WEST PILBARA IRON ORE PROJECT

West Pilbara Iron Ore Project Stage 1

Anketell Point Port Development Proposal

Migratory Bird Survey Program Design Report

July 2014

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API Management Pty Ltd

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Prepared by API Management Pty Ltd

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D	Draft (Issued for Use)	S. Shute	P. Goodman	DoE	22/08/2013
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Front cover image: NE tip of Dixon Island (lower right hand side) and tip of Anketell Point (top, centre), looking south west (image taken during autumn equinox high tide, March 2011, source API)

Inside cover image: Migratory birds at Anketell Point (Dixon Island in background) during flood tide (February 2012, source API)

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1 Introduction

1.1 Project background

API Management Pty Ltd (API) is the proponent for the West Pilbara Iron Ore Project (WPIOP), a proposed iron ore mining and export operation based on a number of resources located on the western fringe of the Hamersley Ranges, south of Pannawonica, Western Australia. The project involves the development of a series of open-cut mines, a railway and port facilities at Anketell Point, near Dixon Island (the Anketell Port proposal).

The State Minister for Environment; Water released Ministerial Statement 930 (MS930) granting approval of the Anketell Port proposal, on 30 January 2013. The Commonwealth Minister for Environment (the Minister) (formerly the Minister for Sustainability, Environment, Water, Population and Communities) approved the Anketell Port proposal under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act), subject to conditions, on 15 May 2013.

1.2 Purpose of this document

The EPBC Act approval of the Anketell Port proposal requires the development of several plans and programs, in addition to those required under the State approval (MS930). This report addresses the requirement for API to prepare a Migratory Bird Survey Program, and submit that plan to the Minister for approval, as stipulated in Conditions 38 and 39.

1.3 Relevant conditions under the EPBC Act approval for Anketell Port

Conditions 38 and 39 prescribe the preparation, and submission for approval, of a Migratory Bird Survey Program. Conditions 38 and 40 were amended, following the Department of Environment's review of the draft Migratory Bird Survey Program (Rev D), to (1) provide for closer alignment between the surveys to be completed under this program and those proposed under the Ecosystem Research and Monitoring Program (required under Condition 22 of the EPBC Act approval), and (2) provide for the collection of 'baseline', 'during' and 'post' development data. Conditions 38 (amended) and 39 are as follows:

38. The person taking the action must submit for the Minister's approval, a survey program of the coastline of the Australian mainland within a 100km radius of the site of the Anketell Point Iron Ore Processing & Export Port for listed migratory birds. The survey program must:

a. Take into account the guidance on survey methodology, other than survey timing, within the current 'Significant impact guidelines for 36 migratory shorebird species' policy statement produced by the Department; and

b. Provide for at least two surveys per listed migratory birds season for three seasons to be undertaken during high tides in December, January or February:

i. prior to the commencement of construction,

ii. during construction, and

iii. no more than two seasons following the completion of construction of the Anketell Point Ore Processing & Export Port.

39. The survey program required by Condition 38 must be submitted to the Minister at least three months prior to the start date of the first survey and must be approved by the Minister prior to implementation.

Related conditions, relevant to the design and implementation of the Migratory Bird Survey Program, include Conditions 40 and 41, as follows:

40. The results of the surveys required by Condition 38 must be provided to the Department (within 12 months of completion of each survey) for submission to the Shorebirds 2020 Program;

41. To offset residual impacts to listed migratory birds, the person taking the action must submit a Migratory Birds Offsets Management Plan (MBOMP) to the Minister for approval. The MBOMP must include, but may not be limited to, the following:

a. *Identification of at least 275 ha of roosting and foraging habitat that is internationally significant for the Grey-tailed Tattler (Heteroscelus brevipes) or nationally significant for listed migratory birds. The identified habitat is to be actively managed for conservation from the commencement of the action until the expiry date of this approval. The person taking the action is to fully fund the conservation program and, where*

required is to negotiate a conservation agreement(s) for the site(s) with land holder(s) and relevant government agencies;

b. *Management and control of feral animals and other invasive species within the area(s) required by Condition 41a;*

c. *Restriction of access to the area(s) required by Condition 41a from recreational activities during the northern and southern migration of listed migratory birds;*

d. *Maintenance and monitoring of the area(s) required by Condition 41a; and*

e. *Regular reporting on the actions undertaken to fulfill the requirements of Condition 41 a- d.*

1.4 Interpretation and implementation of Conditions 38-41

From dialogue with the Department of Environment (DoE) (formerly the Department of Sustainability, Environment, Water, Population and Communities (DSEWPaC)) prior to the grant of the EPBC Act approval, API understood that the main objectives of the survey program were to (i) enable identification of the 275 hectares of migratory bird habitat as required under Condition 41; and (ii) fill information gaps in migratory bird utilization of the Northwest Australian coastline (M. Ward, pers comm. 2013). An additional objective of the program, given greater emphasis following the amendment of Condition 38, is the collection of data relating to the regional distribution (± 100 km of Anketell Point) of listed migratory birds before, during and following the construction of Anketell Port. A 100 km radius from Anketell Point encompasses the shoreline from Cape Preston in the west to Cape Cossigny in the east (Figure 1.1) within which there are a number of other coastal (port) developments approved under the EPBC Act in the period 2013-2014.

Following the receipt of advice from DoE after its review of the draft Migratory Bird Survey Program (Rev D and E), API modified the program to include the survey of all sites during each survey, rather than the incremental assessment of sites. Further, to align with the requirements of Condition 38 (amended) the timing of the surveys was modified from southern migration and non-breeding season surveys to instead include two surveys during the non-breeding period (January to March) of the 'wader year' or 'listed migratory birds season' (refer Section 1.5).

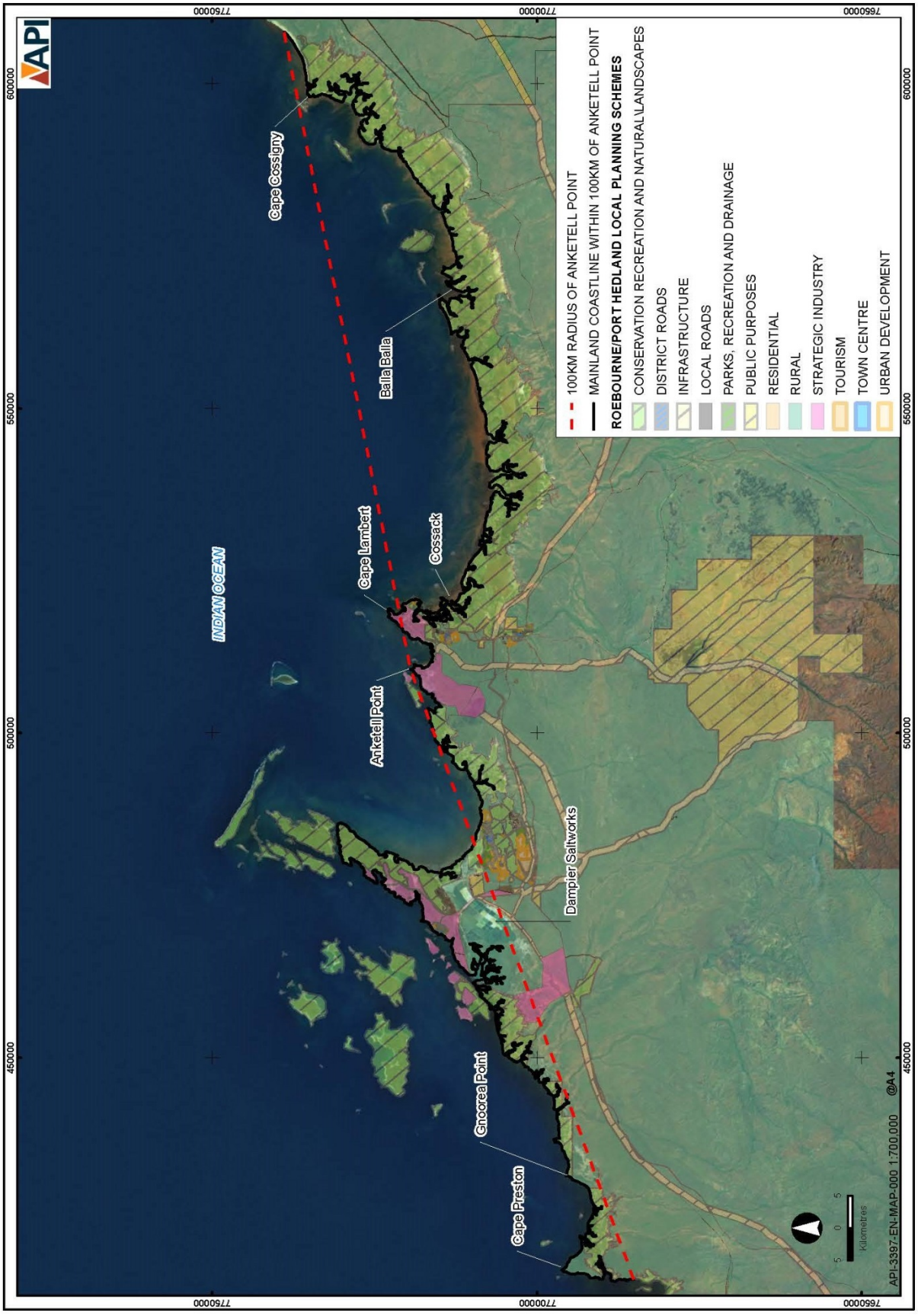


Figure 1.1 Geographical extent of required migratory bird survey program

1.5 Migratory birds in Western Australia

Migratory shorebirds that visit Australia are from the East Asian – Australasian (EAA) Flyway (EAAF). The EAAF includes Russia, Alaska, parts of south and east Asia, Australia and New Zealand.

Migratory birds migrate south from the northern hemisphere (southern migration) typically arriving in Australia during September and October, using offshore islands as stopover or staging sites before dispersing to intertidal flats on the mainland, coastal areas, or freshwater wetlands and grasslands. They then spend the non-breeding season (December to February) in these habitats, building up stores of fat before returning to the northern hemisphere to breed (northern migration) in February to April (Table 1.1). Some individuals remain in Australia during the northern hemisphere breeding season (May to July). Typically, these individuals are too old, too young (i.e. 'first year' birds) or did not accumulate enough fat reserves to make the return migration.

Table 1.1 Migratory bird migration, breeding and non-breeding seasons

Migratory period	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Southern migration (adults fly to Australia)								▒	■	■	▒	
Non-breeding season (adults and juveniles remain in Australia)	■	■	▒								▒	■
Northern migration (adults fly to breeding sites in N hemisphere)		▒	■	▒								
Breeding season (non-breeding birds remain in Australia)					■	■	■	▒				

Legend	
■	Peak activity (likely to vary on an annual basis)
▒	Diminished activity at beginning or end of migratory period (likely to vary on an annual basis)

Migratory species are listed under the EPBC Act. The listed species include those identified under the China-Australia Migratory Bird Agreement (CAMBA), the Japan-Australia Migratory Bird Agreement (JAMBA), the Republic of Korea-Australia Migratory Bird Agreement (ROKAMBA) and the Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention). Species listed under JAMBA are also protected under Schedule 3 of the Western Australian *Wildlife Conservation Act 1950*.

Thirty-six species regularly migrate along the coastline, with six of these species typically present in significant numbers: Grey-tailed Tattlers, Ruddy Turnstones, Red-necked Stints, Sanderlings, Greater Sand Plovers and Lesser Sand Plovers (Bamford et al. 2008). Roebuck Bay and Eighty Mile Beach are two of the most important sites for migratory waders in Australia, supporting greater than 1% of the EAA Flyway populations for 18 and 16 species respectively (Bamford et al. 2008). Elsewhere in the Pilbara, the saltworks at Port Hedland supports >1% of the population for five species (DEWHA 2008) and the Dampier saltworks supports >1% of the population of Curlew Sandpiper (1.67%) and Oriental Plover (2.6%) (AECOM 2011).

2 Existing information

A number of areas within 100 km of Anketell Point have previously been surveyed to determine the occurrence of sites of significance to migratory birds, as part of studies undertaken to support the environmental impact assessment (EIA) of major coastal infrastructure proposals. In addition, surveys are ongoing within the Dampier Saltworks Important Bird Area (IBA)[1]. Figure 2.1 outlines the approximate areas previously surveyed. Summaries of the work undertaken and key survey findings are provided below.

2.1 Information available from the Anketell Point region

2.1.1 Surveys completed to date at Anketell Point

A number of studies have been completed to support the assessment of potential impacts to migratory birds, and to support the development of appropriate management plans, including:

- AECOM. 2011. Migratory Wader Assessment Report. Report prepared by AECOM Australia Pty Ltd for API Management Pty Ltd, Como, Western Australia
- AECOM. 2010. Migratory Wader Assessment Report. Report prepared by AECOM Australia Pty Ltd for API Management Pty Ltd, Como, Western Australia
- Western Wildlife 2012. Greater Anketell Point Area: Summer (non-breeding season) shorebird survey 2012. Report prepared by Western Wildlife for API Management Pty Ltd, Como, Western Australia
- Western Wildlife. 2011. Greater Anketell Point Area: Summer (non-breeding season) shorebird survey. Report prepared by Western Wildlife for AECOM Pty Ltd, Perth, Western Australia
- Western Wildlife. 2010. Greater Anketell Point Area: Spring (southward migration) shorebird survey. Report prepared by Western Wildlife for AECOM Pty Ltd, Perth, Western Australia
- Western Wildlife. 2009a. Anketell Point: Spring shorebird survey. Report prepared by Western Wildlife for AECOM Pty Ltd, Perth, Western Australia
- Western Wildlife. 2009b. Anketell Point: Autumn shorebird survey. Report prepared by Western Wildlife for AECOM Pty Ltd, Perth, Western Australia
- Western Wildlife. 2009c. Anketell Point: Winter shorebird survey. Report prepared by Western Wildlife for AECOM Pty Ltd, Perth, Western Australia; and
- Western Wildlife. 2008. Anketell Point: Preliminary bird survey. Report prepared by Western Wildlife for AECOM Pty Ltd, Perth, Western Australia.

[1] Important Birds Areas are:
- Places of international significance for the conservation of birds and other biodiversity;
- Recognised world-wide as practical tools for conservation;
- Distinct areas amenable to practical conservation action;
- Identified using standardised, agreed criteria; and
- Sites that together form part of a wider, integrated approach to the conservation and sustainable use of the natural environment.

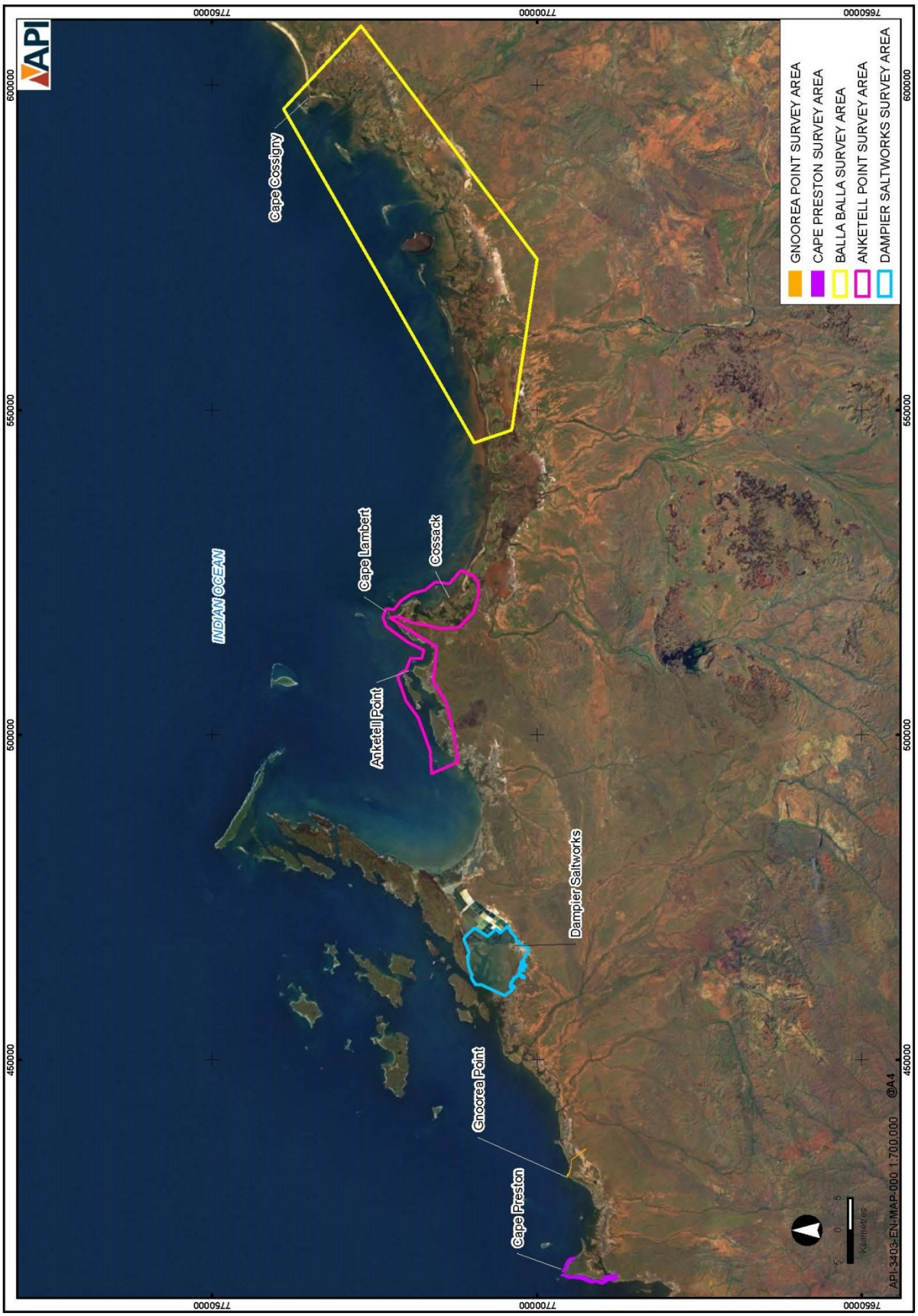


Figure 2.1 Areas previously surveyed within 100 km of Anketell Point

2.1.2 Migratory bird species recorded at Anketell Point

Field surveys between October 2008 and February 2012 confirmed the presence within the Proposal area and surrounding region of 31 bird species listed as Migratory under the EPBC Act. Migratory wader diversity was greatest during the period comprising northward migration/non-breeding season (March) and the non-breeding season (January) (AECOM 2011). The significance of habitat within the Anketell Point survey area (Figure 2.1) for the 31 listed migratory bird species is discussed in Table 2.1.

Table 2.1 Migratory bird species listed under the EPBC Act and recorded in the Proposal area

Species	EPBC listing status	Occurrence and significance of habitat
Bar-tailed Godwit (*Limosa lapponica*)	Migratory/ Marine	Bar-tailed Godwits were widely observed across the survey area including on the 'South-west mudflats' at Anketell Point (where the highest numbers were recorded) and on Dixon and Poverty islands. Numbers did not exceed 0.06% of estimated global population during any surveys.
Black-tailed Godwit (*Limosa limosa)*	Migratory/ Marine	A single individual was recorded.
Caspian Tern (*Sterna caspia*)	Migratory/ Marine	Small groups (2 or 3 individuals) were observed on numerous occasions along the beaches on Dixon Island and the mainland. A breeding season survey indicated that the species was common in the Proposal area with 141 individuals being recorded at high tide (0.05% of the global population of this species).
Little Tern (*Sternula albifrons*)	Migratory/ Marine	Very common, recorded primarily at high tide. A total of 110 birds were counted at high tide during the February 2012 survey, at sites across the wider survey area (including Cape Lambert, Point Samson and Cossack).
Common Greenshank (*Tringa nebularia*)	Migratory/ Marine	Recorded as common across the Proposal area, being most common at high tide. A maximum count of 305 individuals was recorded during the southern migration (< 0.03% global population count).
Common Sandpiper (*Tringa hypoleucos*)	Migratory/ Marine	Widespread and frequently recorded (≤ 20 birds within wider survey area). Common Sandpipers were recorded roosting at high tide in the majority of survey areas, and were also recorded foraging at low tide.
Curlew Sandpiper (*Calidris ferruginea*)	Migratory/ Marine	Considered uncommon in the Proposal area.
Eastern curlew (*Numenius madagascariensis*)	Migratory/ Marine	Low numbers observed. This species is far more abundant on the coastline between Port Hedland and Broome on passage to/from south-eastern Australia where it winters.
Great Knot (*Calidris tenuirostris*)	Migratory/ Marine	During the southward migration survey (Spring 2010), 524 individuals were recorded across the wider survey area, predominantly within the 'South-west mudflats'. In Summer 2011 and 2012 a total of 1895 (0.5% of the estimated global population count) and 1120 individuals respectively were recorded across this area, with greatest numbers again within the 'South-west mudflats'.
Greater Sand Plover (*Charadrius leschenaultii*)	Migratory/ Marine	Relatively high numbers (1094 (Summer 2011), 692 (Summer 2012)) (≤ 0.3% of the global population and approaching 1% flyway population) were recorded during surveys, with individuals widely distributed across the wider survey area.
Grey Plover (*Pluvialis squatarola*)	Migratory/ Marine	Common to frequent within the Proposal area, where birds were recorded roosting at high tide in the South-east and North-east regions of the survey area. Observed during the northern and southern migration periods and during the breeding season.
Grey-tailed Tattler (*Tringa brevipes*)	Migratory/ Marine	The wider survey area provides habitat for 2% of the estimated global population while the Proposal area and surrounds supports >1% during the non-breeding season.
Lesser Crested Tern (*Sterna bengalensis*)	Migratory/ Marine	Uncommon across the wider survey area.

Species	EPBC listing status	Occurrence and significance of habitat
Lesser Sand Plover (*Charadrius mongolus*)	Migratory/ Marine	Uncommon during the majority of surveys, common during the Spring 2010 survey and very common during the Summer 2012 survey (total 193 individuals at high tide across the wider survey area).
Marsh Sandpiper (*Tringa stagnatilis*)	Migratory/ Marine	Recorded on two occasions.
Oriental Plover (*Charadrius veredus*)	Migratory/ Marine	Low numbers occasionally recorded.
Oriental Pratincole *(Glareola maldivarum)*	Migratory	The most numerous bird recorded on the tidal mudflats (71 individuals) south of Anketell Point in October 2008 but was not recorded in significant numbers during subsequent surveys.
Pacific Golden Plover (*Pluvialis fulva*)	Migratory/ Marine	Uncommon in the Proposal area, with seven birds observed roosting at high tide in the North-east region and one bird found foraging at low tide on the South-west mudflats during the southern migration survey.
Rainbow Bee-eater (*Merops ornatus*)	Migratory/ Marine	Common and widespread, and was present in low numbers in the Proposal area.
Red Knot (*Calidris canutus*)	Migratory/ Marine	Generally uncommon to scarce within the survey area.
Red-necked Stint (*Calidris ruficollis*)	Migratory/ Marine	Common in the Proposal area during the northern and southern migrations as well as during the breeding season. Between 0.13% and 0.15% of the estimated global population were recorded on southward and northward migrations. Lower numbers (0.05% of estimated global population) were recorded during the breeding season.
Ruddy Turnstone (*Arenaria interpres*)	Migratory/ Marine	Less than 0.02% of the estimated global population recorded from the survey areas during the northern and southern migration and breeding season surveys.
Sanderling (*Calidris alba*)	Migratory/ Marine	A maximum of 25 individuals (<0.01% estimated global population) were recorded during the 2008 to 2010 surveys, 35 were recorded in summer 2012.
Terek Sandpiper (*Tringa cinereus*)	Migratory/ Marine	Frequent to common across the wider survey area during Spring and Summer surveys. In summer 2012, 148 birds were recorded at high tide in Nickol Bay (48) and at Anketell Point (100) (< 0.01% of global population).
Whimbrel (*Numenius phaeopus*)	Migratory/ Marine	Commonly recorded at numerous roosts across the wider survey area. Approximately 0.01% of the estimated global population of this species was recorded across the wider survey area.
White-bellied Sea-eagle (*Haliaeetus leucogaster*)	Migratory/ Marine	Observed on several occasions on Dixon Island and near coastal sections of the mainland.
Wood Sandpiper (*Tringa glareola*)	Migratory/ Marine	One individual was observed on Dixon Island.
Common Sandpiper (*Actitis hypoleucos*)	Migratory/ Marine	Frequently recorded (≤ 22 individuals) across the wider survey area.
Eastern Great Egret (*Ardea alba*)	Migratory/ Marine	Uncommon. The only record is a single bird at high tide in the North Samson Mudflats.
Eastern Reef Egret (*Egretta sacra*)	Migratory/ Marine	Frequent. A total of 14 birds were recorded at high tide, mostly from Walcott Island (7), but also from Cleaverville, Dixon Island North, Cape Lambert and Point Samson Mangroves.
Osprey (*Pandion haliaetus*)	Migratory/ Marine	Frequent. A total of nine birds recorded at high tide with most (six) on Dixon Island.

2.2 Surveys previously completed at Cape Preston

Two shorebird surveys have previously been carried out in the Cape Preston area (Figure 2.1) to support the EIA of the Sino Iron Project (Stage 1), Balmoral South Iron Ore Project (Stage 2), and Mineralogy Expansion Proposal (Stage 3), as follows:

- October 2002 (Hassell 2002); and
- October/November 2008 (Bennelongia 2008).

The two shorebird surveys recorded 21 species, 19 of which were recorded during both surveys. The overall community composition and proportions of species was quite stable between the two surveys (Bennelongia 2008). Most of the birds observed in 2008 showed no remnants of breeding colour which suggested they were juveniles that had remained in the area over the breeding season and were likely to remain there through the Australian summer (Bennelongia 2008).

A total of 2517 shorebirds of 19 species were counted over the seven day survey at Cape Preston during the southern migration period in 2008. The most abundant species were the Red-necked Stint (497 individuals), the Grey-tailed Tattler (347 individuals) and the Greater Sand Plover (290 individuals) (Table 2.2).

Table 2.2 Shorebird species recorded at Cape Preston 2008 (1% population estimates (Delaney & Scott 2006) and whether species are listed under international treaties (source: Bennelongia 2008)

Taxonomic Name	Common Name	Count	1% popn criterion	JAMBA CAMBA ROKAMBA
Limosa lapponica	Bar-tailed Godwit	264	1700	X
Numenius phaeopus	Whimbrel	6	550	X
Numenius madagascariensis	Eastern Curlew	10	380	X
Tringa stagnatilis	Marsh Sandpiper	2	10,000	X
Tringa nebularia	Common Greenshank	19	1000	X
Actitis hypoleucos	Common Sandpiper	1	500	X
Heteroscelus brevipes	Grey-tailed Tattler	347	400	X
Arenaria interpres	Ruddy Turnstone	250	1000	X
Calidris tenuirostris	Great Knot	113	3800	X
Calidris alba	Sanderling	187	220	X
Calidris ruficollis	Red-necked Stint	497	3200	X
Calidris ferruginea	Curlew Sandpiper	4	1800	X
Burhinus gigantea	Beach Stone Curlew	2	250	
Haematopus longirostris	Pied Oystercatcher	8	110	
Haematopus opthalmicus	Sooty Oystercatcher	3	75	
Pluvialis squatarola	Grey Plover	4	1300	X
Charadrius ruficapillus	Red-capped Plover	92	950	
Charadrius mongolus	Lesser Sand Plover	6	200	X
Charadrius leschenaultii	Greater Sand Plover	290	1000	X

The highest number of birds was recorded on the western side of Cape Preston (Figure 2.2), where a moderate-sized flock of small shorebirds was recorded roosting above the high tide mark. No site supported high numbers of birds in the sense of being an important site for shorebird conservation (Bennelongia 2008).

Figure 2.2 Coastline along the western side of Cape Preston (source: Bennelongia 2008)

A potential high tide roost was also recorded (Figure 2.3) but it's significance could not be confirmed on the basis of a single aerial survey (Bennelongia 2008).

Figure 2.3 Potential high tide roosting site (source: Bennelongia 2008)

2.3 Surveys previously completed at Gnoorea Point

To support the EIA for the Reindeer Gas Project (Apache Energy Limited) a 'Level 1' (WA Environmental Protection Authority Guidelines) fauna survey of the study area at Gnoorea Point (Figure 2.1) was conducted on 20 and 21 March 2007. At total of 55 bird species, including 15 conservation significant species, were recorded during the site inspection. Shorebirds recorded during the survey including the Eastern Reef Egret, Black-tailed Godwit, Common Sandpiper, Grey-tailed Tattler, Ruddy Turnstone, Red-necked Stint, Curlew Sandpiper, Lesser Sand Plover and Greater Sand Plover (Bamford Consulting Ecologists 2007).

Figure 2.4 Shoreline and foredune at Gnoorea Point (source: Bamford Consulting Ecologists 2007)

2.4 Surveys completed at the Dampier Saltworks (Dampier)

This IBA consists of the commercial saltworks at Dampier, near Karratha in northern Western Australia (Figure 2.1). The Dampier saltworks is a large network of inundated salt evaporation and intake ponds surrounded by tidal creeks and mud-flats. The site regularly supports more than 1% of the global populations of the Red-necked Stint and Red-capped Plover. It has irregularly supported more than 1% of Sharp-tailed Sandpiper and Oriental Plover (Birdlife Australia 2013a).

During a survey completed by the Pilbara Coastal Birdwatch (October 2010) a number of species were recorded including the Red-necked Avocet, the Black-winged Stilt, the Banded Stilt, Great Knot, Sharp-tailed Sandpiper, Curlew Sandpiper, Marsh Sandpiper, Red-necked Stint, Common Greenshank and Red-capped Plover (Rio Tinto 2010).

2.5 Surveys previously completed at Balla Balla

Historic surveys have reported a total of 8522 waterbirds using this site (Kingsford et al. 2011). Forge Resources Ltd (Forge) proposes to develop the Balla Balla Magnetite Project and associated infrastructure approximately 10 km north-west of Whim Creek. The project involves construction of a dewatering plant, stockyards, overland and over water conveyor and associated infrastructure. To support the EIA of this proposal, a desktop review and aerial survey (Figure 2.1) have been completed (Phoenix Environmental Services 2013).

The desktop survey indicated that significant numbers of migratory shorebirds could occur in, and/or near the study area (NWC & UNSW 2012). The study area encompassed the entire shorebird site as defined in DEWHA (2009a) as 'the entire (discrete) area of contiguous habitat used by the same group of migratory shorebirds, which may include multiple roosts and feeding areas'. The study area encompassed Forestier Bay (from Cape Cossigny to the eastern mouth of the Sherlock River) and included West Moore and East More islands, Depuch Island, Sable Island, Reefs Island and Ronsard Island (Figure 2.1). The study area also included a portion of a salt lake (upper tidal salt flat), in order to determine whether shorebirds were using it as a roosting site at high tide (Phoenix Environmental Services 2013).

Four sampling events were completed (December 2012, and January, February and March 2013). The survey method and design was tailored to adhere to the 'significant impact guidelines' (DEWHA 2009a) but some limitations were encountered due to access constraints, including:

- During the aerial transect main roosting sites were located but identification at the species and/or genus level could not often be obtained given the distance and the speed of the aircraft and movements of the birds;
- The surveys did not capture the southern migration;

- The use of a helicopter to access the sites for ground counts occasionally disturbed a variable proportion of the flocks, reducing the number of birds present at some sites; and
- No sampling was undertaken in the breeding season, when immature birds are likely to remain in Australia (May – July) (Table 1.1).

Two main areas of congregations were identified, as follows:

- The 9 km stretch of coast eastwards from the vicinity of the proposed conveyor supported the largest bird numbers within Forestier Bay, with flocks of over 1,000 individuals being regularly recorded and the largest flock observed being over 3,200 individuals (January 2013); and
- The 4 km of mainland coast facing Ronsard Island also regularly supported large flocks of shorebirds (e.g. flocks of 900-1,500 shorebirds) (Figure 2.5).

A total of 13 species were recorded in numbers exceeding the 0.1% East Asian-Australasian Flyway (EAAF) threshold, indicating that the area is of national significance. Of these, the bar-tailed godwit and grey-tailed tattler were recorded in numbers exceeding the 1% EAAF threshold, which indicates that Forestier Bay is of international significance for these species.

The maximum number of Grey-tailed Tattler recorded was 1,400, but this number was reported as a likely underestimate because the species' expected preference to roost in dense mangrove thickets which could not be accessed. Taking this into account, the population of Grey-tailed Tattler in the study area was estimated at 2,500 individuals, meaning Forestier Bay potentially supports at least 5% of the EAAF population (Phoenix Environmental Services 2013).

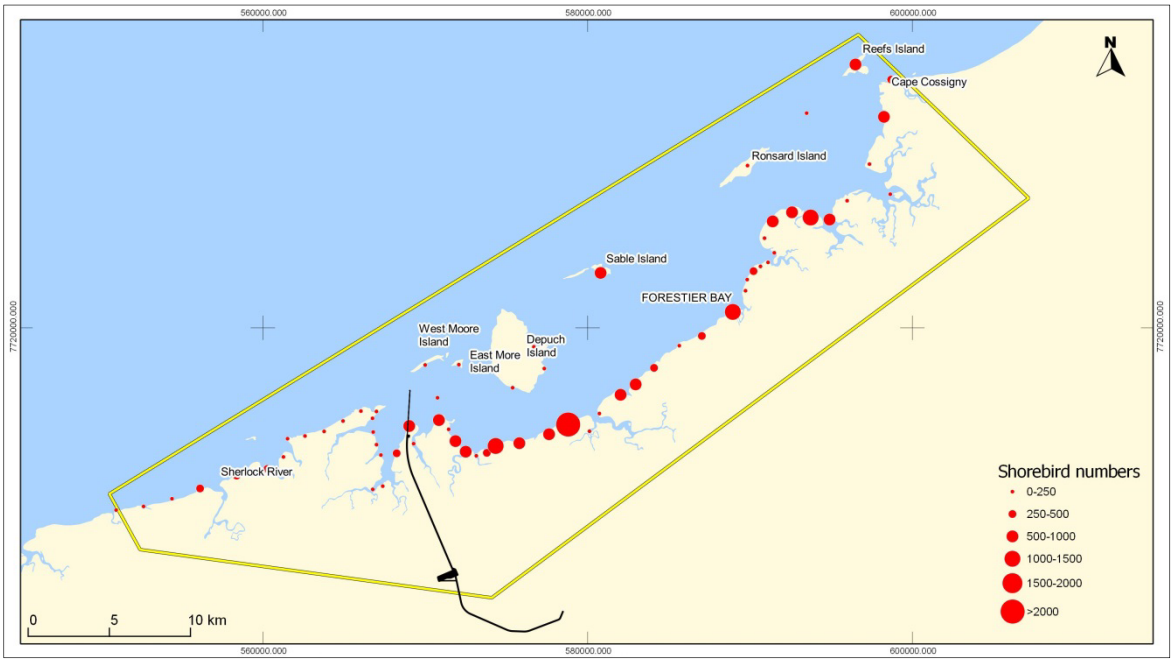


Figure 2.5 Abundance of migratory birds recorded within Balla Balla survey area in January 2013 (source: Phoenix 2013)

2.6 Summary

A summary of the existing information for sites within 100 km of Anketell Point, including identification of the dominant species recorded, timing of previous surveys and the significance of the sites, is presented in Table 2.3.

The area surrounding Anketell Point has been surveyed more intensively than the other areas, with surveys during the breeding season (April to August/early September), southern migration (August-November), northern migration (March/April) and non-breeding season (early November to early March) allowing the stages of key use of the area to be determined. The abundance of the most common species (Grey-tailed Tattler, Greater Sand Plover, Bar-tailed Godwit and Great Knot) was greatest during the southern migration (October 2010) and the non-breeding season (January 2011, February 2012). This follows the pattern in Grey-tailed Tattler abundance recorded during migratory wader surveys conducted on Barrow Island where numbers peaked during the non-breeding season, and decreased during the breeding season (Bamford 2005).

The surveys undertaken at Cape Preston, Gnoorea Point and Balla Balla have been completed during a single season (Cape Preston survey repeated over two years). Further, the 2012 survey completed at Balla Balla (and surrounds) was undertaken using aerial survey only (likely due to the lack of access to extensive parts of the survey area) and therefore accurate counts and species-specific data was not obtained. Surveys of the Dampier Saltworks have occurred since 2006, generally during the southern migration (Birdlife Australia 2013b).

Table 2.3 Summary of data for surveyed sites within 100 km radius of Anketell Point

Site	Dominant species recorded (maximum number)	Migratory stage surveyed (timing of maximum numbers)	Site recorded as nationally significant[1]	Site recorded as internationally significant[2]
Anketell Point	Grey-tailed Tattler (1004) Greater Sand Plover (1094) Bar-tailed Godwit (1329) Great Knot (1120)	All (non-breeding season)	Yes	Yes
Cape Preston	Red-necked Stint (497)* Grey-tailed Tattler (347)* Greater Sand Plover (290)*	Southern migration only	Yes	No
Gnoorea Point	Abundance data not provided	Non-breeding season/northern migration	No	No
Dampier Saltworks	Red-necked Stint (> 3,200) Red-capped Plover	Southern migration	Yes	Yes
Balla Balla	Grey-tailed Tattler (1,400) Bar-tailed Godwit (4,000-5,000)	Non-breeding season/northern migration	Yes	Yes

Notes:

*Number recorded during 2008 survey (Bennelongia 2008)
[1]Site supports ≥0.1% of EAAF population of a species, ≥2000 migratory shorebirds, or ≥15 shorebird species
[2]Site supports ≥1% of EAAF population of a species, or a total abundance of ≥20,000 waterbirds

3 Guidance on migratory bird survey design

3.1 Guidance provided in the 'Significant impact guidelines for 36 migratory shorebird species policy statement 3.21'

A summary of the guidance provided in the 'Significant impact guidelines for 36 migratory shorebird species policy statement 3.21' (DEWHA 2009a) is provided in Table 3.1.

Table 3.1 Summary of relevant guidance

Topic	Guidance
Survey guidelines for migratory shorebirds	Important habitat is the key element that needs to be identified when assessing the significance of potential impacts on migratory shorebirds. To determine whether a site meets the criteria for important habitat (Table 2.3) you will need to do the following investigation: • check for existing suitable survey data collected from the site during previous monitoring activities • if no suitable survey data exists, if it is too old to be considered reliable, or if the site characteristics have changed, surveys of the site must be done to establish the presence and number of migratory shorebirds, and • assess habitat characteristics (for example, type, quality, size and availability) and existing threats to the site in relation to its regional context.
	Where it is not possible to do surveys for migratory shorebirds in the manner recommended, a thorough habitat assessment should be done to identify potential habitat. Areas of potential habitat for migratory shorebirds (including both the riparian/wetland fringe and the floodplain system surrounding the habitat) should be defined.

3.2 Guidance provided in the 'Significant impact guidelines for 36 migratory shorebird species background paper'

The relevant guidance provided in the 'Significant impact guidelines for 36 migratory shorebird species background paper' (DEWHA 2009b) is summarised in Table 3.2.

Table 3.2 Summary of relevant guidance

Topic	Guidance
Survey coverage	At a minimum survey coverage should include: • all of the habitat thought to be used by the same population of shorebirds, and • the entire area of contiguous habitat where shorebirds may occur. This will require consideration of the regional context of the wetland and may include multiple discrete roosts and feeding areas.
Survey timing	Surveys for roosting shorebirds should be conducted as close to the time of high tide as practicable and at a maximum of no more than two hours either side of high tide (unless local knowledge indicates a more suitable time). Surveys for foraging shorebirds should be conducted as close to the time of low tide as practicable and at a maximum of no more than two hours either side of low tide (unless local knowledge indicates a more suitable time). Surveys should not be undertaken during periods of high rainfall or strong winds. Surveys should not be undertaken when activities are taking place which cause disturbance to the birds.

Topic	Guidance
Survey effort	Minimum of four surveys for roosting shorebirds during the period when the majority of shorebirds are present in the area. Replicate surveys over this period are important in obtaining adequate data. For example one survey in December, two surveys in January, and one survey in February. Minimum of four surveys for foraging shorebirds including two surveys at spring low tide and two surveys at neap low tide. Minimum of one survey during the northern hemisphere breeding season to capture birds that remain in Australia during the breeding season as well as the double-banded plover (mid-May to mid-September). For large sites or for sites where large numbers of birds are expected, it is recommended that at least two people undertake the counts and agree on the number of birds and the number of species present.
Minimum data requirements	The following should be included in the survey report: • shorebird statistics relating to roosting sites: • total abundance – total number of birds present across all species • species richness – number of species observed, and • species abundance – number of birds of each species present. Shorebird behaviour: • activity at site – roosting only, foraging only, roosting and foraging, and • foraging location – spatial data of the area used by shorebirds for feeding to enable mapping of foraging habitat Survey conditions: • date, time of day • tide height, and • weather conditions: • temperature • precipitation • wind speed, and • wind direction. Number of observers and experience level. Habitat Characteristics: • dominant landform type • site hydrology • dominant terrestrial and aquatic vegetation types • intertidal substrate characteristics • invasive species • current disturbance regime (see below), and • presence of suitable nocturnal roost sites (see below). Method used to conduct the survey.

Topic	Guidance
Refuge sites	Some sites may provide only marginal habitat for migratory shorebirds under normal conditions but may act as refuge for migratory shorebirds when disturbed at preferred roosting or feeding sites, or when there are extreme conditions at these sites, such as extreme high tides or very strong winds. Surveys should therefore make note of any shorebird habitats outside the study site and attempt to place the study site in the context of the larger wetland environment. Some questions that may help place the site in the broader context include: • is the site in close proximity to known shorebird roosting and feeding sites? • does similar habitat appear widely available within the region? • what is the level of connectivity of the site to other areas of known or potential shorebird habitat, or how much movement exists between adjacent sites? • are birds known to fly to the site when disturbed at other known sites or during unfavourable conditions at other known sites and if so how long do birds spend at the site before returning to preferred habitat? • is the site available during extreme high tides?

4 Migratory Bird Survey Program approach

4.1 Introduction

Given the length of coastline required to be surveyed (200 km centred on Anketell Point) and the remoteness of much of this area, API originally (RevD, August 2013) proposed a phased approach, utilizing both aerial and on-ground surveys, to address the requirements of the program. Following comments from the DoE, and the amendment of Condition 38, API has revised the survey approach to include aerial surveys of each site during each survey.

4.2 Proposed survey sites

API has selected key survey sites based on:

- The extent of previous migratory bird surveys, with unsurveyed/under-surveyed areas prioritized for survey (Figure 4.1);
- A visual assessment of available satellite imagery to identify areas of extensive mud and sand flats (potential foraging habitat) and adjacent salt flat, mangrove and dune areas (potential roosting habitat); and
- Land tenure and status, in particular classification of the sites under the relevant local town planning schemes, noting areas classified as 'Conservation, Recreation and Natural landscapes'.

The proposed survey sites, including indicative survey boundaries, are summarised in Table 4.1 and presented individually in Figure 4.2. The area adjacent to Anketell Point is not included as a proposed survey site under this program as surveys of this area will be undertaken under a separate program as detailed in the Ecosystem Research and Monitoring Program (required under Condition 22 of the EPBC Act approval).

Table 4.1 Summary of selected survey sites

Name	Distance from Anketell Point (to centre of site) (km)	Total area (km^2)	Comments
Cape Preston East	90	33.2	Adjacent to operational port at Cape Preston and slightly overlapping Mineralogy State Agreement area
Gnoorea Point East	65	49.4	In proximity to the Reindeer Gas Project
Cossack East	25	186.5	
Cape Cossigny	90	68.1	East of the proposed Balla Balla export facility

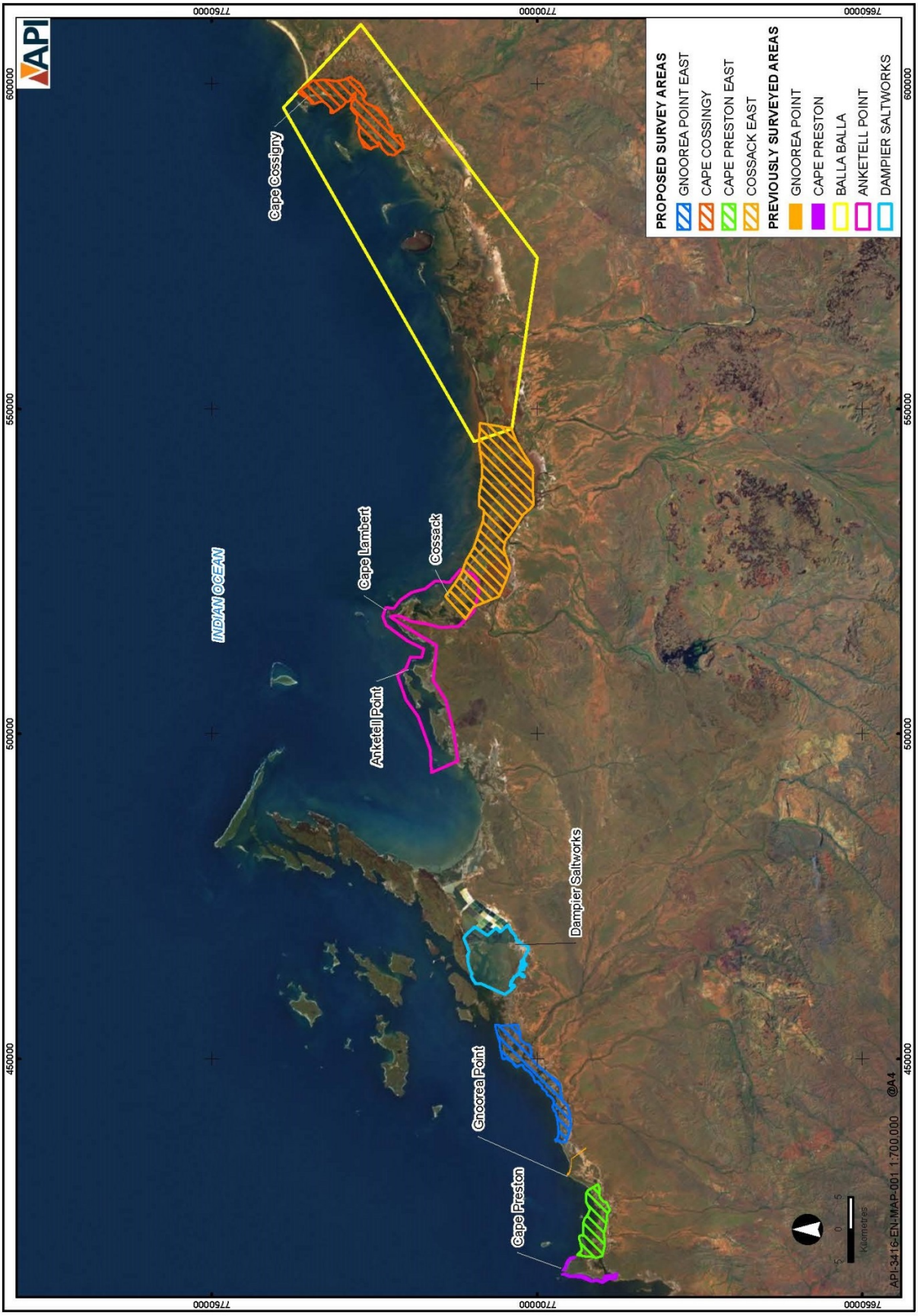


Figure 4.1 Location of proposed migratory bird survey sites in relation to previously surveyed areas

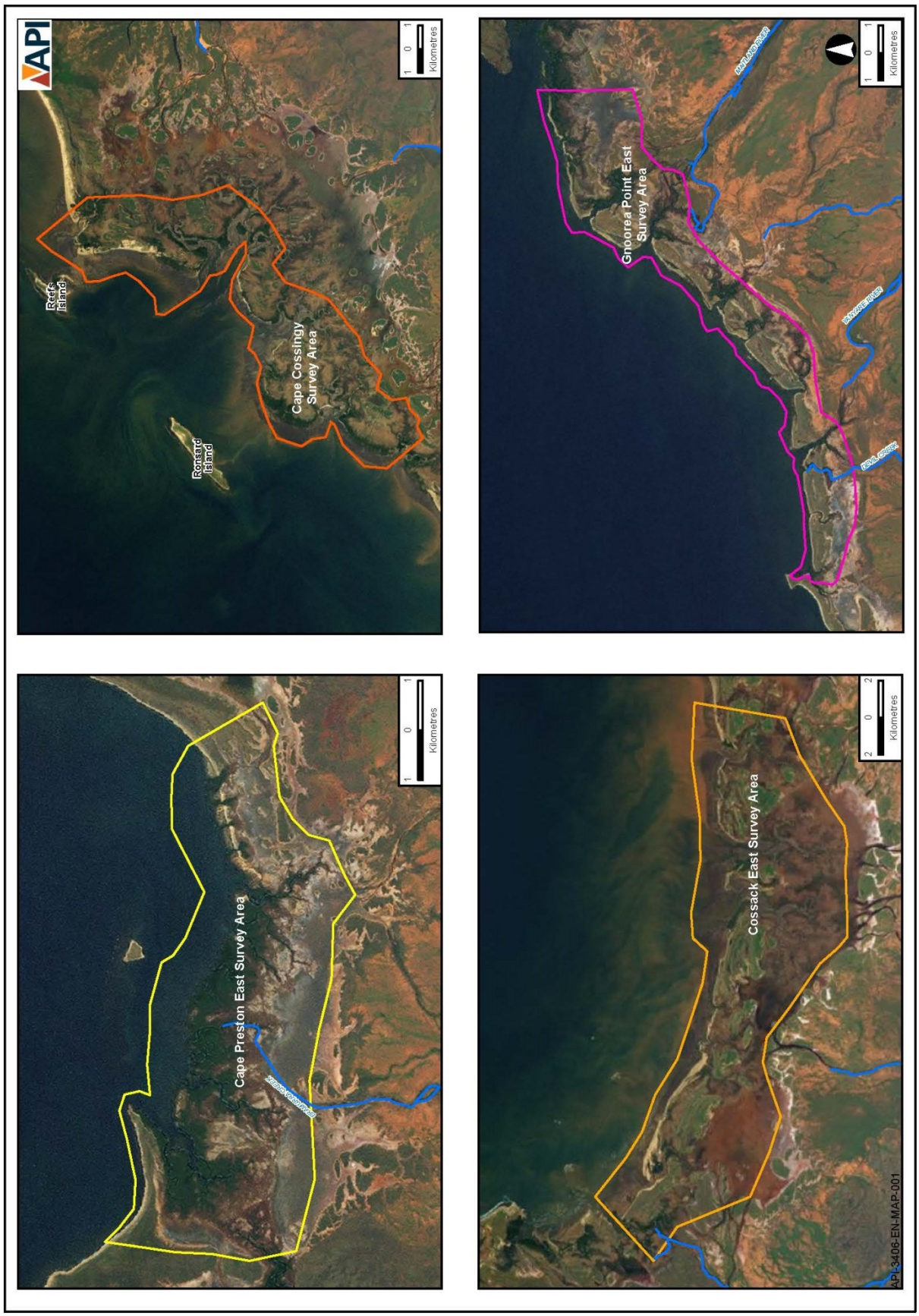


Figure 4.2 Location of proposed migratory bird survey sites

4.3 Survey approach

Aerial surveys will allow the sites, which are remote and extensive (for example the Cossack East survey area covers 186 km^2), to be surveyed during a single survey (1-3 days) to identify key roosts.

The potential value of aerial surveys for waterbirds was first recognised in the late 1940s for North American wetlands, leading to the development of the world's most extensive waterbird survey (at that time). Aerial surveys are a very cost effective technique for collecting data on waterbird populations and allow the distribution of waterbird populations to be measured over large areas. At least 17 major regional or large-scale aerial surveys of waterbird populations have been undertaken since the 1980s, including the North-west Western Australia shorebird counts, with irregular counts undertaken since 1982 focussing on Roebuck Bay and Eighty Mile Beach. An additional advantage gained from aerial surveys using helicopters is the tendency for roosting birds to take off when approached at distances of less than several hundred metres, which allows the abundance of birds roosting within cryptic habitat (e.g. mangroves), to be determined. Disadvantages of aerial surveys include the potential to return low abundance estimates, as some species (e.g. small wading birds) cannot be differentiated from the distance at which aerial observers operate while other species are cryptic and can be hidden in vegetation, though these can be counted if they take flight (as discussed above). During the National Waterbird Survey[2] ground counts were completed in conjunction with aerial surveys (Kingsford et al. 2012).

Targeted on-ground surveys (with access via vehicle or helicopter) will be completed opportunistically to complement the aerial surveys if required, and not prevented by land access or safety issues, to confirm the species present at major roosts[3], or within habitat proposed to be managed under Condition 41 of the EPBC Act approval.

4.4 Survey methods

Aerial surveys will be completed from a helicopter to allow height and speed to be varied as required to maximise data capture. Linear flights across each survey area will be conducted at high tide (±2 hours) to locate and count the largest roosts. The helicopter will fly at a height of 50-100 m at an average speed of ~40 knots. Two experienced observers will complete counts, into a digital audio recorder, on opposite sides of the flight line to maximise survey coverage. Observed birds will be identified to the lowest taxonomic level possible. The location of each roost or foraging area will be recorded by cross-referencing the time of observation to a continuous GPS track recorded during each flight.

The on-ground survey of major roosts will be completed opportunistically[4], but will target high tide (±2 hours) and be completed by a minimum of two experienced observers. Proximity to roosts will be gained by helicopter or vehicle access prior to closure on foot.

4.5 Survey timing

API originally (RevD, August 2013) proposed to undertake the initial surveys at each site during the southern migration (preferred timing as specified within Condition 38), with a second survey during the non-breeding season (period of expected maximum use of sites). Following comments received from DoE, and the amendment of Condition 38, API has revised the survey approach to include two surveys during the non-breeding season, nominally in December and February[5] of each 'wader year' (Table 4.2).

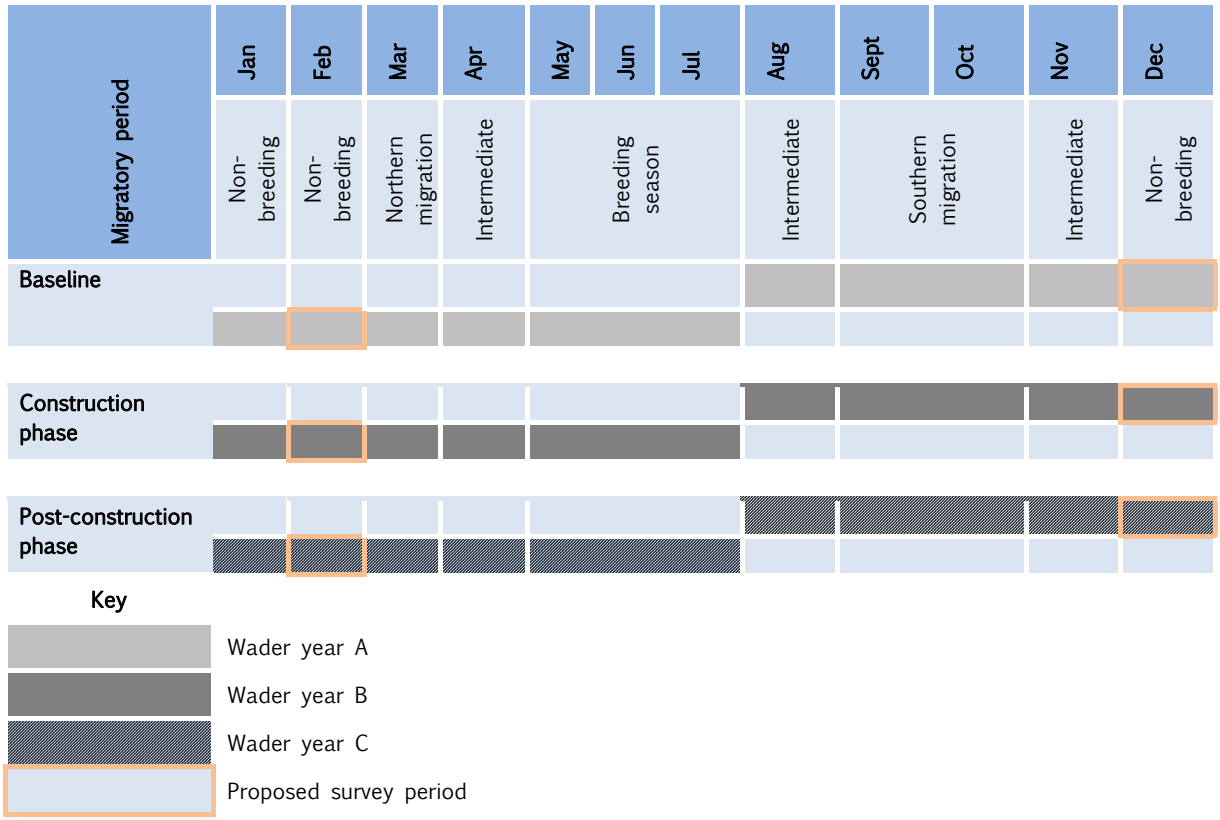
[2] The National Waterbird Survey involved a survey, in 2008, of waterbirds in major wetlands across the whole of Australia and represented the first continental-scale waterbird survey in the world (Kingsford et al. 2012).

[3] Major roosting site defined as that supporting > 2000 migratory shorebirds or > 0.1% of the EAAF population of a species.

[4] For example towards the end of the survey period (high tide ±2 hours) or at the end of the day when the full aerial survey of an additional site cannot be completed.

[5] Precise survey timing will be dependent on the availability of skilled personnel, the timing of spring tides and weather conditions (the cyclone season occurs from ~January to March).

Table 4.2 Migratory bird survey timing in relation to migratory period and 'wader year' (or 'listed migratory birds season')



5 Reporting

5.1 Content of survey reports

Reports will include the following information (taking into account the guidance presented in the *Significant impact guidelines for 36 migratory shorebird species* background paper, DEWHA 2009b):

- Introduction to project and survey program
- Overview of methods employed during survey(s)
- Additional survey information including:
    - Survey personnel and experience level, tidal phase, weather conditions and other relevant observations
    - Date, time of day
    - Tide phase and height, and
    - Weather conditions, including temperature, precipitation, wind speed, and wind direction.
- Summary of survey limitations (e.g. access restrictions, accuracy of counts)
- Classification of site(s) in terms of national or international significance
- Shorebird statistics relating to roosting sites, including:
    - Total abundance – total number of birds present across all species
    - Species richness – number of species observed, and
    - Species abundance – number of birds of each species present.
- Shorebird behaviour, including activity at site – roosting only, foraging only, roosting and foraging.
- Habitat characteristics such as:
    - Dominant landform type
    - Site hydrology
    - Dominant terrestrial and aquatic vegetation types
    - Intertidal substrate characteristics
    - Invasive species
    - Current disturbance regime, and
    - Presence of suitable nocturnal roost sites.

5.2 Timing of survey report submission

The results of surveys will be provided to the DoE within 12 months of completion of each survey, as required by Condition 40 (amended), for submission to the Shorebirds 2020 Program. To streamline the reporting, it is proposed that data from each season of survey be reported within a single report.

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Personal Communications

Michael Ward, Director; North West Section; North, West and Offshore Assessment Branch; Environment Assessment and Compliance Division; Department of Environment. Telephone conversation. 7 May 2013.