ALBERTON WIND FARM

SHOREBIRD DATA ANALYSIS

Synergy Wind Pty Ltd

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1. EXECUTIVE SUMMARY

The proposed Alberton wind farm near Alberton in South Gippsland, Victoria, is located approximately three kilometres north of a coastal wetland area known as Corner Inlet, which is listed as a wetland of international importance under the Convention on Wetlands (the 'Ramsar' Convention), and protected under the provisions of the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (the EPBC Act).

Corner Inlet has been surveyed for shorebirds bi-annually (Summer and Winter) by Birdlife Australia since 1980, with numbers of both migratory and resident species recorded at 15 sites throughout the wetland during this time.

This report comprises an analysis undertaken of the Birdlife Australia data for 35 migratory species recorded from 1980 to 2015 in the eastern part of Corner Inlet, which is the region south of the proposed wind farm site. Similar data exist for the western part of Corner Inlet but this part of the site is located tens of kilometres from the proposed wind farm site, and the risk of impacts on bird inhabiting this portion of the site is considered negligible.

Data from fifteen regular survey sites in the eastern region of Corner Inlet were analysed, averages calculated by survey decade to ascertain long-term trends. Most of the sites where counts were undertaken were located close to the coastal (southern) edge of the wetland such as Dream south (shallow inlet), Kate Kearney entrance and Snake Island (east side). The closest regular shorebird monitoring sites to the Alberton Wind Farm are the One Tree Island, Robertson's Beach and Port Welshpool foreshore sites which are approximately seven to eight kilometres from the nearest proposed turbine in the wind farm.

Counts were undertaken at high tide when most migratory shorebirds concentrate onto high sandy beaches and spits. At low tide, intertidal flats are exposed and birds disperse to forage on these until the tide rises again. Therefore, the counts provide information on the geographic spread of roosting birds but not of foraging birds. Importantly, three low tide counts were undertaken in February 2015 by BL&A (BL&A 2016) to ascertain if any of the large roost aggregations disperse to forage on intertidal flats close to the proposed wind farm.

The analysis used the average summer count, which in many years comprised one count of all sites on the same weekend in late January or February. The highest such counts were recorded from sites located 12 or more kilometres from the wind farm site. One Tree Island, approximately seven kilometres from the closest proposed turbine, also showed comparatively high counts of between 2,000 and more than 4,000 birds. Counts at this site decreased over the years from a decade average of 4,266 in the 1980s to a decade average of 2,161 in the 2010s.

The decade average of the summer counts has been calculated for all sites. It decreased gradually from an average over the decade of 2,702 in the 1980s, 2,033 in the 1990s, 1,992 in the 2000s to 1,741 in the 2010s.

Winter counts have been comparatively low, with a few exceptions and did not show an obvious trend. Winter counts include young migratory shorebirds, which do not migrate back to the breeding grounds in their first year of life. As breeding success in the northern hemisphere varies greatly from year to year, winter counts correspondingly vary far more than summer counts.

Between 2000 and 2015, the two most abundant bird species counted were Bar-tailed Godwit and Red-necked Stint, with over 4,000 birds each at Kate Kearney Entrance, approximately 12 kilometres from the closest proposed turbine.

Based on the findings from this analysis of historical migratory shorebird count data and observations from site-based investigations in recent years (BL&A 2016), the risk of a significant impact on an important population of migratory shorebirds in Corner Inlet from the proposed wind farm is considered low. The reasons are set out below.

- No major wetland capable of supporting an important population of migratory shorebirds is located on the wind farm site and its immediate surrounds.
- The nearest potential habitat lies three kilometres to the south of the nearest proposed wind turbine and was found during the 2015 survey to support only low numbers of shorebirds foraging at low tide.
- Most roosting shorebirds in the eastern part of Corner Inlet use the sandy beaches and spits of the outer barrier islands, located 12 kilometres or more from the closest proposed turbine.
- The routine tidal movements of birds using these roosts would be to adjacent areas of intertidal sand- and mudflat more than five kilometres from the nearest proposed wind turbine.
- An evaluation of the risk of shorebird from eastern Corner Inlet colliding with wind turbines on the proposed project site found that by the time they would be over the site, they would be well above the turbines, given the usual steep rate of climb of migrating shorebirds.

For these reasons, and given the low rate of bird collision with wind turbines generally, it is considered highly unlikely the proposed wind farm will have a significant impact on the important populations of shorebirds that use the eastern part of the Corner Inlet Ramsar site.

For the same reasons, and given that shorebirds are an important element of the ecological character of the Corner Inlet Ramsar site, the proposed wind farm will not significantly impact the ecological character of this important wetland.

2. INTRODUCTION

Synergy Wind Pty Ltd engaged Brett Lane & Associates Pty Ltd (BL&A) to assess the impact of the proposed Alberton Wind Farm in South Gippsland on matters of national environmental significance protected by the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). Two matters are relevant to this assessment:

- The Corner Inlet Ramsar site, a wetland of international importance under the Convention on Wetlands (the 'Ramsar' Convention); and
- Important populations of listed migratory shorebirds that use the extensive intertidal foraging habitat and secure high tide roosting sites within the wetland.

For the former, this report addresses whether the proposed wind farm has a significant impact on the ecological character of the site. For the latter, it addresses whether an important population of a listed migratory shorebird will be impacted significantly.

The proposed wind farm is located west of Alberton in South Gippsland, Victoria (Figure 1). The eastern portion of Corner Inlet lies approximately three to five kilometres (at different points) south of the southern boundary of the proposed wind farm site.

Corner Inlet has been surveyed for shorebirds bi-annually (Summer and Winter) by Birdlife Australia since 1980, with numbers of both migratory and resident species recorded at more than 15 sites throughout the eastern part o the site during this time.

Species analysed for this report were strictly intertidal shore or marine birds unlikely to utilise dams or other wetlands within the wind farm site.

This report is divided into the following sections:

Section 3 provides a description of the wind farm site

Section 4 details the shorebird data used and the analysis

Section 5 presents the results of the analysis, and

Section 6 considers the risk of potential impacts on shorebirds from the proposed wind farm project.

This investigation was undertaken by a team from BL&A, comprising Greg Cranston (Ecologist), Inga Kulik (Senior Ecologist & Project Manager) and Brett Lane (Principal Consultant).

3. WIND FARM SITE DESCRIPTION

The proposed wind farm site does not support any large natural wetlands that would support an important population of migratory birds. Wetlands and waterways on the proposed wind farm site are described briefly below.

The Albert River is the largest watercourse crossing the wind farm site. Its reaches in the northern sections of the wind farm site are fresh water, and shallow to moderately deep. Although the river banks and channel are vegetated, surrounding land is mostly cleared dairy farms. Closer to the mouth of the river, water is brackish, shallower and slower-flowing. These areas, including a number of tributaries (possibly spring-fed) supporting mostly degraded brackish wetland vegetation. These areas are used to graze dairy cattle.

The Jack River is another significant, meandering permanent waterway that crosses the north-eastern part of the wind farm site. This river runs almost parallel with the Albert River, within a kilometre or so until it joins with the Albert River. A number of wet and dry ox-bows occur between and along the two rivers. Stony Creek, which has been channelized for part of its length, is a notable tributary of the Jack River. This creek dissects the far north-eastern corner of the wind farm site.

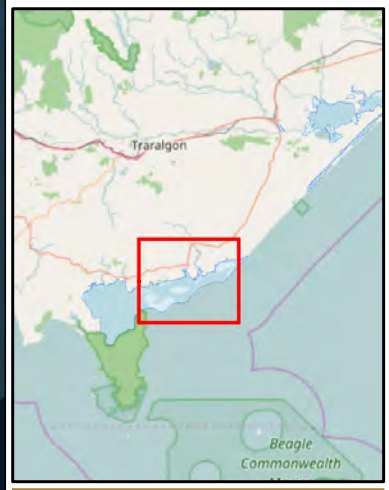
In addition to the aforementioned waterways, the site has many farm dams of varying size, connected by constructed drainage channels.

Figure 1: Overview map - Corner Inlet East

Project: Alberton Wind Farm
Client: Synergy Wind Pty Ltd
Date: 2/12/2016

Legend

- Wind Farm site
- Turbines
- Development footprint
- Ramsar site
- Survey sites



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4. METHODOLOGY

4.1. Sources of Information

This assessment is based on two sources of information;

- A field investigation undertaken in 2012 to ascertain how shorebirds use those parts of eastern Corner Inlet within three to five kilometres of the proposed wind farm; and
- Shorebird count data collected by birders for Birdlife Australia since 1980.

The purpose of the analysis was to identify if any important populations of migratory shorebirds occur close enough to the proposed wind farm to be at risk of a significant impact, as defined under the EPBC Act 'Significant Impact Guidelines for 36 migratory species' (DEWHA 2009). The field investigation methods are described first, followed by the existing information used.

4.1.1. Field investigation

The migratory bird surveys were conducted between 25th and 27th February, 2015 at low tide to identify areas where shorebirds might be foraging on intertidal sand- and mudflats. On the first day, surveys were undertaken by car and foot along the coastline from the land side, while on the second and third day, surveys were undertaken by boat along the edge of the coastline from the water.

4.1.2. Existing data

Existing information was obtained for the eastern part of Corner Inlet from the Birdlife Australia Shorebird 2020 count database (provided in November 2016). These data have been generated over the last 35 years (1980 to 2015) from bird counts within the Corner Inlet Ramsar wetland. The most relevant data are those from the eastern part of the area including data from 15 survey sites.

Data for the following EPBC Act listed 31 migratory shorebird species were analysed.

- Asian Dowitcher
- Bar-tailed Godwit
- Black-tailed Godwit
- Broad-billed Sandpiper
- Common Greenshank
- Common Redshank
- Common Sandpiper
- Curlew Sandpiper
- Double-banded Plover
- Eastern Curlew
- Great Knot
- Greater Sand Plover
- Grey Plover
- Grey-tailed Tattler
- Latham's Snipe
- Lesser Sand Plover
- Little Curlew
- Long-toed Stint
- Marsh Sandpiper
- Oriental Plover
- Pacific Golden Plover
- Pectoral Sandpiper
- Red Knot
- Red-necked Stint
- Ruddy Turnstone
- Ruff
- Sanderling
- Sharp-tailed Sandpiper
- Terek Sandpiper
- unidentified medium wader
- unidentified small wader
- Whimbrel
- Wood Sandpiper

The 15 sites surveyed by Birdlife Australia in eastern Corner Inlet and included in this analysis are listed below and shown in Figure 1.

- Box Bank Island - F
- Clonmel Island - D
- Dog Island south - M
- Dream Island - H
- Dream south (shallow inlet) - G
- East Sunday Island / Drum Island - A
- Kate Kearney entrance - E
- McGloughlans entrance - J
- North of St Margaret Island - L
- One Tree Island - G2 - now S
- Port Albert entrance - C
- Port Welshpool foreshore
- Robertsons Beach - K
- Snake Island (east side) - G3 - now B
- Sunday Island west end

Most of the sites were located close to the southern, coastal edge of the Ramsar Wetland such as Dream south (shallow inlet), Kate Kearney entrance and Snake Island (east side).

The closest regular shorebird monitoring sites to the Alberton Wind Farm are One Tree Island, Robertson's Beach and Port Welshpool foreshore, which are approximately seven to eight kilometres from the nearest wind turbine at the proposed Alberton wind farm.

4.2. Data analysis

4.2.1. Species abundance trends between 1980 and 2015

Shorebirds 2020 data from Birdlife Australia were used to analyse population trends for EPBC Act listed migratory shorebird species within Corner Inlet east (see above). Average summer and average winter counts for each of these species were calculated separately for each survey decade. The decade averages for each species were then added together to produce a total migratory shorebird average count for 1980-89, 1990-99, 2000-09 and 2010-16 and corresponding maps.

4.2.2. Counts of the most abundant migratory shorebirds from 2010 to 2015

Focusing on the more recent data, the seven most abundant species during the summer counts between 2010 and 2015 were mapped for all survey sites. During this period, these species represented 98 percent of the total of site average shorebird counts in Corner Inlet east. These species were:

- Bar-tailed Godwit
- Black-tailed Godwit
- Curlew Sandpiper
- Eastern Curlew
- Grey Plover
- Red Knot
- Red-necked Stint

The averages for all species recorded in this period by survey site were also tabulated (see Appendix 2).

4.3. Limitations

Some of the 15 survey sites were not surveyed during each decade, leaving some gaps in the database. Given that only three sites where not surveyed during summer in the

1980s and one site (Sunday Island west end) was not surveyed from 1990 onwards the data has been considered sufficient for this analysis.

5. RESULTS

5.1. Field results from 2015

The species, time when observed and conservation status of migratory birds recorded during February survey are listed in Table 1.

Table 1: Shorebird species recorded during 25th to 27th February 2015 survey at the coastal area south of Alberton Wind Farm.

Species	Number birds seen in February			Conservation status*
	25th	26th	27th	
Pied Oystercatcher		250	300	secure
Sooty Oystercatcher		46	58	NT (DEPI),
Eastern Curlew	11	22	12	VU (DEPI), EPBC (m)
Whimbrel		30	28	VU (DEPI), EPBC (m)
Bar-tailed Godwit		135	1124	EPBC (m)
Common Greenshank		11	12	EPBC (m)
Red Knot		0	18	EN (DEPI); EPBC (m)
Great Knot		0	2	EN (DEPI); EPBC (m)
Red-necked Stint		4	320	EPBC (m)
Other waterbirds				
Royal Spoonbill	100			NT (DEPI)
Black-faced Cormorant		30		NT (DEPI)
Little Egret			3	EN (DEPI)
White bellied Sea-eagle		1	1	VU (DEPI);
Gull-billed Tern		2	9	EN (DEPI); EPBC (m)
White-throated Needletail		3		VU (DEPI), EPBC (m)

EPBC (m) protected under the Environmental Protection and Biodiversity Conservation Act 1999 as a migratory species.

DEPI protected under Department of Environment and Primary Industries Advisory List of Threatened Vertebrate fauna in Victoria (2013), EN – endangered, VU – vulnerable, NT - near threatened

A summary of observations in February 2015 for each of the above birds is discussed below:

Pied and Sooty Oystercatchers **(non-migratory):** The most common species at the shores of the study area. When feeding or roosting they spread throughout the whole area.

Eastern Curlew**:** Similar to the oystercatcher, common and feed and roost throughout the whole of the study area.

Whimbrel**:** This species was found to feed as a flock, primarily at Lipscore Point on Sunday Island.

Bar-tailed Godwit**:** The species ecology is similar to the Whimbrel where they feed in flocks, primarily at Lipscore Point on Sunday Island.

Common Greenshank**:** Found to feed in flocks, mainly close to the jetty on Sunday Island.

Red Knot and Great Knot: Both found to feed within Bar-tailed Godwit flocks.

***Red-necked Stint*:** Common shorebirds found feeding in the mudflats throughout the study area.

In addition other waterbirds were also recorded within the study area. These included:

***Royal Spoonbill* (non-migratory):** A large flock of 100 birds was found at a high-tide roost at McMillons Beach at Port Albert.

***Black-faced Cormorant* (non-migratory):** almost strictly marine species, common on the shores of the study area.

***Little Egret* (non-migratory):** Rather common, usually found in association with wetlands, creeks and rivers and might occasionally feed in farm dams.

***Gull-billed Tern*:** An uncommon tern along the shores of Port Albert and Port Welshpool. The birds observed were in full breeding plumage indicating that these birds may breed in the area.

***White-billed Sea-Eagle*:** An uncommon eagle, usually found along the shores of southern Victoria. They are mainly restricted to the coastal habitats but might occasionally travel inland along large rivers.

***White-throated Needletail*:** A summer visitor to the area.

5.2. Average Counts of all migratory birds from 1980 to 2015

5.2.1. Summer Counts

The average counts of all migratory shorebirds in Corner Inlet east in the summers between 1980 and 2015 are shown in Table 2, sorted by distance of the survey site to the wind farm site and grouped by decade.

Table 2: Sum of average counts for all migratory shorebird species over Summer 1980 - 2015

Survey Site	1980-89	1990-99	2000-09	2010-15	Distance from wind farm site
One Tree Island - G2 - now S	4266	3585	3442	2161	7 km
Port Welshpool foreshore	Ns	60	15	40	7.5 km
Robertsons Beach – K	Ns	0	0	500	7.5 km
Sunday Island west end	377	ns	ns	ns	7.5 km
Clonmel Island – D	2413	2276	2329	2063	9 km
Dog Island south – M	ns	1268	70	18	9 km
East Sunday Island / Drum Island - A	101	145	18	7	9 km
Port Albert entrance – C	946	621	1049	2676	11 km
Box Bank Island – F	8662	4426	3110	2877	12 km
Kate Kearney entrance – E	2081	1477	12920	9909	12 km
Snake Island (east side) - G3 - now B	2523	3780	3191	0	12.5 km
Dream south (shallow inlet) - G	3086	9173	515	2598	16 km
Dream Island – H	5095	428	99	343	18 km
McGloughlans entrance – J	921	1195	1104	1061	19 km
North of St Margaret Island - L	1951	21	25	129	20 km

Average	2702	2033	1992	1742	

Notes: ns – not surveyed. Counts greater than 3000 are highlighted in grey

In the 1980s (Figure 2) the two sites where most migratory shorebirds were recorded over summer were the Box Bank Island site and the Dream Island site, which are located on the eastern side of Corner Inlet east, approximately 12 and 18 kilometres respectively from the proposed wind farm site. In the 1990s (Figure 3), even though the count for Box Bank Island had decreased by almost 50%, it was still supported large number of shorebirds. The site where the most birds were recorded in the 1990s was Dream South (shallow inlet), located close to Box Bank Island. At Dream Island, high numbers were recorded in the 1980s but numbers had decreased markedly in the 1990s. All sites with an average count of more than 3000 migratory shorebirds over the count period (shaded in Table 1) are 12 or more kilometres from proposed turbines, except One Tree Island, which is located seven kilometres from the closest turbine.

The 2000-09 period (Figure 4) saw a big change, with Kate Kearney entrance being the site where the most shore birds were counted. This was again the case between 2010 and 2015 (Figure 5). This site is located nearby Box Bank Island, approximately 12 kilometres from the closest proposed wind turbine.

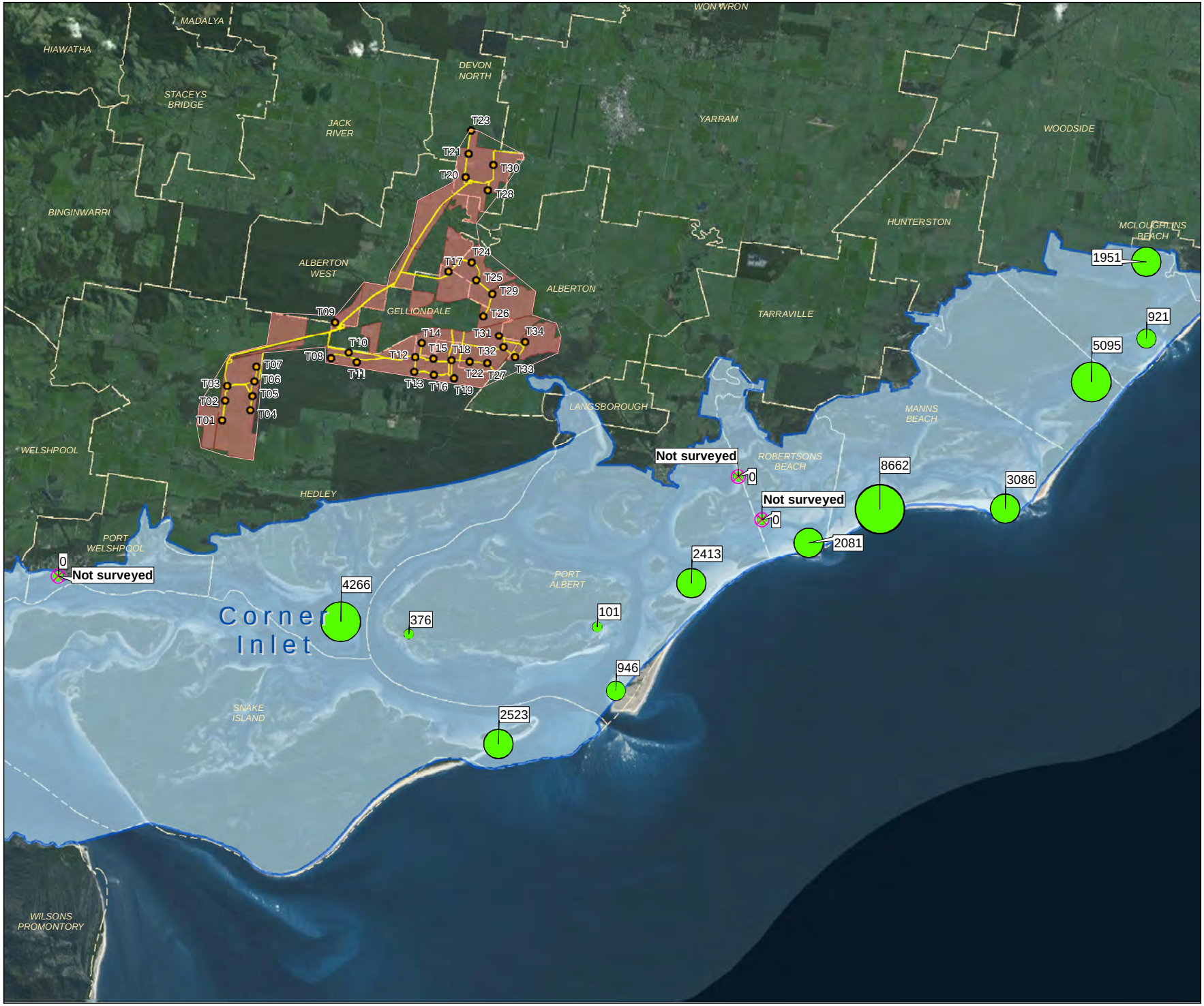
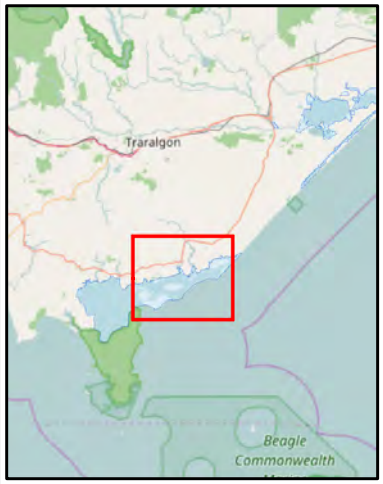


Figure 2: 1980-1989 sum of average migratory shorebird counts

Project: Alberton Wind Farm
Client: Synergy Wind Pty Ltd
Date: 6/12/2016

Legend

- Wind Farm site
- Turbines
- Development footprint
- Ramsar site



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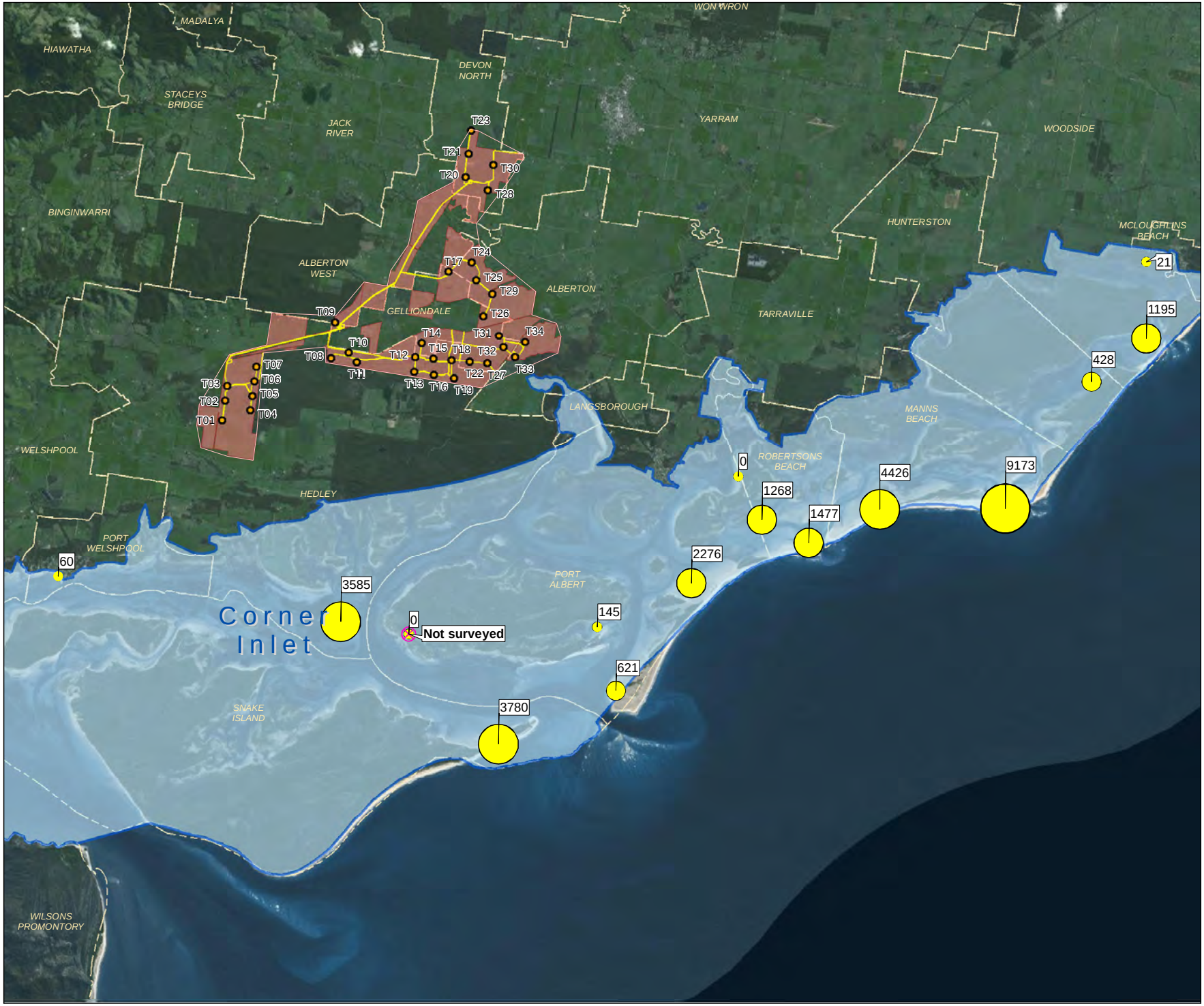
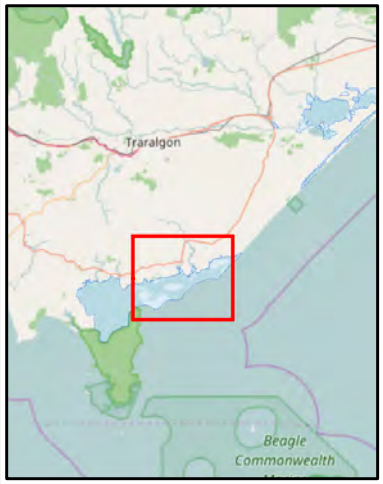


Figure 3: 1990-1999 sum of average migratory shorebird counts

Project: Alberton Wind Farm
Client: Synergy Wind Pty Ltd
Date: 6/12/2016

Legend

- Wind Farm site
- Turbines
- Development footprint
- Ramsar site



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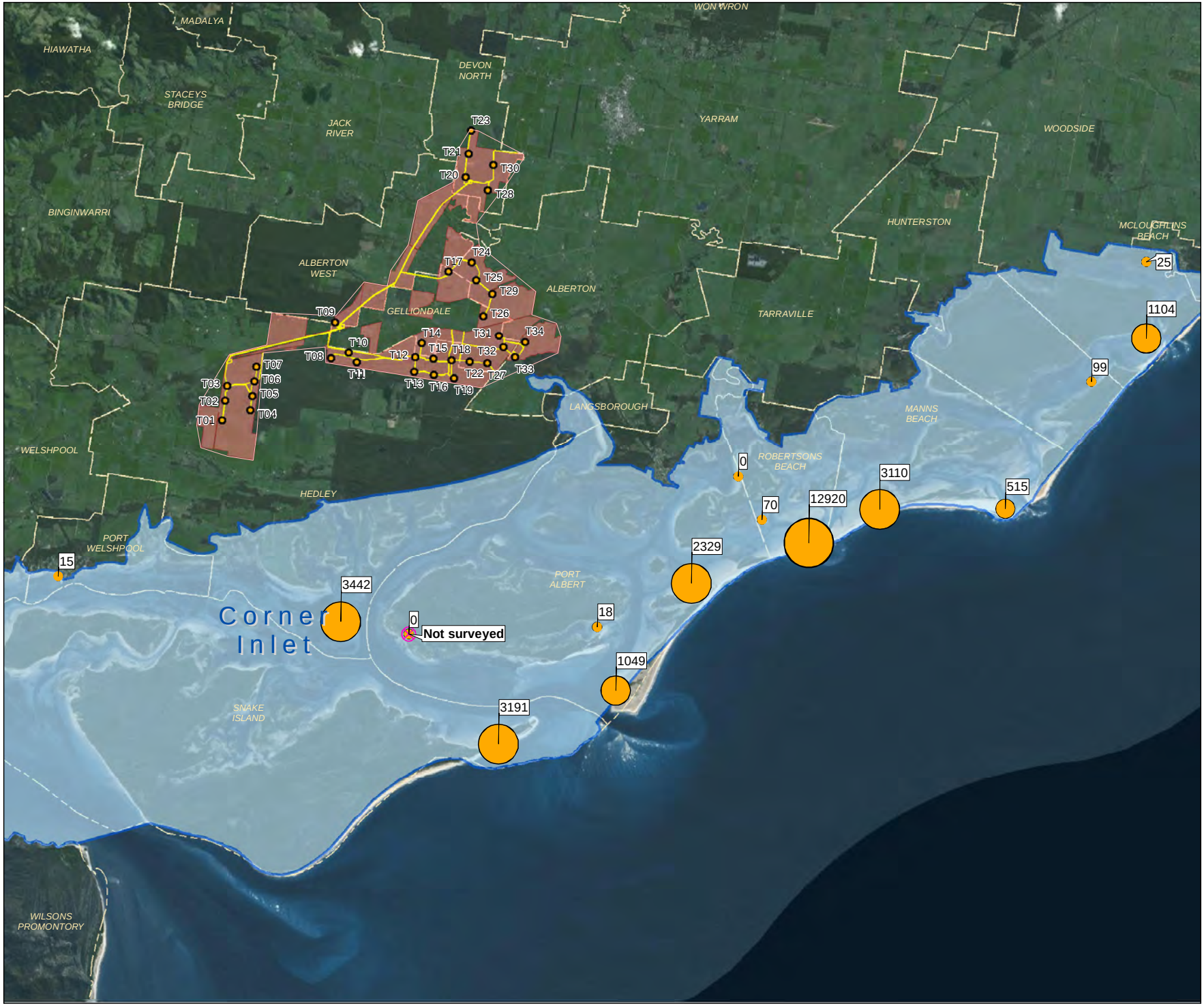
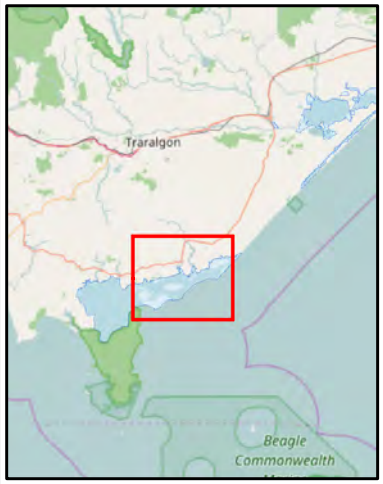


Figure 4: 2000-2009 sum of average migratory shorebird counts

Project: Alberton Wind Farm
Client: Synergy Wind Pty Ltd
Date: 6/12/2016

Legend

- Wind Farm site
- Turbines
- Development footprint
- Ramsar site



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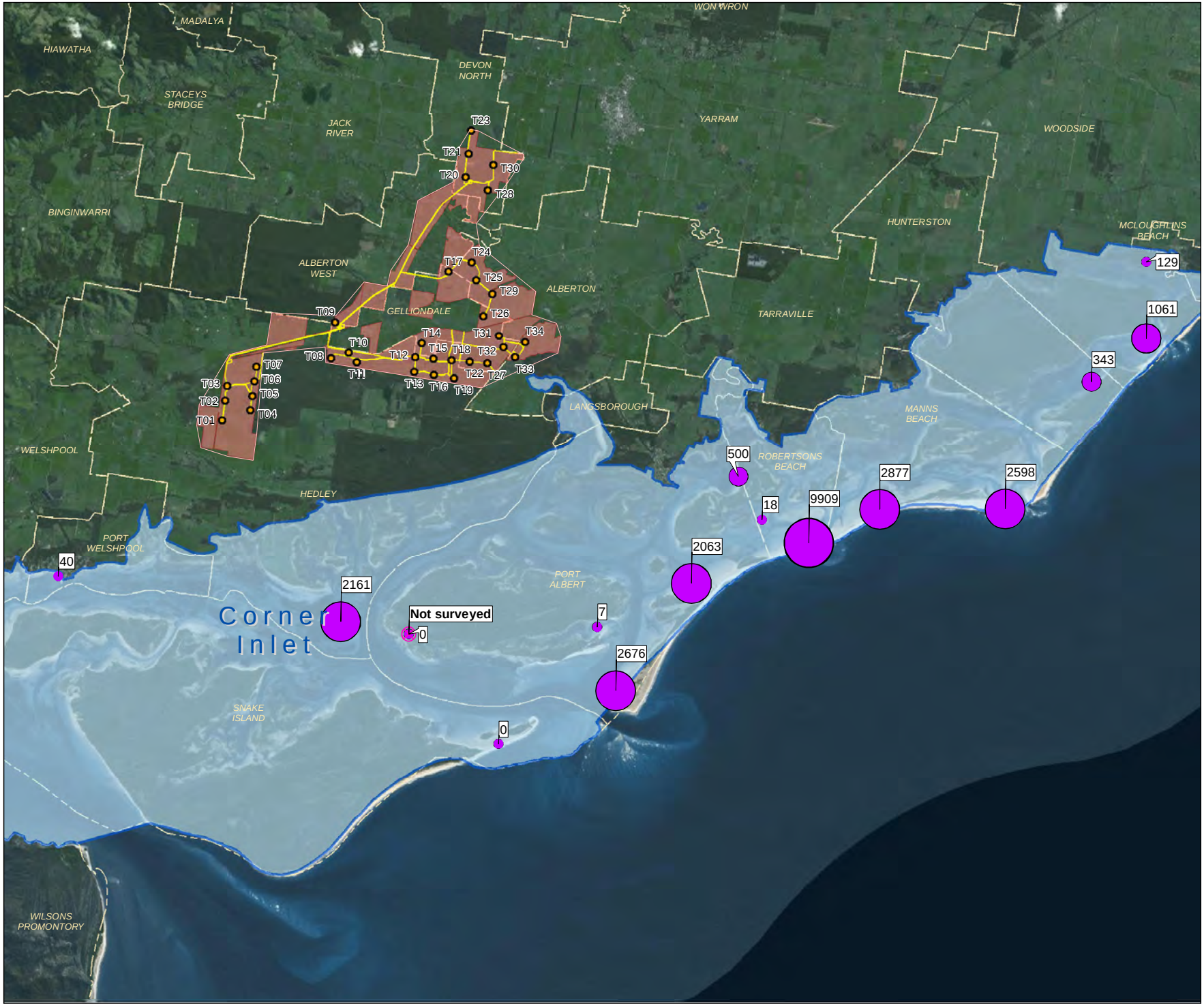
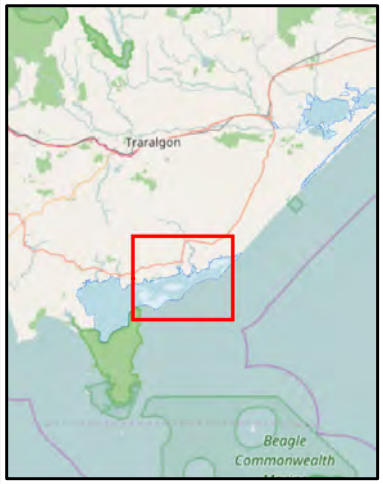


Figure 5: 2010-2016 sum of average migratory shorebird counts

Project: Alberton Wind Farm
Client: Synergy Wind Pty Ltd
Date: 6/12/2016

Legend

- Wind Farm site
- Turbines
- Development footprint
- Ramsar site



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5.2.2. Trends in summer shorebird abundance from 1980 to 2015

Trends of the shorebird summer observations between 1980 and 2015 are shown in Figure 6. There were sites such as Box Bank Island and One Tree Island that saw a noticeable decrease in yearly average migratory shorebird counts over the decades (see also Table 2). Others, like Kate Kearney entrance showed a significant increase in numbers. Some sites, such as McLoughlans entrance and Clonmel Island showed remarkably consistent numbers over the recording period.

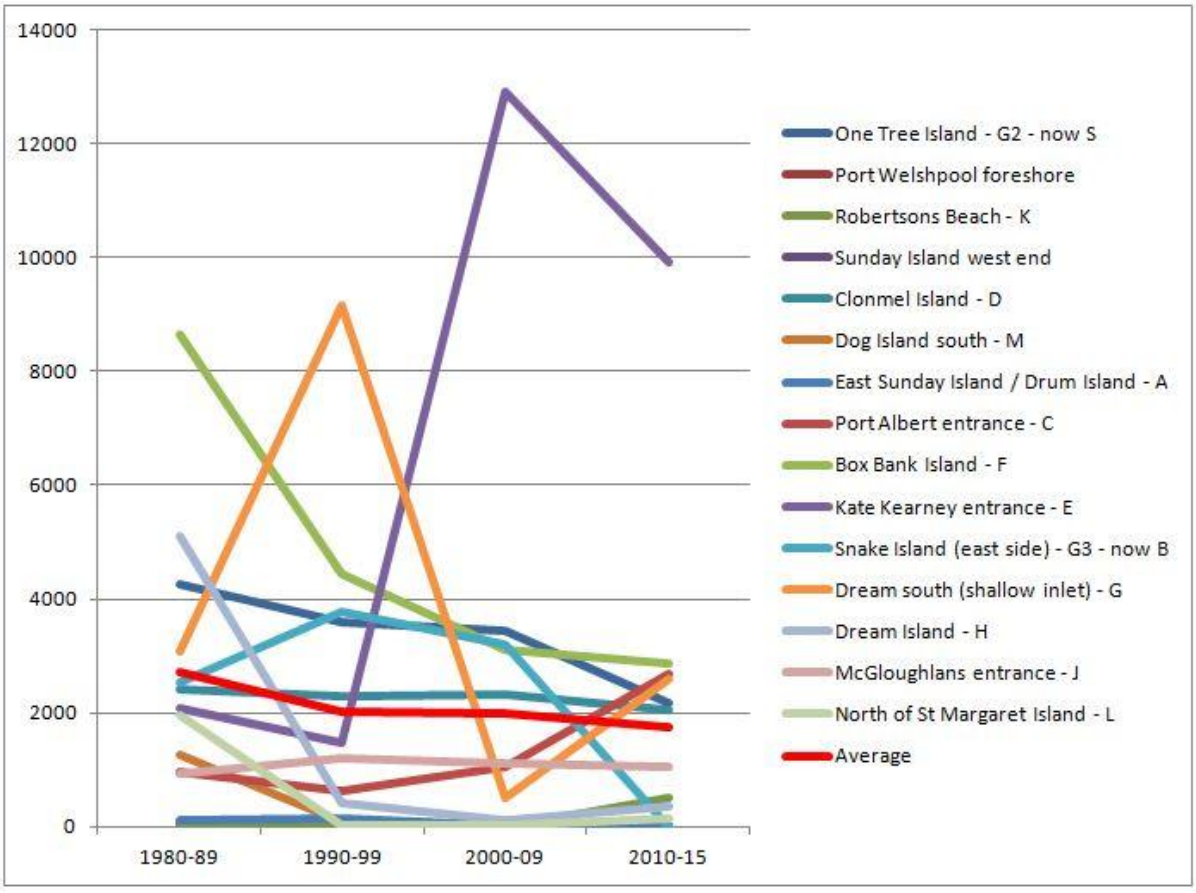


Figure 6: Changes between decades in the total of the average summer counts for all migratory shorebird species at each site between 1980 and 2016

Figure 6 shows a decline in the average number of migratory shorebirds counted per site (red line in Figure 6 and Table 2), with 2702 being the average counts per site average for the 1980s, which decreased to 2033 for the 1990s, then only a slight decrease to 1992 for the 2000-09 period, and finally down to 1741 for the latest period (2010-16). These figures suggest a gradual decrease over the last 35 years of migratory shorebird numbers over the summer survey period at Corner Inlet east. This is consistent with declining numbers of migratory shorebirds throughout Australia in recent decades.

5.2.3. Winter Counts

By comparison, the winter count averages (Table 3: and Figure 7) were more consistent, with no significant change in average counts per site over the decades.

Table 3: Sum of average counts for all migratory shorebird species over Winter 1980-2015

Survey Site	1980-89	1990-99	2000-09	2010-15	Distance from wind farm site
One Tree Island - G2 - now S	1	51	1	ns	7 km
Port Welshpool foreshore	166	316	87	365	7.5 km
Robertsons Beach - K	0	9	0	ns	7.5 km
Sunday Island west end	2	269	165	5	7.5 km
Clonmel Island - D	1177	790	458	302	9 km
Dog Island south - M	ns	315	32	2	9 km
East Sunday Island / Drum Island - A	320	111	13	410	9 km
Port Albert entrance - C	1037	458	375	138	11 km
Box Bank Island - F	886	355	891	33	12 km
Kate Kearney entrance - E	179	85	1924	1874	12 km
Snake Island (east side) - G3 - now B	ns	0	0	ns	12.5 km
Dream south (shallow inlet) - G	187	295	62	284	16 km
Dream Island - H	44	6	10	ns	18 km
McGloughlans entrance - J	532	117	120	262	19 km
North of St Margaret Island - L	ns	ns	3112	ns	20 km
Average	378	227	483	368	

Notes: ns – not surveyed, counts bigger than 1000 are highlighted in grey

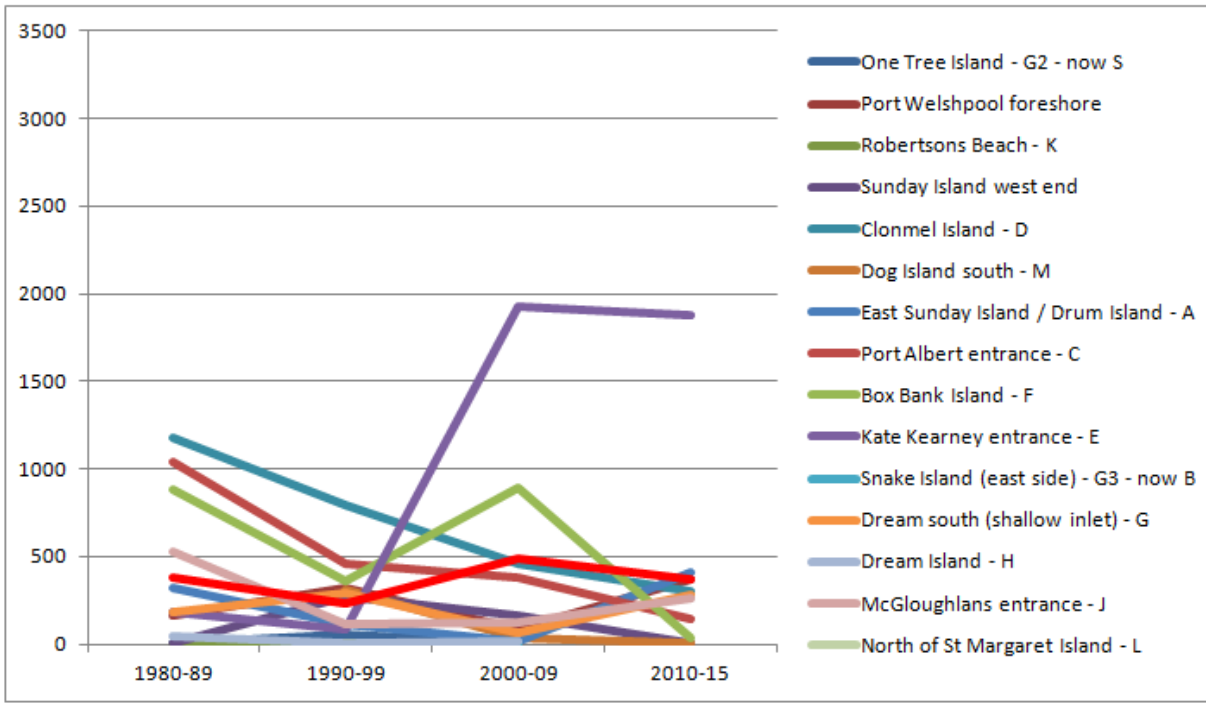


Figure 7: Trends of winter shorebird observations between 1980 and 2015

There were however trends at individual sites with decreases in average counts found at sites such as Clonmel Island and Port Albert entrance in the 1990s and an increase recorded at Kate Kearney entrance from 2000 to 2015. North of Margaret Island was only surveyed in the 1990s, where it experienced a high average species count of over 3000 birds. This site is located approximately 20 kilometres from the proposed wind

farm site. Increased average counts were reported from Kate Kearney entrance and Box Bank Island from 2000 to 2009. At the former site, this persisted until the present.

5.3. Summer counts of abundant migratory bird species from 2010 to 2015

Table 4 shows the average of the summer counts since 2010 for the seven most abundant species within Corner Inlet east (see also Figures 8 to 14). Bar-tailed Godwit and Red-necked Stint were the two most numerous species. More than 4,000 of both species were recorded at Kate Kearney Entrance, approximately 12 kilometres from the nearest proposed turbine. The Red-necked Stint was also recorded in good numbers at Port Albert Entrance and Box Bank Island (11 and 12 km from the wind farm site) and Dream south (shallow inlet, 16 km). and with over 1,000 birds from One Tree Island, approximately 7 kilometres from the closest proposed turbine.

Table 4: Average counts (summer) for target species per site in the 2010-2015 period

Survey Sites	Bar-tailed Godwit	Black-tailed Godwit	Curlew Sandpiper	Eastern Curlew	Grey Plover	Red Knot	Red-necked Stint	Distance from wind farm site
One Tree Island - G2 - now S	807	0	0	44	0	90	1180	7 km
Port Welshpool foreshore	0	0	0	0	0	0	40	7.5 km
Robertsons Beach - K	0	500	0	0	0	0	0	7.5 km
Clonmel Island - D	941	<1	50	168	50	59	776	9 km
Dog Island south - M	10	0	<1	<1	0	0	0	9 km
East Sunday Island / Drum Island - A	0	0	0	5	0	0	0	9 km
Port Albert entrance - C	568	0	47	45	<1	18	1955	11 km
Box Bank Island - F	1099	0	2	42	91	77	1551	12 km
Kate Kearney entrance - E	4313	0	58	67	141	182	4936	12 km
Snake Island (east side) - G3 - now B	0	0	0	0	0	0	0	12.5 km
Dream south (shallow inlet) - G	1260	0	34	21	5	105	1136	16 km
Dream Island - H	300	0	0	0	0	<1	0	18 km
McGloughlans entrance - J	132	0	13	73	0	0	842	19 km
North of St Margaret Island - L	0	0	0	128	0	0	1	20 km
Total	**9429**	**500**	**204**	**591**	**287**	**531**	**12416**	

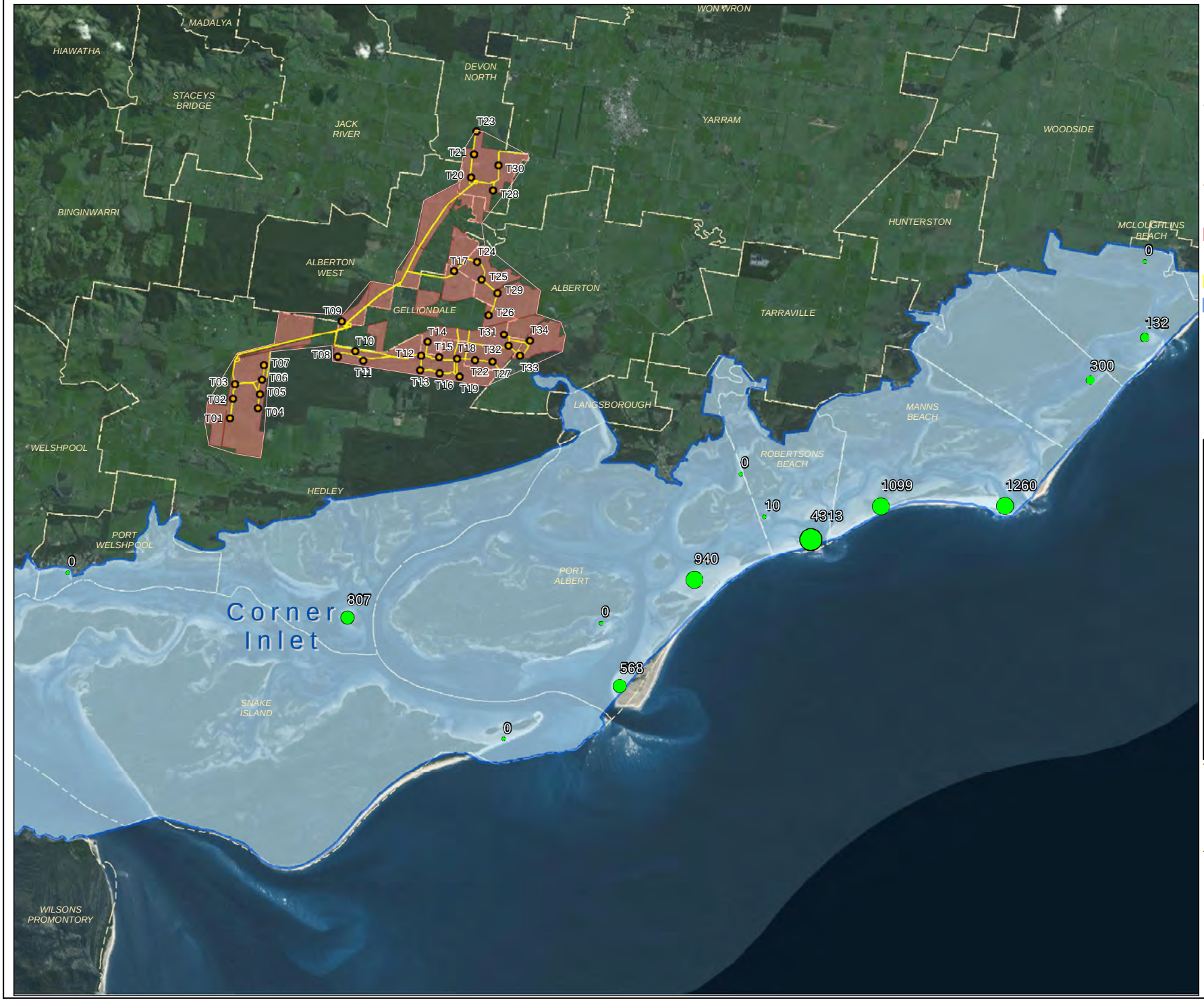
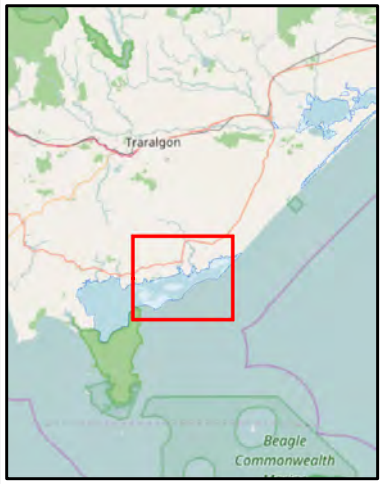


Figure 8: Average counts (per year) for target species per site in the 2010-2016 period - Bar-tailed Godwit

Project: Alberton Wind Farm
Client: Synergy Wind Pty Ltd
Date: 6/12/2016

Legend

- Wind Farm site
- Turbines
- Development footprint
- Ramsar site



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Kilometers
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Figure 9: Average counts (per year) for target species per site in the 2010-2016 period - Black-tailed Godwit

Project: Alberton Wind Farm
Client: Synergy Wind Pty Ltd
Date: 6/12/2016

Legend

- Wind Farm site
- Turbines
- Development footprint
- Ramsar site

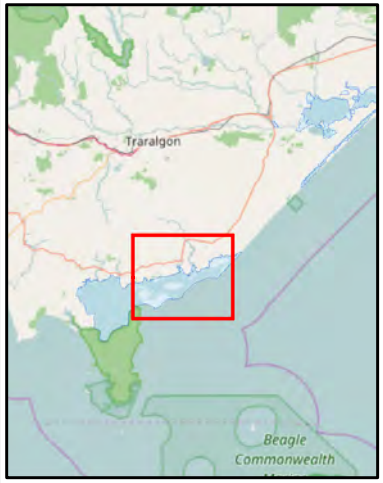

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Figure 10: Average counts (per year) for target species per site in the 2010-2016 period - Curlew Sandpiper

Project: Alberton Wind Farm
Client: Synergy Wind Pty Ltd
Date: 6/12/2016

Legend

- Wind Farm site
- Turbines
- Development footprint
- Ramsar site

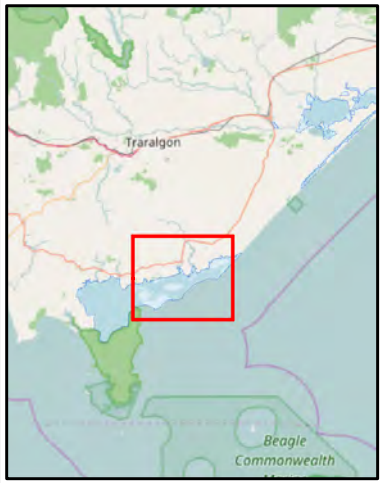

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Figure 11: Average counts (per year) for target species per site in the 2010-2016 period - Eastern Curlew

Project: Alberton Wind Farm
Client: Synergy Wind Pty Ltd
Date: 6/12/2016

Legend

- Wind Farm site
- Turbines
- Development footprint
- Ramsar site

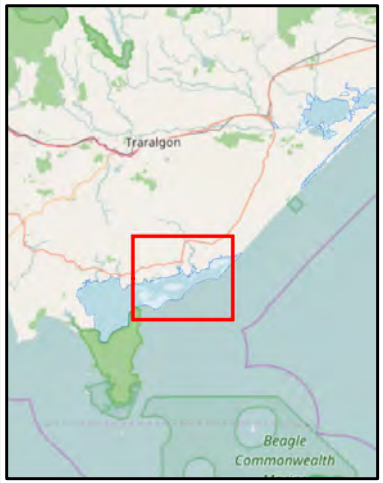

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Figure 12: Average counts (per year) for target species per site in the 2010-2016 period - Grey Plover

Project: Alberton Wind Farm
Client: Synergy Wind Pty Ltd
Date: 8/12/2016

Legend

- Wind Farm site
- Turbines
- Development footprint
- Ramsar site

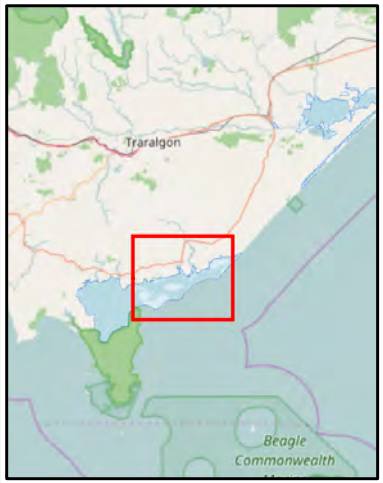

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Figure 13: Average counts (per year) for target species per site in the 2010-2016 period - Red Knot

Project: Alberton Wind Farm
Client: Synergy Wind Pty Ltd
Date: 6/12/2016

Legend

- Wind Farm site
- Turbines
- Development footprint
- Ramsar site

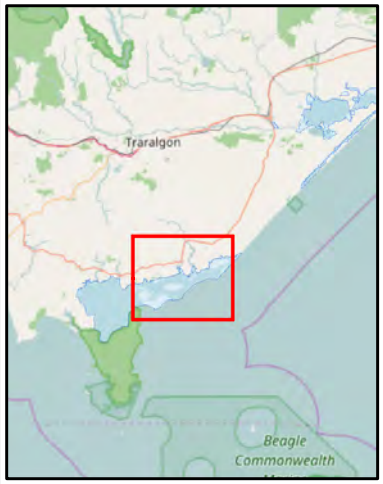

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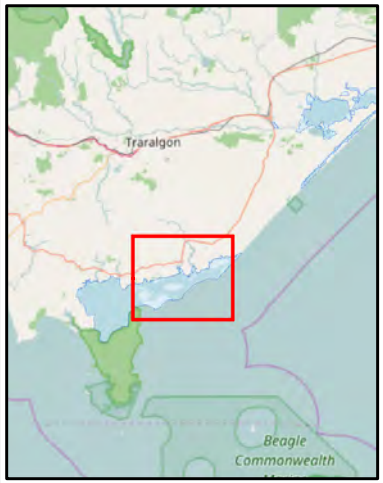
Figure 14: Average counts (per year) for target species per site in the 2010-2016 period - Red-necked Stint

Project: Alberton Wind Farm
Client: Synergy Wind Pty Ltd
Date: 6/12/2016

Legend

- Wind Farm site
- Turbines
- Development footprint
- Ramsar site



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6. IMPACT ASSESSMENT AND CONCLUSIONS

Table 5 summarises the impact assessment as detailed within the Significant Impact Guidelines for Migratory Shorebird Species (DEWHA 2009).

Table 5: Significant Impact Assessment guide for migratory shorebirds (DEWHA 2009)

Ecological element affected	Significant impact assessment	Comment
Important Habitat	**Loss** of important habitat	The loss (for example, clearing, infilling or draining) of important habitat areas is likely to have a significant impact on migratory shorebirds when it results in a reduction in the capacity of the habitat to support migratory shorebirds. The magnitude of the impact may increase with the number of shorebirds using the area, the regional significance of the site and/or the extent to which the loss reduces carrying capacity.
	Degradation of important habitat leading to a substantial reduction in migratory shorebirds using the site	Defining substantial reduction will need to be made on a case-by-case basis. Factors to consider will include: ▪ the number of migratory shorebirds historically using a site (based on surveys and historical data) ▪ likely resultant changes in bird numbers and species diversity ▪ alterations to the value, quality, geographic extent of the site (for example, will the site still be classed as important habitat) ▪ the function and role of the site (roosting, foraging) and likely changes in ecology and hydrology ▪ the regional and local context of the site, and ▪ the nature, extent, duration of impacts, their likelihood and consequence.
	Increased **disturbance** leading to a substantial reduction in migratory shorebirds using important habitat Important habitat	
	Direct mortality of birds leading to a substantial reduction in migratory shorebirds using important habitat	

The bird species studied in this analysis were strictly intertidal shore or marine birds that do not fly inland and utilise dams or other wetlands, such as those within the proposed wind farm site. Consequently none of the populations of listed migratory shorebirds will be impacted upon by the construction and operation of the proposed wind farm while roosting or feeding in Corner Inlet. No important habitat will be **lost, degraded or disturbed** by the proposed wind farm.

Observations at a wind farm in South Australia (BL&A, unpublished data – two years before and two years after wind farm construction) indicated that operating wind turbines sited within 300 metres of coastal shorebird habitats did not alter the distribution and abundance of shorebirds compared with their distribution and abundance before wind farm construction commenced. Therefore indirect impacts from the proposed Alberton Wind Farm, at a minimum distance of about three kilometres from intertidal habitats are considered unlikely. Increased **disturbance** that excludes shorebirds from habitats at Corner Inlet is considered a very remote possibility.

The possibility that, when migrating to and from Corner Inlet east, shorebirds may fly across the proposed Alberton Wind Farm site was explored. Shorebird migration has been described by a number of authors (Lane & Jessop 1985; Piersma *et al.* 1990; Swennen 1992; Tulp *et al.* 1994). These studies show that wherever it has been studied shorebird migratory departure has remarkably consistent characteristics, described below.

- Shorebirds depart in flocks of between 5 and 250 birds, with occasional observations of larger flocks (averages: 52, Lane & Jessop 1985; 10 – 151, depending on species, Piersma *et al.* 1990;127, Swennen 1992; 13 – 94, depending on species, Tulp *et al.* 1994)
- They fly in an elongated, shallow "V" formation, termed an "echelon" (see Piersma *et al.* 1990)
- Shorebirds are very vocal when they depart, calling unceasingly to one another rather loudly compared with their normal calling during flight
- They ascend rapidly and steeply, and are usually still ascending when lost from sight by the observer. Estimates of climb rate vary, with larger, heavier species of shorebirds climbing at slower rates (Piersma *et al.* 1990, 1997). Rates of ascent for smaller shorebirds in West Africa were between 0.7 and 0.92 metres per second. Optimal climb rates of approximately twice this have been predicted for shorebirds by Hedenstrom and Alerstam (1994)
- Observations of flight altitude using weather radar show that during migration, shorebirds fly at between 0.5 and 6 kilometres (Williams *et al.* 1981; Piersma *et al.* 1990; Tulp *et al.* 1994). Altitudes of migration given in the last two studies are of birds still ascending when they disappeared from sight, often at altitudes of greater than one kilometre, and are therefore likely to be at the lower range of altitude estimates for level migratory flight. The first two studies used radar on oceanic islands to study shorebirds on long-distance, level, migratory flights. Altitudes in these circumstances ranged from 2.5 to 6 kilometres
- Ground speeds for migrating shorebirds range between 20 km/h and 91 km/h (Lane & Jessop 1985; Tulp *et al.* 1994), although both studies were of birds climbing with varying strength winds affecting them.

Given the consistent behaviour of migratory shorebirds and their high rate of climb on departure, it is highly unlikely that shorebirds migrating northwards from the nearby intertidal habitats would be low enough by the time the crossed the proposed wind farm site to interact with operating wind turbines. Therefore, **direct mortality** is considered highly unlikely.

Based on the findings from this analysis of historical migratory shorebird count data and observations from site-based investigations in 2015 (BL&A 2016), the risk of a

significant impact on an important population of migratory shorebirds in Corner Inlet from the proposed wind farm is considered low. The reasons are set out below.

- No major wetland capable of supporting an important population of migratory shorebirds is located on the wind farm site and its immediate surrounds.
- The nearest potential habitat lies three kilometres to the south of the nearest proposed wind turbine and was found during the 2015 survey to support only low numbers of shorebirds foraging at low tide.
- Most roosting shorebirds in the eastern part of Corner Inlet use the sandy beaches and spits of the outer barrier islands, located 12 kilometres or more from the closest proposed turbine.
- The routine tidal movements of birds using these roosts would be to adjacent areas of intertidal sand- and mudflat more than five kilometres from the nearest proposed wind turbine.
- An evaluation of the risk of shorebirds from eastern Corner Inlet colliding with wind turbines on the proposed project site found that by the time they would be over the site, they would be well above the turbines, given the usual steep rate of climb of migrating shorebirds.

For the same reasons, and given that shorebirds are an important element of the ecological character of the Corner Inlet Ramsar site, the proposed wind farm will not significantly impact the ecological character of this important wetland.

7. REFERENCES

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Piersma, T; Zwarts, L and Bruggemann, J H (1990) Behavioural aspects of the departure of waders before long distance flights: flocking, vocalisations, flight paths and diurnal timing. *Ardea* 78: 157-184.

Piersma, T; Hedenstrom, A and Bruggemann, J H (1997) Climb and flight speeds of shorebirds embarking on an intercontinental flight; do they achieve the predicted optimal behaviour? *Ibis* 139: 299-304.

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Appendix 1: Raw migratory shorebird count averages for site and species per decade

Decade averages per species per site	Asian Dowitcher	Bar-tailed Godwit	Black-tailed Godwit	Broad-billed Sandpiper	Common Greenshank	Common Redshank	Common Sandpiper	Curlew Sandpiper	Double-banded Plover	Eastern Curlew	Great Knot	Greater Sand Plover	Grey Plover	Grey-tailed Tattler	Latham's Snipe	Lesser Sand Plover	Little Curlew	Long-toed Stint	Marsh Sandpiper	Oriental Plover	Pacific Golden Plover	Pectoral Sandpiper	Red Knot	Red-necked Stint	Ruddy Turnstone	Ruff	Sanderling	Sharp-tailed Sandpiper	Swinhoe's Snipe	Terek Sandpiper	unidentified medium wader	unidentified small wader	Wandering Tattler	Whimbrel	Wood Sandpiper
Box Bank Island - F																																			
1980-89	0	3433	<1	0	1	0	0	707	<1	241	217	3	207	0	0	25	0	0	0	0	<1	0	1628	2100	50	0	36	14	0	<1	0	0	0	0	0
1990-99	0	2267	0	0	9	0	0	87	1	156	80	2	159	1	0	6	0	0	0	0	0	0	978	636	22	0	22	<1	0	<1	0	0	0	0	0
2000-09	0	1290	0	0	3	0	0	7	0	95	7	0	24	4	0	0	0	0	0	0	0	0	29	1643	1	0	3	4	0	0	0	0	0	0	0
2010-15	0	1099	0	0	4	0	0	2	0	42	6	0	91	<1	0	0	0	0	0	0	0	0	77	1551	1	0	6	0	0	0	0	0	0	0	0
Clonmel Island - D																																			
1980-89	0	1033	0	0	17	0	0	106	<1	376	6	0	37	0	0	0	0	0	0	0	0	0	264	561	4	0	0	0	0	0	0	0	9	0
1990-99	0	955	0	0	1	0	0	275	1	389	0	0	18	0	0	0	0	0	0	0	0	0	210	415	<1	0	4	0	0	0	0	0	9	0
2000-09	0	1136	0	0	0	0	0	31	0	280	1	1	10	0	0	0	0	0	0	0	0	0	137	729	3	0	0	0	0	0	0	0	<1	0
2010-15	0	941	<1	0	0	0	0	50	0	168	1	<1	50	0	0	0	0	0	0	0	0	0	59	776	1	0	17	0	0	0	0	0	2	0
Dog Island south - M																																			
1980-89	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
1990-99	0	1080	0	0	7	0	0	8	<1	37	6	0	13	0	0	0	0	0	0	0	0	0	33	81	<1	0	0	3	0	0	0	0	0	0	0
2000-09	0	12	0	0	4	0	0	0	0	26	0	0	24	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	<1	0	0
2010-15	0	10	0	0	8	0	0	<1	0	<1	0	0	0	0	0	0	0	0	<1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dream Island - H																																			
1980-89	0	1442	0	0	49	0	0	383	0	100	70	<1	72	4	0	<1	0	0	0	0	<1	0	1252	1667	12	0	25	0	0	0	0	0	0	20	0
1990-99	0	239	0	0	133	0	0	8	0	3	0	0	0	0	0	0	0	0	1	0	3	0	13	14	0	0	0	0	0	0	0	0	0	16	0
2000-09	0	25	0	0	35	0	0	0	0	1	0	0	0	13	0	0	0	0	0	0	0	0	3	8	0	0	0	0	0	3	0	0	0	10	0
2010-15	0	300	0	0	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	<1	0	0	0	0	0	0	0	0	0	0	15	0
Dream south (shallow inlet) - G																																			
1980-89	0	257	0	0	0	0	0	469	0	56	29	0	100	0	0	23	0	0	0	0	5	0	386	1731	13	0	4	14	0	0	0	0	0	0	0
1990-99	0	2929	<1	0	0	0	0	414	0	47	43	12	121	2	0	33	0	0	0	0	0	0	732	4714	21	0	76	23	0	<1	0	0	0	4	0
2000-09	0	198	0	0	0	0	0	0	0	56	10	0	37	<1	0	0	0	0	0	0	0	0	80	130	<1	0	4	0	0	0	0	0	0	0	0
2010-15	0	1260	0	0	0	0	0	34	0	21	1	<1	5	3	0	2	0	0	0	0	0	0	105	1136	17	0	15	0	0	0	0	0	0	0	0
East Sunday Island / Drum Island - A																																			
1980-89	0	2	0	0	1	0	0	1	0	4	0	0	<1	0	0	0	0	0	0	0	0	0	0	93	0	0	0	0	0	0	0	0	0	0	0
1990-99	0	130	0	0	7	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	2	0
2000-09	0	0	0	0	17	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010-15	0	0	0	0	2	0	0	0	0	5	0	0	0	<1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kate Kearney entrance - E																																			
1980-89	0	930	0	0	1	0	0	144	0	162	65	1	56	0	0	2	0	0	0	0	0	0	256	450	13	0	1	<1	0	0	0	0	0	0	0
1990-99	0	222	0	0	0	0	0	53	0	65	0	0	59	0	0	0	0	0	0	0	0	0	2	1074	1	0	1	0	0	0	0	0	0	0	0
2000-09	0	5343	0	0	0	0	0	268	1	18	54	1	161	0	0	4	0	0	0	0	0	0	473	6411	21	0	118	48	0	0	0	0	0	0	0
2010-15	0	4313	0	0	0	0	0	58	<1	67	40	9	141	3	0	1	0	0	0	0	0	0	182	4936	9	0	112	39	0	1	0	0	0	0	0
McGloughlans entrance - J																																			
1980-89	0	260	<1	0	22	0	0	117	0	67	2	0	0	0	0	0	0	0	0	0	1	0	17	437	0	0	0	0	0	0	0	0	0	0	0
1990-99	0	75	0	0	0	0	0	76	<1	119	1	0	<1	0	0	0	0	0	0	0	9	0	36	879	0	0	0	0	0	0	0	0	0	0	0
2000-09	0	233	0	0	0	0	0	0	2	76	0	0	0	0	0	0	0	0	0	0	0	0	11	781	<1	0	0	0	0	0	0	0	0	0	0
2010-15	0	132	0	0	0	0	0	13	0	73	0	0	0	0	0	0	0	0	0	0	0	0	0	842	1	0	1	0	0	0	0	0	0	0	0
Nooramunga Section																																			
1980-89	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
1990-99	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
2000-09	0	8354	0	0	51	0	0	427	13	693	162	<1	277	<1	0	<1	0	0	0	0	0	0	1744	14256	28	0	80	66	0	0	0	0	0	12	0
2010-15	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
North of St Margaret Island - L																																			
1980-89	0	90	0	0	27	0	0	267	0	63	0	0	0	0	0	0	0	0	0	0	0	0	367	1067	0	0	0	67	0	0	0	0	0	4	0
1990-99	0	0	0	0	15	0	0	4	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000-09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0
2010-15	0	0	0	0	0	0	0	0	0	128	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
One Tree Island - G2 - now S																																			
1980-89	0	650	0	0	2	0	0	416	0	7	102	4	71	0	0	10	0	0	0	0	0	0	671	2229	15	0	24	66	0	0	0	0	0	0	0
1990-99	0	767	<1	0	0	0	0	361	0	27	23	6	13	2	0	14	0	0	0	0	0	0	461	1811	32	0	30	34	0	<1	0	0	2	0	0
2000-09	0	723	0	0	0	0	0	75	1	28	5	0	29	<1	0	<1	0	0	0	0	0	0	72	2483	2	0	<1	18	0	0	0	0	7	0	0
2010-15	0	807	0	0	0	0	0	0	0	44	24	0	0	0	0	0	0	0	0	0	0	0	90	1180	0	0	7	0	0	0	0	0	9	0	0
Port Albert entrance - C																																			
1980-89	0	57	0	0	0	0	0	64	<1	4	0	0	3	0	0	0	0	0	0	0	0	0	20	796	1	0	0	<1	0	0	0	0	0	0	0
1990-99	0	211	0	0	0	0	0	0	0	<1	0	1	28	0	0	0	0	0	0	0	0	0	10	366	2	0	4	<1	0	0	0	0	0	0	0
2000-09	0	1	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	10	1034	2	0	<1	0	0	0	0	0	0	0	0
2010-15	0	568	0	0	0	12	0	47	2	45	1	1	<1	0	0	0	0	0	0	0	0	0	18	1955	3	0	25	<1	0	0	0	0	0	<1	0
Port Welshpool foreshore																																			
1980-89	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
1990-99	0	0	0	0	20	0	0	12	0	<1	0	0	0	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0
2000-09	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010-15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	0	0	0	0	0	0	0	0	0	0
Robertsons Beach - K																																			
1980-89	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
1990-99	0	0	0	0	0	0	0	0	0	<1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000-09	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010-15	0	0	500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Snake Island (east side) - G3 - now B																																			
1980-89	0	1390	0	0	5	0	0	31	0	203	2	0	114	8	0	0	0	0	0	0	0	0	63	697	4	0	7	0	0	0	0	0	0	0	0
1990-99	0	1535	0	0	13	0	0	87	<1	150	21	4	126	<1	0	18	0	0	0	0	0	0	380	1433	5	0	8	1	0	<1	0	0	0	0	0
2000-09	0	1007	0	0	0	0	0	67	5	37	50	2	93	0	0	<1	0	0	0	0	0	0	192	1717	5	0	17	0	0	0	0	0	0	0	0
2010-15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sunday Island west end																																			
1980-89	0	0	0	0	26	0	0	14	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	336	0	0	0	0	0	0	0	0	0	0	0

Appendix 2: Average of 2010-2016 for each species at each site

Species	Box Bank Island - F	Clonmel Island - D	Dog Island south - M	Dream Island - H	Dream south (shallow inlet) - G	East Sunday Island / Drum Island - A	Kate Kearney entrance - E	McGloughlans entrance - J	Nooramunga Section	North of St Margaret Island - L	One Tree Island - G2 - now S	Port Albert entrance - C	Port Welshpool foreshore	Robertsons Beach - K	Snake Island (east side) - G3 - now B	Total	Percentage
Asian Dowitcher	0	0	0	0	0	0	0	0	ns	0	0	0	0	0	0	**0**	**0.0**
Bar-tailed Godwit	1099	941	10	300	1260	0	4313	132	ns	0	807	568	0	0	0	**9429**	**38.7**
Black-tailed Godwit	0	<1	0	0	0	0	0	0	ns	0	0	0	0	500	0	**500**	**2.1**
Broad-billed Sandpiper	0	0	0	0	0	0	0	0	ns	0	0	0	0	0	0	**0**	**0.0**
Common Greenshank	4	0	8	28	0	2	0	0	ns	0	0	0	0	0	0	**42**	**0.2**
Common Redshank	0	0	0	0	0	0	0	0	ns	0	0	12	0	0	0	**12**	**0.0**
Common Sandpiper	0	0	0	0	0	0	0	0	ns	0	0	0	0	0	0	**0**	**0.0**
Curlew Sandpiper	2	50	<1	0	34	0	58	13	ns	0	0	47	0	0	0	**204**	**0.8**
Double-banded Plover	0	0	0	0	0	0	<1	0	ns	0	0	2	0	0	0	**2**	**0.0**
Eastern Curlew	42	168	<1	0	21	5	67	73	ns	128	44	45	0	0	0	**591**	**2.4**

Species	Box Bank Island - F	Clonmel Island - D	Dog Island south - M	Dream Island - H	Dream south (shallow inlet) - G	East Sunday Island / Drum Island - A	Kate Kearney entrance - E	McGloughlans entrance - J	Nooramunga Section	North of St Margaret Island - L	One Tree Island - G2 - now S	Port Albert entrance - C	Port Welshpool foreshore	Robertsons Beach - K	Snake Island (east side) - G3 - now B	Total	Percentage
Great Knot	6	1	0	0	1	0	40	0	ns	0	24	1	0	0	0	**72**	**0.3**
Greater Sand Plover	0	<1	0	0	<1	0	9	0	ns	0	0	1	0	0	0	**9**	**0.0**
Grey Plover	91	50	0	0	5	0	141	0	ns	0	0	<1	0	0	0	**287**	**1.2**
Grey-tailed Tattler	<1	0	0	0	3	<1	3	0	ns	0	0	0	0	0	0	**6**	**0.0**
Latham's Snipe	0	0	0	0	0	0	0	0	ns	0	0	0	0	0	0	**0**	**0.0**
Lesser Sand Plover	0	0	0	0	2	0	1	0	ns	0	0	0	0	0	0	**3**	**0.0**
Little Curlew	0	0	0	0	0	0	0	0	ns	0	0	0	0	0	0	**0**	**0.0**
Long-toed Stint	0	0	0	0	0	0	0	0	ns	0	0	0	0	0	0	**0**	**0.0**
Marsh Sandpiper	0	0	<1	0	0	0	0	0	ns	0	0	0	0	0	0	**0**	**0.0**
Oriental Plover	0	0	0	0	0	0	0	0	ns	0	0	0	0	0	0	**0**	**0.0**
Pacific Golden Plover	0	0	0	0	0	0	0	0	ns	0	0	0	0	0	0	**0**	**0.0**
Pectoral Sandpiper	0	0	0	0	0	0	0	0	ns	0	0	0	0	0	0	**0**	**0.0**

Species	Box Bank Island - F	Clonmel Island - D	Dog Island south - M	Dream Island - H	Dream south (shallow inlet) - G	East Sunday Island / Drum Island - A	Kate Kearney entrance - E	McGloughlans entrance - J	Nooramunga Section	North of St Margaret Island - L	One Tree Island - G2 - now S	Port Albert entrance - C	Port Welshpool foreshore	Robertsons Beach - K	Snake Island (east side) - G3 - now B	Total	Percentage
Red Knot	77	59	0	<1	105	0	182	0	ns	0	90	18	0	0	0	**531**	**2.2**
Red-necked Stint	1551	776	0	0	1136	0	4936	842	ns	1	1180	1955	40	0	0	**12416**	**50.9**
Ruddy Turnstone	1	1	0	0	17	0	9	1	ns	0	0	3	0	0	0	**31**	**0.1**
Ruff	0	0	0	0	0	0	0	0	ns	0	0	0	0	0	0	**0**	**0.0**
Sanderling	6	17	0	0	15	0	112	1	ns	0	7	25	0	0	0	**183**	**0.7**
Sharp-tailed Sandpiper	0	0	0	0	0	0	39	0	ns	0	0	<1	0	0	0	**39**	**0.2**
Terek Sandpiper	0	0	0	0	0	0	1	0	ns	0	0	0	0	0	0	**1**	**0.0**
unidentified medium wader	0	0	0	0	0	0	0	0	ns	0	0	0	0	0	0	**0**	**0.0**
unidentified small wader	0	0	0	0	0	0	0	0	ns	0	0	0	0	0	0	**0**	**0.0**
Whimbrel	0	2	0	15	0	0	0	0	ns	0	9	<1	0	0	0	**25**	**0.1**
Wood Sandpiper	0	0	0	0	0	0	0	0	ns	0	0	0	0	0	0	**0**	**0.0**