroy River Floodplain and Delta are expected to collectively provide a range of suitable habitat in differing locations at different times - every wetland within the Fitzroy River floodplain is not expected to provide suitable habitat on an annual consistent or predictable basis.

Under the EPBC Act, important habitat is a key concept for migratory species, as identified in *EPBC Act Policy Statement 1.1 Significant Impact Guidelines – Matters of National Environmental Significance* (Department of the Environment, 2013). Important habitat in Australia for migratory shorebirds under the Act include those recognised as internationally or nationally important. The widely accepted and applied approach to identifying internationally important shorebird habitat throughout the world has been through use of criteria adopted under the Ramsar Convention. The Wildlife Conservation Plan for Migratory Shorebirds and EPBC Act Policy Statement 3.21 - Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species (Department of the Environment and Energy, 2017), both stipulate that criteria to be used to identify a site of international importance for migratory shorebirds are that the site regularly supports:

- 1% of the individuals in the flyway population of one species or subspecies of migratory shorebird or
- A total abundance of at least 20,000 waterbirds.

Nationally important habitat for migratory shorebirds has been defined in these same documents, using a similar approach to the international criteria, i.e. if the site regularly supports:

- 0.1% of the flyway population of a single species of migratory shorebird or
- 2000 migratory shorebirds or
- 15 migratory shorebird species.

'Support' is defined differently depending on whether the habitat is considered permanent or ephemeral.

For permanent wetlands, 'support' is defined as: migratory shorebirds are recorded during surveys and/or known to have occurred within the area during the previous five years. For ephemeral wetlands, 'support' is defined as: habitat that migratory shorebirds have ever been recorded in, and where that habitat has not been lost permanently due to previous actions.

Specifically, in response to the criteria provided by the Commonwealth for assessing Important Habitat for migratory shorebirds, the following is provided:

- The Project Area is not located adjacent to, nor contained within any sites identified as internationally important for migratory shorebirds.
- With the exception of Latham's snipe, the Project Area is not located adjacent to, nor contained within any sites that support 0.1% or more of the flyway population of any of the recorded migratory shorebird species, given the very low densities of birds recorded during the surveys.
- The Project Area is not located adjacent to, nor contained within any sites that were observed to support 2,000 or more individual migratory shorebirds.
- The Project Area is not located adjacent to, nor contains any sites that were observed to support 15 or more migratory shorebird species.

The shorebird habitat values of wetlands observed during the surveys is provided in Appendix A .

5.3 Bird Diversity

Bird diversity was high throughout the Survey Area with a total of 45 waterbirds and shorebirds recorded; 32 waterbirds, five resident shorebirds, four migratory shorebirds and four migratory/nomadic waterbirds. Diversity was highest at Padygole Lagoon with a total of 29 species recorded.

Most commonly recorded species throughout the Survey Area included the Pacific Black Duck (*Anas superciliosa)* recorded at 14 wetlands; Great Egret (*Ardea alba)* and Masked Lapwing (*Vanellus miles)* recorded at 13 wetlands; Australian Wood Duck (*Chenonetta jubata)* and Intermediate Egret (*Ardea intermedia)* recorded at 12 wetlands.

The following four migratory shorebirds were recorded:

- Sharp-tailed Sandpiper: A total of 22 individuals were recorded during Survey 1 across three wetlands (Sullivan Rd Wetland, Crescent Lagoon, Lower Gracemere Lagoon). Survey 2 however saw only two individuals at one wetland (Sullivan Rd Wetland).

- Latham's Snipe: A total of 45 individuals were recorded during Survey 1 across four wetlands (Woolwash Lagoon, Crescent Lagoon, Little Lion Lagoon, Murray Lagoon). Survey 2 saw only two individuals across two wetlands (Little Lion Lagoon, Woolwash Lagoon).

- Black-tailed Godwit: A total of 40 individuals were recorded during Survey 1 at two wetlands (Padygole Lagoon, Lower Gracemere Lagoon). Survey 2 saw 20 individuals present at the same two wetlands.

- Marsh Sandpiper: Four individuals were recorded at a single wetland (Padygole Lagoon) during Survey 2.

Three migratory waterbirds were observed during the surveys, these birds are listed as migratory under the EPBC Act:

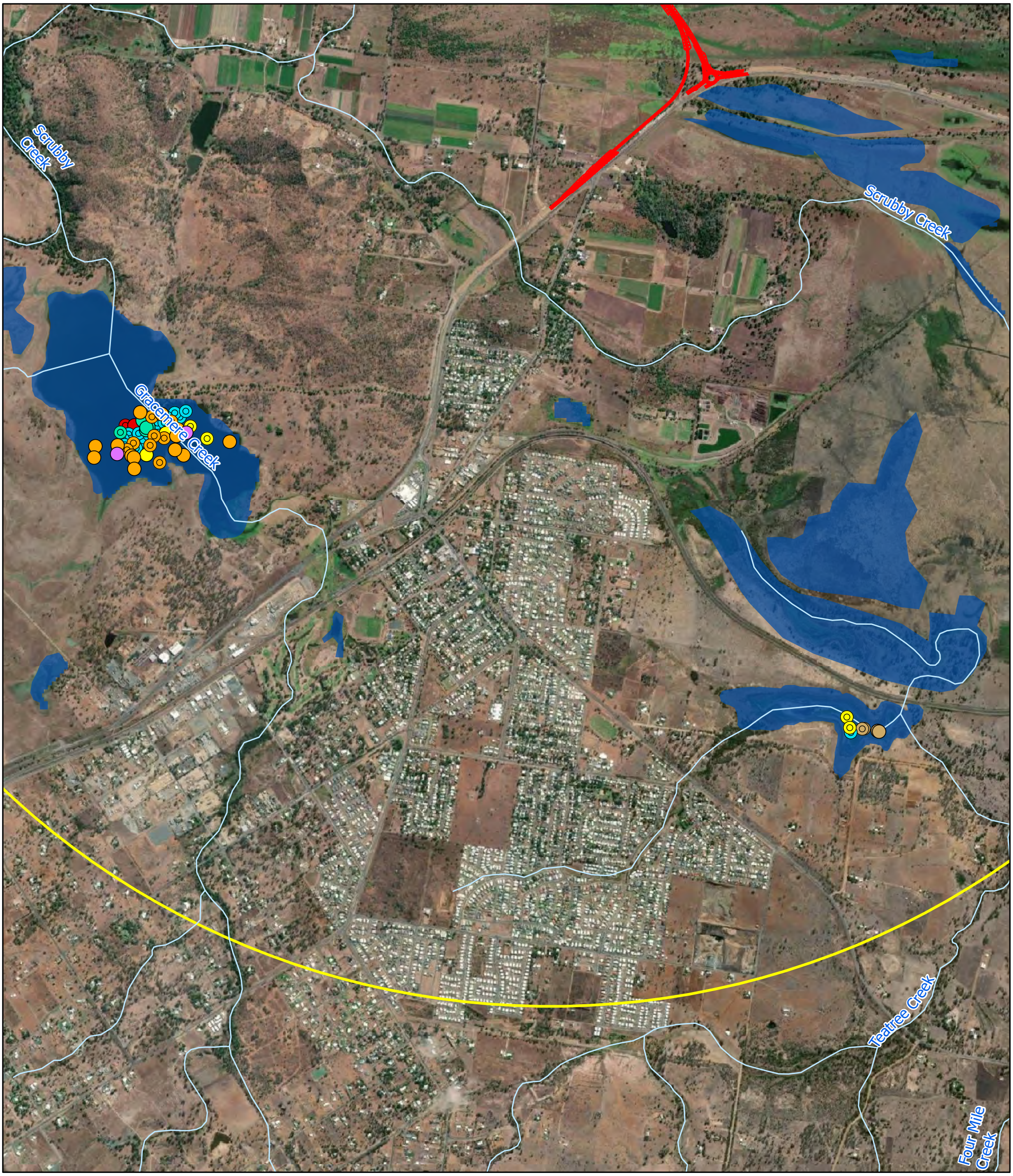
- White-winged Black Tern: Four individuals were observed flying over two wetlands during Survey 1, with only two individuals observed at a single wetland during Survey 2.

- Caspian Tern: Eight individuals were observed overflying two wetlands during Survey 1. However, Survey 2 saw 14 individuals over seven wetlands.

- Glossy Ibis: A total of 50 individuals were observed at five wetlands during Survey 1. Only 7 individuals were recorded across two wetlands during Survey 2.

A complete list of the species recorded during these surveys is detailed in Appendix B . Migratory-listed species recorded during the surveys are shown in Figure 5-1 to Figure 5-4.

Figure 4-1 (Migratory Bird Records)

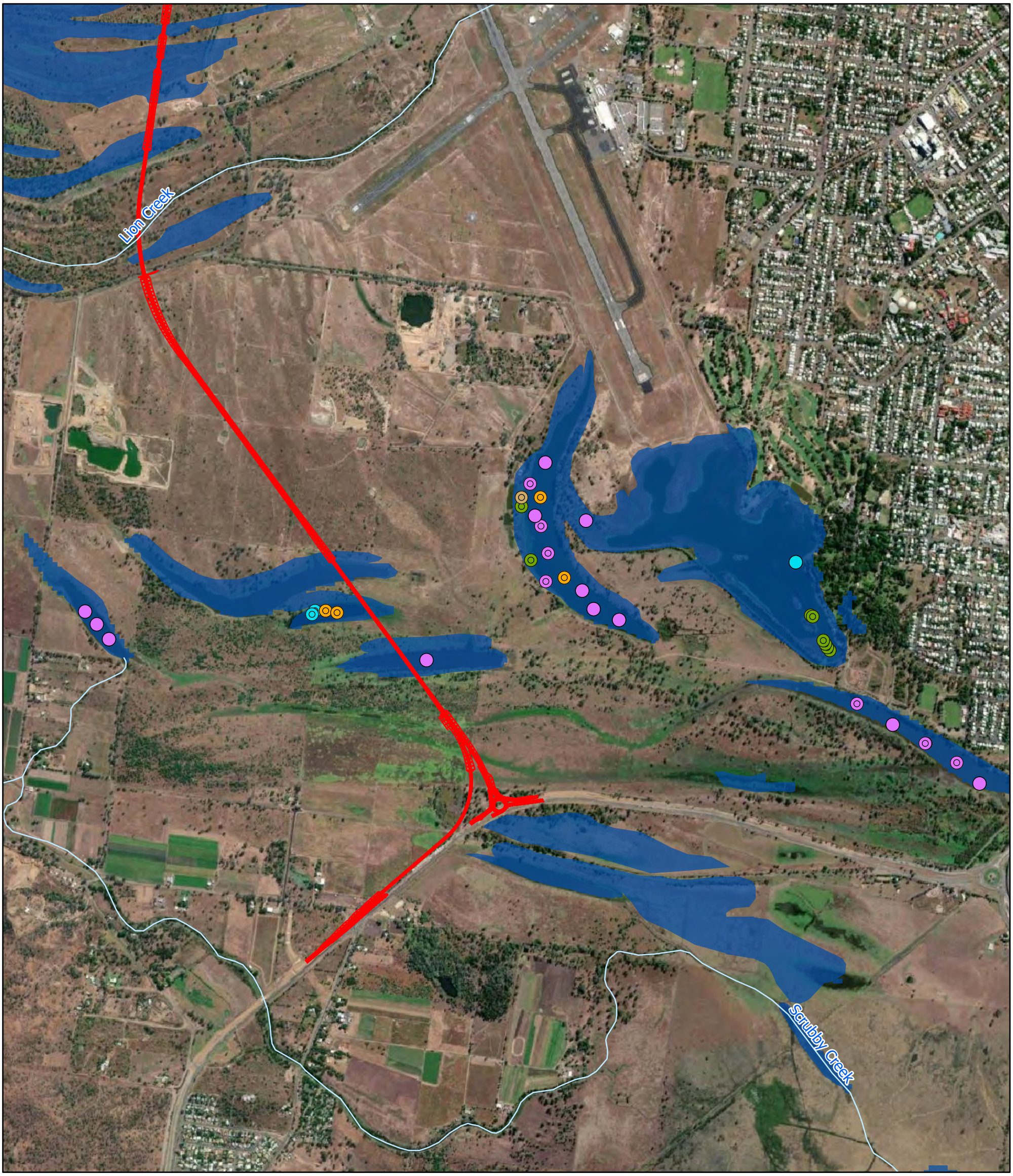


Rockhampton Ring Road

Source: DNRME: Roads, Watercourses (2020; Metromap: Imagery (2020)

C:\Users\bannisri\Desktop\Projects\IW243700\Spatial\ArcGIS\Figures\RRR_Environment.aprx Produced: 12/04/2021 Author: BannisRI

Figure 4-2 (Migratory Bird Records)

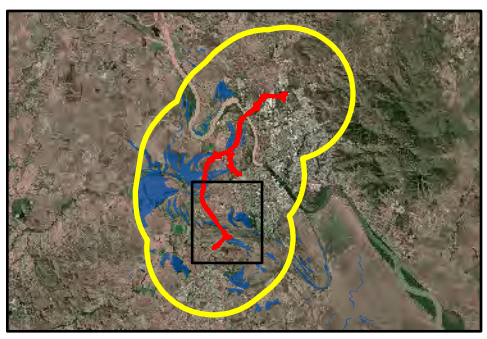


Legend

- Minor Watercourse
- Design
- Survey Area
- Wetlands

Migratory Bird Records

- Caspian Tern (Survey 1)
- Caspian Tern (Survey 2)
- Glossy Ibis (Survey 1)
- Glossy Ibis (Survey 2)
- Latham's Snipe (Survey 1)
- Sharp-tailed Sandpiper (Survey 1)
- Whiskered Tern (Survey 1)



GDA 1994 MGA Zone 56

A3 1:20,000

N

0 0.25 0.5

Kilometres

Jacobs SMEC

Jacobs SMEC Design Joint Venture

Rockhampton Ring Road

Source: DNRME: Roads, Watercourses (2020; Metromap: Imagery (2020)

C:\Users\bannisri\Desktop\Projects\IW243700\Spatial\ArcGIS\Figures\RRR_Environment.aprx Produced: 12/04/2021 Author: BannisRI

Figure 4-3 (Migratory Bird Records)

GDA 1994 MGA Zone 56

A3 1:7,500

N

0 0.1 0.2

Kilometres

Jacobs SMEC

Jacobs SMEC Design Joint Venture

Rockhampton Ring Road

Source: DNRME: Roads, Watercourses (2020; Metromap: Imagery (2020)

C:\Users\bannisri\Desktop\Projects\IW243700\Spatial\ArcGIS\Figures\RRR_Environment.aprx Produced: 12/04/2021 Author: BannisRI

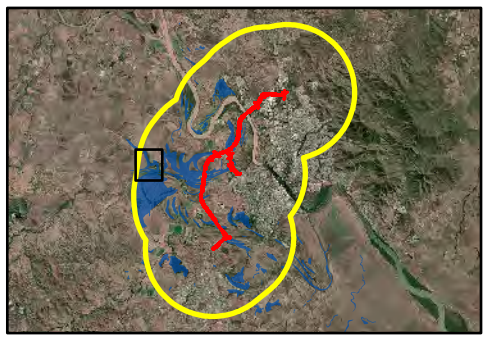
Figure 4-4 (Migratory Bird Records)

Legend

- Minor Watercourse
- Design
- Survey Area
- Wetlands

Migratory Bird Records

- Glossy Ibis (Survey 1)
- Latham's Snipe (Survey 1)
- Latham's Snipe (Survey 2)



GDA 1994 MGA Zone 56

A3 1:7,500

N

0 0.1 0.2

Kilometres

Jacobs SMEC Design Joint Venture

Rockhampton Ring Road

Source: DNRME: Roads, Watercourses (2020; Metromap: Imagery (2020)

6. Conclusion

6.1 Wetland conditions and utilisation by migratory shorebirds

The targeted migratory shorebird surveys were conducted between 8-11 March and 24-26 March 2021 by four ecologists. Summer rains were below average in the Rockhampton region and this influenced the habitat conditions observed. Conditions were characterised by many wetlands being completely dry in comparison to the previous surveys (AECOM, 2020b) where these areas were flooded (in particular Pink Lily Lagoon, Lotus Lagoon and Black Duck Lagoon).

At the time of the March 2021 surveys, wetland conditions did not provide suitable habitat for important populations of migratory shorebirds, with the exception of Latham's Snipe. A network of foraging and roosting habitat is required by shorebirds which is generally represented by large areas of soft substrate in exposed mudflats for foraging and open habitat on slightly elevated ground for roosting. The availability of these types of habitat was limited at the times of the survey due to the lack of water present and subsequently a lack of fringing and emergent vegetation.

Several of the wetlands surveyed did provide suitable habitat for Latham's Snipe (i.e. Lion Lagoon, Murray Lagoon, Woolwash Lagoon, Crescent Lagoon). Over the course of the two March 2021 surveys, a total of 28 Latham's Snipe were flushed from vegetation at Lion Lagoon, 10 were recorded foraging along the mudflats at Woolwash Lagoon, two recorded foraging at Crescent Lagoon and 6 were observed foraging along mudflats and beneath lilies at Murray Lagoon during the March 2021 surveys. Migratory species with a known, moderate or higher likelihood of occurrence within the Project Area include:

- Black-tailed godwit (*Limosa limosa*)
- Caspian tern (*Hydroprogne caspia*)
- Common Greenshank (*Tringa nebularia*)
- Curlew sandpiper (*Calidris ferruginea*)
- Eastern osprey (*Pandion haliaetus*)
- Glossy ibis (*Plegadis falcinellus*)
- Little curlew (*Numenius minutus*)
- Marsh sandpiper (*Tringa stagnatilis*)
- Pectoral sandpiper (*Calidris melanotos*)
- Red-necked stint (*Calidris ruficollis*)
- Sharp-tailed sandpiper (*Calidris acuminata*)
- White-winged black tern (*Chlidonias leucopterus*)
- Wood sandpiper (*Tringa glareola*).

Based on habitat quality, type and variability, previous records in available databases in the vicinity of the Project Area and outcomes of the survey program, the following species are considered unlikely to occur within the Project Area or surrounding region in numbers which would constitute an ecologically significant proportion of their respective populations;

- Caspian tern
- Eastern osprey
- Glossy ibis
- Pectoral sandpiper
- White-winged black tern
- Wood sandpiper.

Wetlands within the Project Area are only expected to provide suitable habitat conditions on an intermittent and unpredictable basis, driven by the incidence of rainfall, localised catchment flooding and subsequent wetland inundation leading up to August and September when migratory species are arriving in or travelling through the area each year.

Given the highly ephemeral nature of wetland habitat resources, it is likely that existing resources within the Project Area would be utilised by migratory bird species infrequently and on a transitory, opportunistic basis only.

6.2 Important habitat

‘Important habitat’ as defined under the *Significant Impact Guidelines 1.1: Matters of National Environmental Significance* (Department of the Environment, 2013) is a key concept in determining the likelihood of significant impact from a proposed action. Important habitat is defined in the *Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species* (Department of the Environment and Energy, 2017) as:

Wetland habitat should be considered **internationally important** if it regularly supports:

- 1% of the individuals in a population of one species or subspecies of waterbird; or
- A total abundance of at least 20,000 waterbirds.

Wetland habitat should be considered **nationally important** if it regularly supports:

- 0.1% of the flyaway population of a single species of migratory shorebird; or
- 2,000 migratory shorebirds; or
- 15 migratory shorebird species.

Based on the above, the habitat within the Survey Area at the time of the survey was not considered to be national or internationally important for migratory shorebirds, with the exception of Latham’s Snipe.

Latham’s Snipe is known to not aggregate in large flocks or use the same habitat as other migratory shorebirds. Important habitat for Latham’s Snipe occurs at sites that have previously been identified as internationally important for the species or sites that:

- Support at least 18 individuals of the species (ecologically significant proportion of the population), and
- Are naturally occurring open freshwater wetland with vegetation cover nearby (for example, tussock grasslands, sedges, lignum or reeds within 100 m of the wetland).

Important habitat for Latham’s Snipe was present within the Project Area at the time of the March 2021 surveys.

7. References

AECOM. (2020a). *Terrestrial fauna and migratory bird technical report Rockhampton Ring Road.*

AECOM. (2020b). *Migratory shorebird survey report.*

Bureau of Meteorology. (2021). Retrieved from Bureau of Meteorology: http://www.bom.gov.au/climate/dwo/IDCJDW4102.latest.shtml

Chapman, G. (1969). Notes on birds of the Kosciusko high country. *Canberra Bird Notes*, 1(4):2-6.

Clemens, R., Weston, M., Haslem, A., Silcocks, A., & Ferris, J. (2010). Identification of significant shorebird areas: thresholds and criteria. *Diversity and Distributions*, 16: 229-242.

Department of the Environment. (2013). *Matters of National Environmental Significance - Significant impact guidelines 1.1.* Canberra: Commonwealth of Australia.

Department of the Environment. (2015). *Wildlife Conservation Plan for Migratory Shorebirds.* Commonwealth of Australia.

Department of the Environment. (2021, 10 22). *Gallinago hardwickii - Latham's Snipe, Japanese Snipe*. Retrieved from Species Profile and Threats Database: http://www.environment.gov.au/cgi-bin/sprat/public/publicspecies.pl?taxon_id=863

Department of the Environment and Energy. (2017). *EPBC Act Policy Statement 3.21: Industry guidelines for avoiding, assessing and mitigating impacts on EPBC Act listed migratory shorebird species. .* Commonwealth of Australia.

Frith, H. (1970). The Japanese Snipe Gallinago hardwickii - a preliminary report. *CSIRO Division of Wildlife Research Technical Memorandum 6*.

Frith, H., Crome, F., & Brown, B. (1977). Aspects of the Biology of the Japanese Snipe Gallinago hardwickii. *Australian Journal of Ecology*, 2:341-368.

Garnett, S. T., & Barry Baker, G. (2000). *The Action Plan for Australian Birds 2020.* CSIRO Publishing .

Hansen, B., Fuller, R., Watkins, D., Rogers, D., Clemens, R., Newman, M., . . . Weller, D. (2016). *Revision of the East Asian-Australasian Flyway Population Estimates for 37 listed Migratory Shorebird Species.* Melbourne: Unpublished report for the Department of the Environment. BirdLife Australia.

Higgins, P., & Davies, S. (1996). *Handbook of Australian, New Zealand and Antartic Birds. Volume Three - Snipe to Pigeons.* Melbourne, Victoria: Oxford University Press.

Jacobs SMEC Design Joint Venture. (2021). *Rockhampton Ring Road Preliminary Documentation (EPBC 2020/8628).*

Naarding, J. (1982). Latham's Snipe (Gallinago hardwickii) in Tasmania. *Wildlife Division Technical Report. 82/1. Tasmania: National Parks and Wildlife Service*.

Naarding, J. (1983). Latham's Snipe (Gallinago hardwickii) in Southern Australia. *Wildlife Division Technical Report. 83/01. Tasmania: National Parks and Wildlife Service*.

Todd, M. (2000). Feeding ecology of Latham's Snipe Gallinago hardwickii in the Lower Hunter Valley. *Emu*, 100:133-138.

Appendix A Hydrology and shorebird habitat suitability of wetlands within the Survey Area

Hydrology and shorebird habitat suitability of wetlands within the Survey Area

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Murray Lagoon	Murray Lagoon is an extensive waterbody located just south of the Rockhampton Airport. The Project Area does not directly intersect Murray Lagoon with the wetland located 1.2 km to the east.	Murray Lagoon during the March 2021 surveys was at approximately 15% capacity. The wetted width of the lagoon was between 10-30 m. Fringing vegetation along the banks of the Murray Lagoon varies throughout the extent of the wetland. Banks toward the southern extent of the wetland are densely fringed with lilies where banks at the northern extent are largely mudflats with very little vegetation. Latham's Snipe were recorded at this wetland during Survey 1 (SMEC, 2021).
		

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
	Plate 1: Lily-lined banks at the southern portion of Murray Lagoon (March 2021)  **Plate 2: Northern extent of Murray Lagoon, extensive mudflats with little fringing vegetation (March 2021)**	

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
	 **Plate 3: Middle portion of Murray Lagoon. Mudflats and fringing vegetation present (March 2021)**	
Crescent Lagoon	Crescent Lagoon is a large, near-permanent waterbody located southwest of the Rockhampton Airport. The Project Area does not intersect Crescent Lagoon with the wetland located 800 m to the east.	The lagoon during the March 2021 surveys was at approximately 50% capacity with an average wetted width of 70 m. Fringing vegetation was relatively lacking due to the dry conditions. Mudflats were observed along the edges of the wetland for a large extent. Latham's Snipe were recorded during Survey 1 at this lagoon.

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey

Plate 4: Southern portion of Crescent Lagoon

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
	Plate 5: Bend of Crescent Lagoon	
Lower Gracemere Lagoon	Lower Gracemere Lagoon is an extensive waterbody located 7 km west of the Rockhampton Airport. The Project Area does not intersect Lower Gracemere Lagoon, with the wetland located 4.5 km to the west.	The Lower Gracemere Lagoon was at approximately 25% capacity at the time of the surveys. The average wetted width of the lagoon was approximately 400 m, an island also present within this. The main lagoon contained little fringing vegetation, however mudflats existed along the extents of the banks. The island within the lagoon contained fringing vegetation and sloped banks. Latham's Snipe was not observed at this wetland, however Sharp-tailed Sandpiper and Black-tailed Godwit were recorded during the survey.
	 **Plate 6: Lower Gracemere Lagoon during the March 2021 surveys.**	

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Padygole Lagoon	Padygole Lagoon (Gracemere Lagoon) is an extensive waterbody located north of the Capricorn Highway to the south-west of the Project Area. The Project Area does not intersect Padygole Lagoon, with the wetland located 2.5 km to the south-west.	Padygole Lagoon was at approximately 15% capacity with a wetted width of 350 m. Due to the dry conditions at the time of the surveys, the wetland lacked fringing vegetation and instead had relatively extensive mudflats surrounding the waterbody. Latham's Snipe was not observed at this wetland, however Marsh Sandpiper and Black-tailed Godwit were recorded here.

Plate 7: Padygole Lagoon during the March 2021 surveys.

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Lion Lagoon	Lion Lagoons are large waterbodies located along Nine Mile Rd approximately 5.5 km north-west of the Rockhampton Airport. The Project Area does not intersect Lion Lagoon with the wetland located 3.2 km to the west.	Lion Lagoon consists of two elongated waterbodies that join in the centre, one of which is parallel with Nine Mile Rd where the other tracks north perpendicular from Nine Mile Rd. The lagoon at the time of the survey was at approximately 50%. The lagoon was fringed with vegetation (although exotic), at heights suitable for the Latham's Snipe. Mud banks were also observed in areas where water had receded. Latham's Snipe was recorded during flush transects at this lagoon during the March 2021 surveys. Feral pigs were observed within the northern extent of the lagoon with disturbance noted throughout the site.

Plate 8: Northern extent of Lion Lagoon

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
	 **Plate 9: Southern extent of Lion Lagoon (parallel to Nine Mile Rd)**	

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Dunganweate Lagoon	Dunganweate Lagoon is a near-permanent waterbody located 2.7 km south-west of the Rockhampton Airport. The Project Area directly intersects this wetland.	Dunganweate Lagoon was at approximately 50% capacity with a wetted width of 30 m. The elongated wetland had limited fringing vegetation due to the dry conditions during the survey. However, mud banks were observed surrounding the wetland. Evidence of grazing disturbance was observed throughout the site due to the presence of horses. The wetland would support suitable habitat for Latham's Snipe during periods of high rainfall where fringing vegetation would thrive and become suitable for refuge and foraging purposes. Latham's Snipe was not observed during this survey event.

Plate 10: Dunganweate Lagoon conditions during March 2021 survey event

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Nelson Lagoon	Nelson Lagoon is a semi-permanent waterbody located 1.8 km to the south-west of the Rockhampton Airport. The Project Area directly intersects this wetland.	The lagoon was at approximately 50% capacity during the March 2021 surveys with a wetted width of 25 m. The lagoon had little fringing vegetation and mud banks exist along the extent of the wetland that are disturbed by grazing cattle. The lagoon is unlikely to support Latham's Snipe unless inundated to the high water mark during a flood event.

Plate 11: Nelson Lagoon conditions during March 2021 surveys

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Dunganweate South Lagoon	Dunganweate South Lagoon is a small waterbody located between Dunganweate Lagoon and Nelson Lagoon. The Project Area directly intersects this wetland.	Dunganweate South Lagoon was at approximately 50% capacity with a wetted width of 35 m during the March 2021 surveys. The lagoon had mud banks that surround the waterbody with limited fringing vegetation beyond this due to the lack of rainfall. It is thought during flood events where the lagoon is at a higher capacity, it may provide suitable habitat for Latham's Snipe.

Plate 12: Dunganweate South conditions during March 2021 survey

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Deadmans Lagoon	Deadmans Lagoon is a permanent waterbody located 3.5 km to the south-west of the Rockhampton Airport. The Project Area does not intersect Deadmans Lagoon with the wetland located 1.3 km to the west.	The lagoon during the March 2021 survey was at approximately 50% capacity. The site provides marginal habitat for shorebirds, with limited fringing vegetation and disturbance from grazing cattle.

Plate 13: Deadmans Lagoon conditions during March 2021 surveys

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Yeppen Yeppen Lagoon	Yeppen Yeppen Lagoon is a moderate sized elongated waterbody located to the south of Murray Lagoon. This lagoon is a permanent waterbody. The Project Area does not intersect Yeppen Yeppen Lagoon with the wetland located 1.4 km to the east.	The lagoon during the March 2021 surveys was at approximately 60% capacity and had a wetted width of 80 m. Fringing vegetation exists along the banks beyond the mudflats that verge the waters edge.

Plate 14: Yeppen Yeppen Lagoon during March 2021 surveys

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Capricorn Lagoon	A small elongated permanent waterbody located south of the Capricorn Highway, connected to Neerkol Creek. The Project Area overlaps a small portion of the northern extent of this lagoon.	This wetland had similar habitat value to Dunganweate, Dunganweate South and Nelson Lagoons, with similar lack of fringing ground cover vegetation along the banks.

Plate 15: Capricorn Hwy Lagoon during March 2021 surveys

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Woolwash Lagoon	Woolwash Lagoon is a long linear waterbody located 2.5 km to the south-east of the Capricorn Hwy. The Project Area does not intersect Woolwash Lagoon with the wetland located 5 km to the south-east.	Woolwash Lagoon was at approximately 40% capacity during the March 2021 surveys with a wetted width of 30 m. The lagoon provides shallow water along the banks for foraging and when at a higher capacity would provide low vegetation cover. Latham's Snipe were recorded at this wetland during the March 2021 surveys.
	 **Plate 16: Woolwash Lagoon during March 2021 surveys**	

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Fitzroy River South Bank	The Fitzroy River South Bank wetlands exist adjacent to the west of Fitzroy River towards the northern extent of the Project Area. The Project Area directly intersects the eastern portion of this wetland system.	These wetlands have marginal habitat for shorebirds. The banks are heavily vegetated with no exposed mud evident for foraging. The centre of the western portion of the wetland contained aquatic vegetation which may provide potential habitat for the Latham's Snipe. The eastern portion of this wetland does not contain suitable habitat for shorebirds. No migratory shorebirds were observed during the March 2021 surveys at these wetlands.

Plate 17: Western portion of the Fitzroy River wetlands

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
	 **Plate 18: Eastern portion of the Fitzroy River wetlands**	

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Sullivan Road Wetland	Sullivan Road Wetland is a permanent waterbody located 4 km to the south of the Capricorn Hwy within the township of Gracemere. The Project Area does not intersect Sullivan Road Wetland with the wetland located 3.5 km to the south.	The Sullivan Rd Wetland was at approximately 50% capacity with a wetted width of 120 m during the March 2021 surveys. The wetland was fringed with low vegetation with areas of mudflats suitable for foraging. Migratory shorebirds such as the Sharp-tailed Sandpiper were present during the March 2021 surveys.

Plate 19: Sullivan Road Wetland during March 2021 surveys

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Pink Lily Lagoon	Pink Lily Lagoon is a large complex wetland located south of the Fitzroy River and intersected by the Project Area.	Pink Lily Lagoon was largely dry during the March 2021 surveys. A small pond of water was observed surrounded by mudflats towards the northern extent of the wetland during the second March survey. The wetland was overgrown with weed dominated pasture and shrubs with evidence of cattle grazing. It was noted that during periods when the wetland becomes inundated it would provide suitable habitat for shorebirds.
		

Plate 20: Northern extent of Pink Lily Lagoon during March 2021 surveys

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Lotus Lagoons	Lotus Lagoon is a large floodplain wetland that is highly episodic. It is located east and west of Nine Mile Road and north of Rockhampton Airport. The Project Area directly intersects this wetland.	Lotus Lagoons were dry during the March 2021 surveys. Fringing habitat is available throughout this lagoon, however at the time of these surveys the habitat was considered unsuitable due to the complete lack of water present. When inundated, Lotus Lagoons would provide suitable habitat for shorebirds, with fringing vegetation and exposed muddy verges present.
		

Plate 21: Western extent of Lotus Lagoon during March 2021 surveys

Wetland	Hydrological Summary	Shorebird Habitat Suitability During 2021 Survey
Black Duck Lagoon	Black Duck Lagoon is a small waterbody located 1 km to the north-east of the Rockhampton Airport. The Project Area does not intersect this wetland, however the boundary of the wetland is approximately 60 m from the alignment.	Black Duck Lagoon was dry during the March 2021 surveys. However, it was noted that during periods of inundation, the lagoon would provide suitable habitat for shorebirds due to the presence of fringing vegetation habitat and likelihood of exposed muddy verges for foraging purposes.

Plate 22: Black Duck Lagoon during March 2021 surveys

Appendix B Bird species recorded during the migratory shorebird survey

Bird species recorded during the migratory shorebird survey

Species		Conservation Status[1]		Wetland[2]												
Scientific Name	**Common Name**	**EPBC Act**	**NC Act**	**1 Murray lagoon**	**2 Crescent Lagoon**	**3 Lower Gracemere**	**4 Pafygole Lagoon**	**5 Little Lion Lagoon**	**6 Dunganweate**	**7 Nelson Lagoon**	**8 Dunganweate**	**9 Deadmans Lagoon**	**10 Yeppen Lagoon**	**11 Capricorn Lagoon**	**12 Woolwash Lagoon**	**13 Fitzroy River**	**14 Sullivan Road**
Acridotheres tristis	Common Myna	-	Y						ab						b		
Acrocephalus australis	Australian Reed-Warbler	-	LC														b
Anas castanea	Chestnut Teal	-	LC			a											
Anas gracilis	Grey Teal	-	LC	a	ab	ab	ab				ab	b	b	b	ab	b	ab
Anas superciliosa	Pacific Black Duck	-	LC	ab	ab	ab	ab	ab	b	ab	ab	ab	ab	ab	ab	ab	ab
Anhinga novaehollandiae	Australasian Darter	-	LC	b	ab		a	ab	ab	ab	a	a	ab	b	ab		
Anthus novaeseelandiae	Australasian pipit	-	LC			a	ab				a						

Species		Conservation Status[1]		Wetland[2]													
Scientific Name	Common Name	EPBC Act	NC Act	1 Murray lagoon	2 Crescent Lagoon	3 Lower Gracemere	4 Pafygole Lagoon	5 Little Lion Lagoon	6 Dunganweate	7 Nelson Lagoon	8 Dunganweate	9 Deadmans Lagoon	10 Yeppen Lagoon	11 Capricorn Lagoon	12 Woolwash Lagoon	13 Fitzroy River	14 Sullivan Road
Antigone rubicunda	Brolga	-	LC				a	a		a							
Aprosmictus erythropterus	Red-winged parrot	-	LC		ab		ab	b	a			b	ab		a		b
Aquila audax	Wedge-tailed Eagle	-	LC		ab				a								
Ardea alba	Great Egret	-	LC	b	ab	b	ab	a	ab	ab	a	a	ab	b	ab	b	
Ardea intermedia	Intermediate Egret	-	LC	ab	ab	ab	ab	a	ab		a	b	b	b	ab		a
Ardea pacifica	White-necked Heron	-	LC				a										
Ardeotis australis	Australian Bustard	-	LC				a										
Artamus cinereus	Black-faced Woodswallow	-	LC				a		ab								
Artamus leucorynchus	White-breasted Woodswallow	-	LC		b	b			a	b			ab				

Species		Conservation Status[1]		Wetland[2]													
Scientific Name	**Common Name**	**EPBC Act**	**NC Act**	**1 Murray lagoon**	**2 Crescent Lagoon**	**3 Lower Gracemere**	**4 Pafygole Lagoon**	**5 Little Lion Lagoon**	**6 Dunganweate**	**7 Nelson Lagoon**	**8 Dunganweate**	**9 Deadmans Lagoon**	**10 Yeppen Lagoon**	**11 Capricorn Lagoon**	**12 Woolwash Lagoon**	**13 Fitzroy River**	**14 Sullivan Road**
Aythya australis	Hardhead	-	LC		ab	ab			ab			ab		b			
Bubulcus ibis	Cattle Egret	-	LC	ab	b	ab	b	a	ab	ab		ab	a	ab	ab		
Cacatua galerita	Sulfur-crested Cockatoo	-	LC				ab						a				
Cacatua sanguinea	Little Corella	-	LC	b	b		ab			b		b					
Calyptorhynchus banksii	Red-tailed Black-cockatoo	-	LC				ab		b								
Calidris acuminata	Sharp-tailed Sandpiper	M[3]	SL		a	a											ab
Chenonetta jubata	Australian Wood Duck	-	LC	a	a	a	ab	a	ab	ab	a	ab	ab	ab	ab		
Cincloramphus cruralis	Brown Songlark	-	LC						b								

Species		Conservation Status[1]		Wetland[2]													
Scientific Name	**Common Name**	**EPBC Act**	**NC Act**	**1 Murray lagoon**	**2 Crescent Lagoon**	**3 Lower Gracemere**	**4 Pafygole Lagoon**	**5 Little Lion Lagoon**	**6 Dunganweate**	**7 Nelson Lagoon**	**8 Dunganweate**	**9 Deadmans Lagoon**	**10 Yeppen Lagoon**	**11 Capricorn Lagoon**	**12 Woolwash Lagoon**	**13 Fitzroy River**	**14 Sullivan Road**
Cincloramphus mathewsi	Rufous songlark	-	LC									b					
Chlidonias hydrida	Whiskered Tern	Ma	LC	a	a	a	ab				a						
Chlidonias leucopterus	White-winged Black Tern	M/Ma	SL				ab										a
Cincloramphus timoriensis	Tawny Grassbird	-	LC				ab						a				
Cisticola exilis	Golden-headed Cisticola	-	LC	b	b		ab	a					a				
Corancina noavaehollandiae	Black-faced Cuckoo Shrike	-	LC		b		ab						ab		ab	b	
Corvus coronoides	Australian Raven	-	LC		b												
Corvus orru	Torresian Crow	-	LC	ab			ab	a			a		b		b	b	

Species		Conservation Status[1]		Wetland[2]													
Scientific Name	**Common Name**	**EPBC Act**	**NC Act**	**1 Murray lagoon**	**2 Crescent Lagoon**	**3 Lower Gracemere**	**4 Pafygole Lagoon**	**5 Little Lion Lagoon**	**6 Dunganweate**	**7 Nelson Lagoon**	**8 Dunganweate**	**9 Deadmans Lagoon**	**10 Yeppen Lagoon**	**11 Capricorn Lagoon**	**12 Woolwash Lagoon**	**13 Fitzroy River**	**14 Sullivan Road**
Cracticus nigrogularis	Pied Butcherbird	-	LC	b	ab		ab	a	b		ab	b	ab		ab		ab
Cygnus atratus	Black Swan	-	LC	b	ab	ab	b		ab					b			
Dacelo leachii	Blue-winged kookaburra	-	LC		b			b		b		b					
Dacelo novaeguineae	Laughing Kookaburra	-	LC	ab			a				a				a	b	
Dendrocygna arcuata	Wandering Whistling-Duck	-	LC	b											ab		a
Dendrocygna eytoni	Plumed Whistling-Duck	-	LC	b													
Dicaeum hirundinaceum	Mistletoebird	-	LC	b	ab	ab			a		a			b	ab		
Egretta garzetta	Little Egret	-	LC		ab	b				a	ab		a		ab		

Species		Conservation Status[1]		Wetland[2]													
Scientific Name	Common Name	EPBC Act	NC Act	1 Murray lagoon	2 Crescent Lagoon	3 Lower Gracemere	4 Pafygole Lagoon	5 Little Lion Lagoon	6 Dunganweate	7 Nelson Lagoon	8 Dunganweate	9 Deadmans Lagoon	10 Yeppen Lagoon	11 Capricorn Lagoon	12 Woolwash Lagoon	13 Fitzroy River	14 Sullivan Road
Egretta novaehollandiae	White-faced Heron	-	LC		ab		b	a		b		a			a		a
Elanus axillaris	Black-shouldered Kite	-	LC			b	ab										
Elseyornis melanops	Black-Fronted Dotterel	-	LC	ab	ab	ab		ab	a				a		ab		
Entomyzon cyanotis	Blue-faced Honeyeater	-	LC	ab		ab	ab	b	ab				ab		ab		
Ephippiorhynchus asiaticus	Black-necked Stork	-	LC				ab										
Eolophus roseicapilla	Galah	-	LC												b		
Eudynamys orientalis	Eastern Koel	-	LC												b		
Eurystomus orientalis	Dollarbird	-	LC	b									a				

Species		Conservation Status[1]		Wetland[2]													
Scientific Name	**Common Name**	**EPBC Act**	**NC Act**	**1 Murray lagoon**	**2 Crescent Lagoon**	**3 Lower Gracemere**	**4 Pafvgole Lagoon**	**5 Little Lion Lagoon**	**6 Dunganweate**	**7 Nelson Lagoon**	**8 Dunganweate**	**9 Deadmans Lagoon**	**10 Yeppen Lagoon**	**11 Capricorn Lagoon**	**12 Woolwash Lagoon**	**13 Fitzroy River**	**14 Sullivan Road**
Falco berigora	Brown Falcon	-	LC				b		ab								
Falco cencrhoides	Nankeen Kestrel	-	LC			a	ab		a								
Falco peregrinus	Peregrine Falcon	-	LC												b		
Falco subniger	Black Falcon	-	LC	b			b										
Fulica atra	Eurasian coot	-	LC	b	b	b							a				
Gallinago hardwickii	Latham's Snipe	M[3]	SL	a	a			ab							ab		
Gallinula tenebrosa	Dusky Moorhen	-	LC	b	ab	b							ab		ab		
Gallirallus philippensis	Buff-banded Rail	-	LC	a													
Geopelia placida	Peaceful Dove	-	LC		a	b	ab	ab	ab				ab		ab	b	

Species		Conservation Status[1]		Wetland[2]													
Scientific Name	Common Name	EPBC Act	NC Act	1 Murray lagoon	2 Crescent Lagoon	3 Lower Gracemere	4 Pafygole Lagoon	5 Little Lion Lagoon	6 Dunganweate	7 Nelson Lagoon	8 Dunganweate	9 Deadmans Lagoon	10 Yeppen Lagoon	11 Capricorn Lagoon	12 Woolwash Lagoon	13 Fitzroy River	14 Sullivan Road
Gerygone olivacea	White-throated Gerygone	-	LC		b		a		ab			b					
Grallina cyanoleuca	Magpie-Lark	-	LC	ab	ab	ab	ab	ab	ab		ab	b	ab	b	ab	b	ab
Gymnorhina tibicen	Australian Magpie	-	LC	b	b	a	ab	a	ab		b	b	ab		ab		a
Haliaeetus leucogaster	White-bellied Sea-Eagle	Ma	LC		b		ab										
Haliastur indus	Brahminy Kite	-	LC	b					ab								
Haliastur sphrenurus	Whistling Kite	-	LC	b	ab	ab	ab	ab		b	ab	b	ab	b	ab	b	ab
Himantopus himantopus	Black-winged Stilt	Ma	LC	ab	ab	ab	ab				ab			ab	ab		ab
Hirundo neoxena	Welcome Swallow	-	SL		ab	ab	a	a				b	a		b		
Hydroprogne caspia	Caspian Tern	M	LC	ab	ab		b			b		b	ab	a	ab		

Species		Conservation Status[1]		Wetland[2]													
Scientific Name	**Common Name**	**EPBC Act**	**NC Act**	**1 Murray lagoon**	**2 Crescent Lagoon**	**3 Lower Gracemere**	**4 Pafygole Lagoon**	**5 Little Lion Lagoon**	**6 Dunganweate**	**7 Nelson Lagoon**	**8 Dunganweate**	**9 Deadmans Lagoon**	**10 Yeppen Lagoon**	**11 Capricorn Lagoon**	**12 Woolwash Lagoon**	**13 Fitzroy River**	**14 Sullivan Road**
Irediparra gallinacea	Comb-crested Jacana	-	LC	b				ab									
Lichmera indistincta	Brown Honeyeater	-	LC		ab	b		ab	ab		a		ab	b	b		a
Limosa limosa	Black-tailed Godwit	M[3]	SL			ab	ab										
Lonchura castaneothorax	Chestnut-breasted mannikin	-	LC										b				
Lonchura punctulata	Nutmeg Mannikin	-	LC										ab				
Malurus melanocephalus	Red-backed Fairy Wren	-	LC	b	ab								a		b	b	a
Manorina melanocephala	Noisy Miner	-	LC	b	a		b		ab	b			ab		b		
Melithreptus albogularis	White-throated Honeyeater	-	LC		b						a				ab	b	

Species		Conservation Status[1]		Wetland[2]													
Scientific Name	**Common Name**	**EPBC Act**	**NC Act**	**1 Murray lagoon**	**2 Crescent Lagoon**	**3 Lower Gracemere**	**4 Pafygole Lagoon**	**5 Little Lion Lagoon**	**6 Dunganweate**	**7 Nelson Lagoon**	**8 Dunganweate**	**9 Deadmans Lagoon**	**10 Yeppen Lagoon**	**11 Capricorn Lagoon**	**12 Woolwash Lagoon**	**13 Fitzroy River**	**14 Sullivan Road**
Merops ornatus	Rainbow Bee-eater	M[4]	SL	b	ab		b	ab	ab	ab	ab		ab		b		b
Microcarbo melanoleucos	Little Pied Cormorant	-	LC	b	b				b					a	b		
Milvus migrans	Black Kite	-	LC		a	a	ab		ab		a						
Mirafra javanica	Horsfield's Bushlark	-	LC				ab										
Myiagra inquieta	Restless Flycatcher	-	LC			ab			a								
Nymphicus hollandicus	Cockatiel	-	LC				b										
Ocyphaps lophotes	Crested pigeon	-	LC	b			a	b	a		a	b	ab	b	ab	b	
Oriolus sagittatus	Olive-backed Oriole	-	LC	a			a										
Pachycephala rufiventris	Rufous Whistler	-	LC						a						b		

Species		Conservation Status[1]		Wetland[2]													
Scientific Name	Common Name	EPBC Act	NC Act	1 Murray lagoon	2 Crescent Lagoon	3 Lower Gracemere	4 Pafygole Lagoon	5 Little Lion Lagoon	6 Dunganweate	7 Nelson Lagoon	8 Dunganweate	9 Deadmans Lagoon	10 Yeppen Lagoon	11 Capricorn Lagoon	12 Woolwash Lagoon	13 Fitzroy River	14 Sullivan Road
Pardalotus striatus	Striated Pardalote	-	LC				b								b		
Pelecanus conspicillatus	Australian Pelican	-	LC	ab	ab	ab	ab		ab		ab		ab		a	b	a
Petrochelidon ariel	Fairy Martin	-	LC					a	a				a				
Petrochelidon nigricans	Tree Martin	-	LC		ab	ab			b								
Phalacrocorax carbo	Great Cormorant	-	LC		ab			b							ab		
Phalacrocorax sulcirostris	Little Black Cormorant	-	LC	b	ab	b		a	ab	b	ab		b		ab		
Phalacrocorax varius	Pied Cormorant	-	LC		ab				ab	ab	ab	b	a	b	ab		
Philemon citreogularis	Little Friarbird	-	LC										ab	b	b	b	
Platalea flavipes	Yellow-billed Spoonbill	-	LC	b			ab										a

Species		Conservation Status[1]		Wetland[2]													
Scientific Name	Common Name	EPBC Act	NC Act	1 Murray lagoon	2 Crescent Lagoon	3 Lower Gracemere	4 Pafygole Lagoon	5 Little Lion Lagoon	6 Dunganweate	7 Nelson Lagoon	8 Dunganweate	9 Deadmans Lagoon	10 Yeppen Lagoon	11 Capricorn Lagoon	12 Woolwash Lagoon	13 Fitzroy River	14 Sullivan Road
Platalea regia	Royal Spoonbill	-	LC	ab	ab	b	ab	b	b		ab		ab	b	ab		a
Platycercus adscitus	Pale-headed Rosella	-	LC	b	ab	b	ab	ab		b			a	b			b
Plectorhyncha lanceolata	Striped Honeyeater	-	LC					ab	a								
Plegadis falcinellus	Glossy Ibis	M[3]	SL	b			a	a			a			a	ab		a
Podiceps cristatus	Great Crested Grebe	-	LC		a												
Pomatostomus temporalis	Grey-crowned babbler	-	LC	b	b		a		ab	b							a
Porphyrio porphyrio	Purple Swamphen	-	LC	ab		ab							b		a	b	
Ramsayornis fasciatus	Bar-breasted Honeyeater	-	LC										ab		b		

Species		Conservation Status[1]		Wetland[2]													
Scientific Name	Common Name	EPBC Act	NC Act	1 Murray lagoon	2 Crescent Lagoon	3 Lower Gracemere	4 Pafygole Lagoon	5 Little Lion Lagoon	6 Dunganweate	7 Nelson Lagoon	8 Dunganweate	9 Deadmans Lagoon	10 Yeppen Lagoon	11 Capricorn Lagoon	12 Woolwash Lagoon	13 Fitzroy River	14 Sullivan Road
Recurvirostra novaehollandiae	Red-necked Avocet	-	LC	a		ab	ab										
Rhipidura leucophrys	Willie Wagtail	-	LC	b	b	a	ab	a	ab		ab	b	ab	b	b	b	a
Rhipidura leucophrys	Weebill	-	LC														a
Spatula rhynchotis	Australasian Shoveler	-	LC	a		a											
Sphecotheres vieilloti	Australasian Figbird	-	LC	a			a										
Struthidewa cinerea	Apostlebird	-	LC										a				
Synoicus ypsilophora	Brown Quail	-	LC								a						
Tachybaptus novaehollandiae	Australasian Grebe	-	LC			ab					b			b			
Taeniopygia bichenovii	Double-barred Finch	-	LC		b	ab	ab	a	a				ab				

Species		Conservation Status[1]		Wetland[2]													
Scientific Name	**Common Name**	**EPBC Act**	**NC Act**	**1 Murray lagoon**	**2 Crescent Lagoon**	**3 Lower Gracemere**	**4 Pafygole Lagoon**	**5 Little Lion Lagoon**	**6 Dunganweate**	**7 Nelson Lagoon**	**8 Dunganweate**	**9 Deadmans Lagoon**	**10 Yeppen Lagoon**	**11 Capricorn Lagoon**	**12 Woolwash Lagoon**	**13 Fitzroy River**	**14 Sullivan Road**
Taeniopygia guttata	Zebra Finch	-	LC						a								
Threskiornis molucca	Australian White Ibis	-	LC	ab	ab	a	ab	a	a		ab		ab	a	ab		a
Threskiornis spinicollis	Straw-necked Ibis	-	LC		b	a	ab						b		b		
Todiramphus macleayii	Forest Kingfisher	-	LC					ab							b		a
Todiramphus sanctus	Sacred Kingfisher	-	LC		a			b	ab			b			a		
Trichoglossus chlorolepidotus	Scaly-breasted Lorikeet	-	LC	b	b			ab					ab		ab		
Trichoglossus moluccanus	Rainbow Lorikeet	-	LC	ab	b			a		b			ab		b		b
Tringa stagnatilis	Marsh Sandpiper	M[3]	SL				b										
Turnix velox	Little Button-quail	-	LC				b										

Species		Conservation Status[1]		Wetland[2]													
Scientific Name	**Common Name**	**EPBC Act**	**NC Act**	**1 Murray lagoon**	**2 Crescent Lagoon**	**3 Lower Gracemere**	**4 Pafygole Lagoon**	**5 Little Lion Lagoon**	**6 Dunganweate**	**7 Nelson Lagoon**	**8 Dunganweate**	**9 Deadmans Lagoon**	**10 Yeppen Lagoon**	**11 Capricorn Lagoon**	**12 Woolwash Lagoon**	**13 Fitzroy River**	**14 Sullivan Road**
Vanellus miles	Masked Lapwing	-	LC	ab	ab	ab	ab	ab	ab	ab	ab	b	ab	b	ab		b
	Total Species (Survey 1)			25	41	34	53	33	41	10	30	7	44	8	38	1	23
	Total Species (Survey 2)			45	51	33	52	22	34	19	17	22	37	22	51	16	13
Migratory Shorebirds		Resident Shorebirds				Waterbirds						Migratory Waterbirds					

[1]Conservation status: LC = Least Concern, SL = Special Least Concern, M[3] = Migratory wetland species, M[4] = Migratory terrestrial species, Ma = Marine. [2]Wetland: a = Survey 1 (8-11 March 2021); b = Survey 2 (24-26 March 2021).