

Appendix 7

Avifauna Report – Andrew Crossland

Southshore and South New Brighton Park coastal
protection works (RMA 2023/3243)

Avifauna memorandum

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Parks Biodiversity Team - May 2025



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Executive Summary

This memo provides a peer review of an avifaunal assessment undertaken by Boffa Miskell Ltd (subcontracted by Jacobs Ltd) as part of the ecological evaluation for proposed coastal protection works in the Southshore Spit and South New Brighton Park areas of the Avon-Heathcote Estuary, a nationally and internationally significant wetland for coastal and estuarine birdlife.

This memo also consolidates over 40 years of local ornithological knowledge regarding bird movement patterns, and habitat use along the eastern shoreline of the estuary.

Long-term studies confirm a consistent >50-year pattern of movement and roosting behaviour among key wader species such as South Island pied oystercatcher, variable oystercatcher, and bar-tailed godwit. These birds primarily roost on exposed sandy islands near the tip of Southshore Spit with hundreds of individuals dispersing to feeding areas as mudflats are exposed with the falling tide. Bird densities within a 100 m wide “disturbance footprint zone” along the eastern shoreline are highest during falling tides when newly exposed mudflats attract large flocks, and again during the mid-rising tide when birds prepare to return to high tide roosts. In contrast, bird abundance within this zone is consistently low during two specific tidal windows around high tide and low tide. These windows present the least risk of disturbance and are recommended for construction activity.

Additionally, seasonal exclusions are recommended:

- 10 September to 30 October, when godwits return from migration and feed intensively near shore.
- 1 February to 15 April, during pre-migration fattening, when godwits require prolonged undisturbed access to feeding areas.

Boffa Miskell's assessment was based on six fortnightly bird surveys conducted between February and April 2022. No surveys were undertaken outside this window, meaning that their data does not represent seasonal or annual variation in bird use of the site. Their own report concedes this limitation. Critically, their survey methods failed to detect substantial aggregations of estuarine birds along the shoreline where proposed coastal protection works will take place. This omission resulted from suboptimal survey timing relative to tidal cycles, a lack of attention to known bird movement patterns, and misapplication of key ecological principles such as site fidelity and tidal-driven foraging behaviour.

The Boffa Miskell avifaunal assessment assigned very low to low ecological value to intertidal areas, underestimating both bird numbers and the importance of the habitat. This conclusion is inconsistent with extensive systematic count data and photographic evidence presented in this report, which documents hundreds of birds—particularly waders such as godwits and oystercatchers—regularly using the area immediately adjacent to the proposed works.

Additional methodological concerns include the inappropriate use of a 45-metre buffer zone to assess potential disturbance effects, derived from flight initiation distances (FID) for a narrow and poorly representative group of species. The standard 100-metre buffer used in Canterbury by agencies such as Environment Canterbury and Christchurch City Council was disregarded without adequate justification. The exclusion of key species such as bar-tailed godwit and South Island pied oystercatcher from the buffer calculation further undermines the credibility of the disturbance analysis.

Furthermore, Boffa Miskell's bird count zones were excessively large, encompassing estuarine areas far beyond the actual disturbance footprint. This inflated the spatial denominator in their analysis and diluted the apparent density and significance of birds near the shoreline—where disturbance impacts would actually occur. In contrast, this report's count data, collected between April 2024 and May 2025 within a standardised 100-metre-

wide disturbance footprint, recorded far higher concentrations and proportions of estuarine bird species than those reported by Boffa Miskell for the same general area and season.

The application of the EIANZ Ecological Impact Assessment (EcIA) framework in the Boffa Miskell report further complicates the analysis. While presented as a de facto national standard, this is not the case and the EIANZ approach has been criticised for its rigidity and lack of context-specific adaptability. It is not required under the Resource Management Act (RMA), and in this instance, has produced conclusions based on flawed input data.

While the consultants claim a net gain of 879 m² in intertidal mudflat habitat—derived from a calculated loss of 1,826 m² and a gain of 2,706 m²—the validity and functional value of this gain are questionable. The new mudflat areas are highly fragmented, limited in size, and situated along shoreline margins prone to weed accumulation, algal growth, and tidal debris. These conditions severely limit their value for benthic invertebrates and the diverse range of estuarine birds the report claims will benefit.

The report fails to adequately address the growing threat of *coastal squeeze*—the loss of intertidal habitat due to sea-level rise and the inability of coastal habitats to migrate inland due to hard infrastructure such as seawalls. This oversight is significant, as the Avon–Heathcote Estuary is already exhibiting early signs of this phenomenon. Projections from NIWA and local council experts indicate that sea-level rise and estuary bed subsidence will continue, likely leading to a net reduction in intertidal areas that are vital for foraging by waders, gulls, and other estuarine species.

Boffa Miskell's report also underplays the impacts of increased public access and recreational use—especially dog walking—along the newly protected shoreline. Despite acknowledging a likely increase in human use (page 108), the report concludes that this will result in only a "minor shift" from baseline conditions. This assertion is inconsistent with long-term observational data, which show that current low levels of disturbance have allowed bird populations to continue using estuary edge habitats for roosting and foraging. With improved access infrastructure and the promotion of the area for recreational activity, a significant increase in off-leash dog activity and general disturbance is foreseeable. This has been dismissed in the Boffa Miskell report.

Given the scale of the proposed works and the ecological importance of the estuary, a revised and more robust assessment is recommended.

Introduction

The Christchurch City Council (Council) Consents Team have requested a review of the work by consultants on a resource consent application (RMA 2023/3243) which seeks to construct coastal protection infrastructure along the shoreline of the Ihutai/Avon-Heathcote Estuary.

This memo provides a review of avian aspects of the consent's ecological impact assessment (prepared by Boffa Miskell Ltd), as well as providing baseline data around bird numbers in three estuary zones stretching from the Pleasant Point jetty to Tern Street. These zones cover the 100 m standard buffer width considered best practise in Canterbury for mitigating disturbance impacts on wetland birds. This 100 m width starts at the shoreline and extends out across open mudflats and sea grass beds.

The reviewer's experience and sources of baseline information are provided in **Appendix 1**.

Study Area

The area covered by the Boffa Miskell Ltd report covers about one-third of the estuary from the Bridge Street bridge south to Moncks Bay (Refer Figure 1). This report focuses on three proposed areas of works: 1) **'South Brighton Park Sector'** from Pleasant Point jetty to the north side of Jellicoe Saltmarsh (shown dark blue in Figure 1); 2) **'Northern Eastern Shore Sector'** from Jellicoe Saltmarsh down to the prominent point on the shoreline out from Kingfisher Lane (red); and 3) **'Middle Eastern Shore Sector'** from the point southwards to just south of Tern Street (light blue).

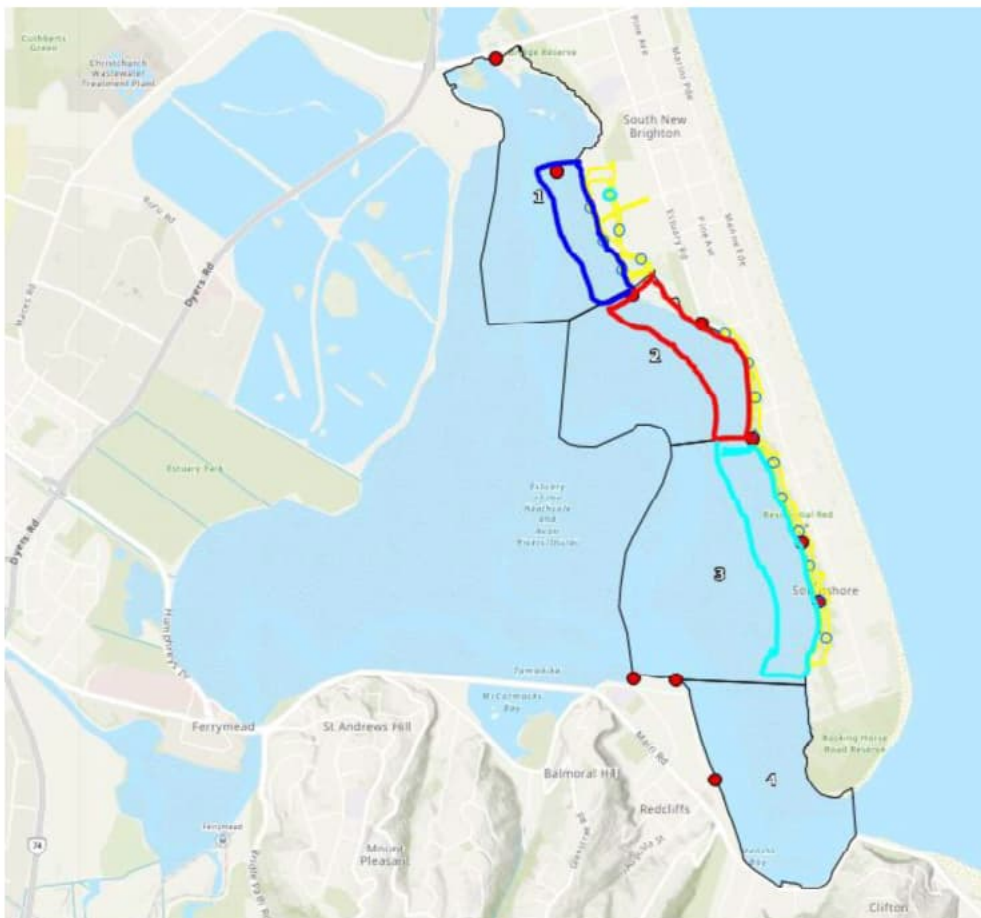


Figure 1. Map showing Boffa Miskell study areas (4 “zones” divided by black lines) and the 3 “survey” sectors used in this report (3 sectors coloured dark blue, red & green. Source © Boffa Miskell EIA report figure 5, produced 1.12.2023.

Birdlife at Southshore and South New Brighton

Terrestrial avifauna

Historically (up until the 1860s), the indigenous terrestrial avifauna of Southshore Spit and South New Brighton Park area was fairly limited with a handful of species utilising the scrubby and duneland environments. These would have included NZ quail, NZ pipit, grey warbler, South Island fantail, South Island tomtit, bellbird, fernbird, swamp harrier, NZ falcon, NZ kingfisher. etc. Local extinctions and the introduction of exotic species changed the composition of the terrestrial avifauna species assemblage.

From the 1870s to present the species mix has remained relatively uniform, dominated by introduced passerines with a handful of indigenous bird species. Tree/shrub plantings in both parkland and residential gardens have provided opportunity for some indigenous bird species to recolonize and notable examples of this in the last 10-20 years have included bellbird, kereru shining cuckoo and occasional tui (the latter three have benefitted from tall woodland environments that were not present during the period of early European settlement). These species have likely benefited from local community predator control efforts also. Consequently, the terrestrial avifauna in the study area is more diverse than is typical for most of metropolitan Christchurch.

Formal surveys of terrestrial avifauna carried out by Council within the study area have occurred at only one site (the SE part of South New Brighton Park – Fig. 2) and comprised 12 consecutive months of bird surveys (slow-walk transect method, with 10m search areas (= 20 m width) along each side of a c.780 m transect. Surveys were undertaken between June 2007 and May 2008 (before the earthquakes), and again 13 years later, in 2020-21 (Refer Tables 1 & 2).

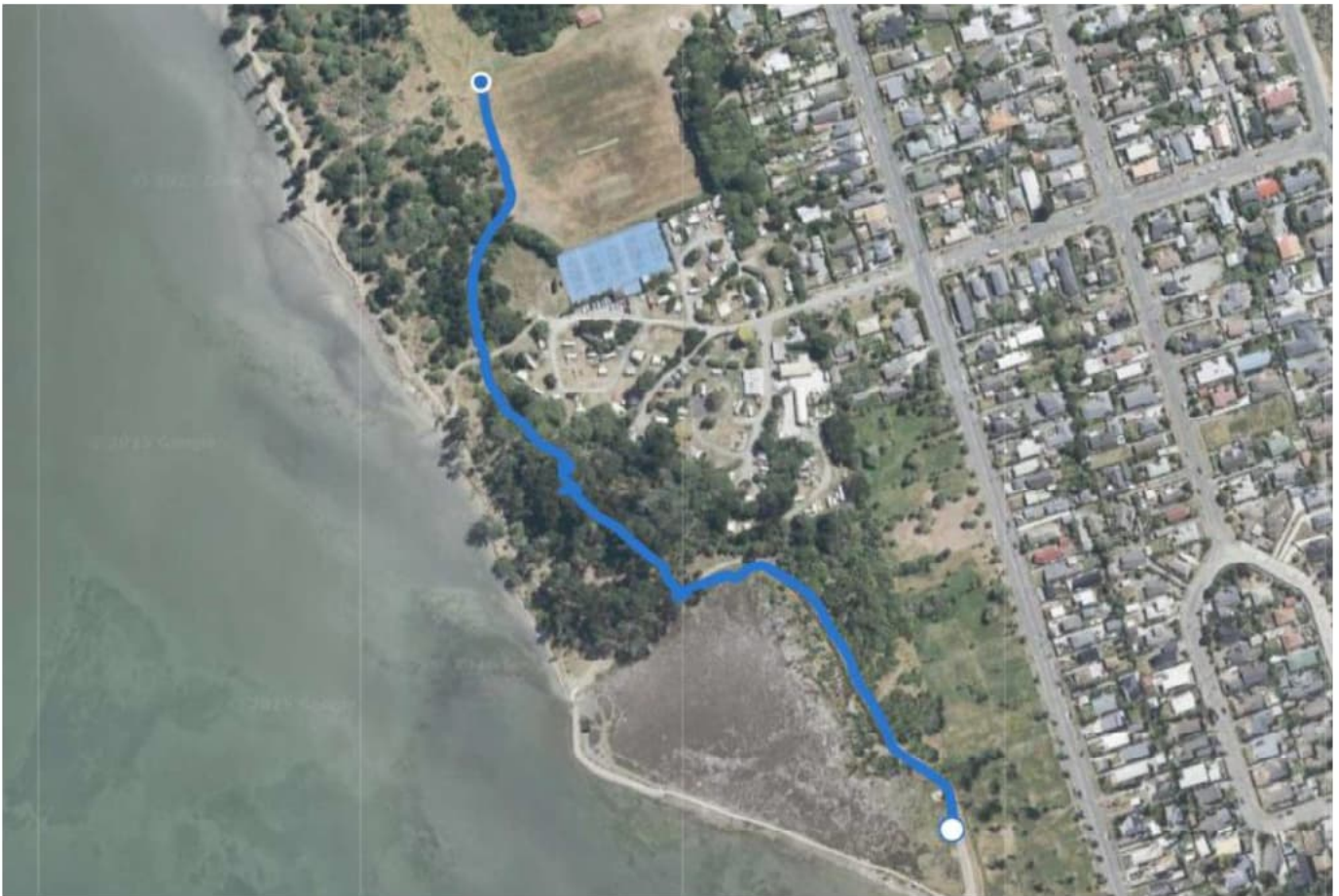


Figure. 2. Christchurch City Council Bird survey transect (blue line).

Species	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	acc total
Welcome Swallow	0	1	0	0	0	0	0	0	0	0	0	0	1
Grey Warbler	3	1	2	3	3	3	5	6	6	2	4	0	38
Fantail	3	0	1	3	1	4	1	1	1	1	3	2	21
Silvereye	4	2	2	5	1	4	6	10	11	18	8	7	78
Bellbird	0	1	1	0	0	0	0	0	0	0	0	1	3
Tomtit	0	0	0	0	0	0	0	0	0	0	0	0	0
Brown Creeper	0	0	0	0	0	0	0	0	0	0	0	0	0
Kereru	0	0	0	0	0	0	0	0	0	0	0	0	0
Tui	0	0	0	0	0	0	0	0	0	0	0	0	0
Shining Cuckoo	0	0	0	0	0	0	0	0	0	0	0	0	0
Chaffinch	2	0	1	8	6	6	6	8	9	4	5	4	59
Greenfinch	0	1	0	29	13	7	14	12	3	2	3	1	85
Goldfinch	2	0	0	18	16	8	17	11	9	2	22	0	105
Redpoll	0	0	0	14	18	4	4	5	1	0	7	0	53
House Sparrow	0	0	0	5	2	6	7	4	2	2	3	1	32
Dunnock	5	2	1	2	4	1	2	2	2	3	5	1	30
Blackbird	5	5	4	10	6	11	8	5	4	12	7	6	83
Song Thrush	1	1	0	1	0	0	3	2	0	7	1	0	16
Starling	7	7	5	3	3	2	5	9	9	44	27	3	124
Magpie	1	1	0	2	0	0	0	1	1	1	3	0	10
California Quail	0	0	0	0	0	0	0	0	0	1	0	0	1
Pheasant	0	0	0	0	0	0	0	0	0	0	0	0	0
Yellowhammer	0	1	0	0	0	0	1	0	0	0	0	0	2
Cirl Bunting	0	0	0	0	0	0	0	0	0	0	0	0	0
Kingfisher	0	0	0	0	0	0	1	1	1	0	2	0	5
NZ Pipit	0	0	0	0	0	0	0	0	0	0	0	0	0
Skylark	0	0	0	0	0	0	0	0	0	0	0	0	0
Harrier	0	0	0	0	0	0	0	0	0	0	0	0	0
Little Owl	0	0	0	0	0	0	0	0	0	0	0	0	0
total	33	23	17	103	73	56	80	77	59	99	100	26	746

Table 1. CCC bird survey data, June 2007-May 2008.

	winter period			breeding period				post-breeding period			winter period				
Species	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	acc total	relative abundance	no. months recorded
Welcome Swallow	0	2	0	2	1	2	0	6	0	0	0	0	13	1.95%	5
Grey Warbler	0	3	3	4	1	3	1	0	0	2	0	1	18	2.71%	8
Fantail	1	2	3	0	0	1	0	2	0	1	1	1	12	1.80%	8
Silvereye	3	2	10	9	10	8	11	12	9	10	3	7	94	14.14%	12
Bellbird	2	2	2	0	1	1	1	0	1	2	1	1	14	2.10%	10
Tomtit	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0
Brown Creeper	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0
Kereru	0	0	1	0	0	2	1	1	0	0	0	1	6	0.90%	5
Tui	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0
Shining Cuckoo	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0
Chaffinch	2	2	2	4	2	3	7	1	4	2	0	0	29	4.36%	10
Greenfinch	2	2	6	7	3	6	6	6	4	3	0	1	46	6.92%	11
Goldfinch	0	0	2	38	10	7	5	8	6	6	1	0	83	12.48%	8
Redpoll	0	0	0	0	8	0	6	6	1	1	0	0	22	3.31%	5
House Sparrow	4	3	2	5	12	11	14	19	10	14	5	30	129	19.40%	12
Dunneck	1	2	5	1	2	0	0	1	0	3	1	2	21	3.16%	9
Blackbird	5	6	4	4	6	3	3	3	1	8	10	7	60	9.02%	12
Song Thrush	0	1	1	1	2	2	1	1	0	1	1	4	15	2.26%	10
Starling	3	4	8	5	6	0	4	11	16	9	7	3	76	11.43%	11
Magpie	0	0	0	1	1	3	3	0	1	0	0	0	9	1.35%	5
California Quail	0	0	0	1	0	1	0	0	0	0	0	0	2	0.30%	2
Pheasant	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0
Yellowhammer	0	1	0	1	0	1	1	1	0	0	0	0	5	0.75%	5
Cirl Bunting	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0
Kingfisher	0	0	1	2	2	1	2	1	1	0	0	0	10	1.50%	6
NZ Pipit	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0
Skylark	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0
Harrier	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0
Rifleman	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00%	0
Feral Rock Pigeon	0	0	0	0	0	0	1	0	0	0	0	0	1	0.15%	1
total	23	32	50	88	67	55	67	79	54	62	30	58	665	99.99%	

Table 2.. CCC bird survey data, June 220 - May 2021. Colour coding shows seasonal occurrence of each species.

Council's terrestrial bird monitoring within the South New Brighton Park survey transect found that total numbers declined by 10.86% between the 2007-2008 and 2020-2021 surveys (IE: 746 birds v 665). This is considered a valid decline as surveys were made by the same observer and under similar time/weather conditions. The most likely reason is that reduction in canopy biomass through the removal of many dead/dying trees following the 2010-2012 earthquakes resulted in reduced habitat for birds that prefer the higher forest tiers such as redpoll (declined from 53 to 22; goldfinch from 105 to 83; greenfinch, 85 to 46; chaffinch, 59 to 29; starling, 124 to 76; grey warbler, 38 to 18; and fantail 21 to 12.

While the canopy cover thinned and number of large trees (mostly exotic conifers) reduced substantially between the two survey periods, the extent, diversity and height of the lower tier vegetation increased substantially. This tier is dominated by local and non-local natives like ngaio, ake ake, pittosporums, cabbage tree, karo, and planted local provenance native species. The increase in lower tier vegetative cover over the 13 years between survey periods was substantial, generated by seedlings growing into shrubs and trees and accelerated by increased sunlight and rain penetration through gaps in the canopy. Consequently, native bird species showed a positive response - total numbers recorded increasing from 146 to 167, representing increases in relative abundance from 19.57% to 25.11% of all terrestrial birds recorded. Bellbird records increased from 3 to 14 (with occurrence increasing from 3 months/year to 10 and breeding confirmed); silvereye 78 to 94; NZ kingfisher 5 to 10; and kereru 0 to 16 (breeding also confirmed). Shining cuckoos and tui were not recorded on the formal surveys but were detected on visits between surveys. New Zealand pipits were not recorded but as these are open country/shoreline birds their absence from this survey of wooded habitat is expected. They occasionally occur along Southshore Spit in winter.

Formal surveys have not been undertaken along the Southshore spit red zone strip, but Incidental records confirm the presence of most of the terrestrial birds recorded in South New Brighton Park. However, densities are generally lower, reflecting the more sparse habitat, lack of any contiguous tree cover, and the higher levels of disturbance. One additional species regularly occurring over Southshore is the swamp harrier.

	2007-2008		2020-2021	
	total numbers	relative abundance		relative abundance
Welcome Swallow	1	0.13%	13	1.95%
Grey Warbler	38	5.09%	18	2.71%
Fantail	21	2.81%	12	1.80%
Silvereye	78	10.46%	94	14.14%
Bellbird	3	0.40%	14	2.10%
Kereru	0	0.00%	6	0.90%
Shining Cuckoo	0	0.00%	0	0.00%
NZ Kingfisher	5	0.67%	10	1.50%
NZ Pipit	0	0.00%	0	0.00%
total numbers of natives	146	19.57%	167	25.11%
total numbers all birds	746		665	

Table 3. CCC terrestrial bird survey native species comparison for 2007-2008 v 2020-2021.

Review of terrestrial avifauna considerations in the Boffa Miskell Ltd report

The ecological consultants for the consent (a small team of ecologists from Boffa Miskell Ltd) undertook field work on terrestrial birds by way of 16 five-minute bird counts at pre-determined stations spaced c.200m apart, comprising six stations along the estuary edge within South New Brighton Park and ten stations along the estuary shoreline of Southshore Spit. Limitations are that these counts only occurred on one day (20 April 2022 – a winter period date) and did not sample either the breeding season months, post-breeding season or deeper into the winter months. The Boffa Miskell report (page 16) acknowledges this by stating: “... *temporal and seasonal variability in the avifauna assemblages has not been accounted for and it is likely that additional species that weren't recorded will utilise the project site over the course of the year*”.

The survey used five minute bird counts which are a well-established method in New Zealand but not the best choice of method for establishing a detailed account of the avifauna at this site. The method was limited to stationary observation points with limited survey duration at each (5 minutes) so is less likely to detect relatively quiet species (such as kereru) nor species that may be sparsely distributed (such as kingfisher and NZ pipit). A better method would have been slow-walk transects down the full length of the proposed works area (divided into sub-sector surveys) with repeats in autumn, winter, spring and summer.

The 15 terrestrial bird species found by the Boffa Miskell Ltd survey (page 53 of their report) match two-thirds of those that Councils monitoring programme recorded, but they missed nine species. Two of these are regularly present in both South New Brighton Park and Southshore (redpoll & song thrush), while the other six are seasonal or of rare occurrence (yellowhammer, cirl bunting, rock pigeon, swamp harrier California quail, shining cuckoo & tui).

The graphs provided in the Boffa Miskell Ltd EIA report showing avifauna composition (pages 53 & 54) attempt to provide far too much definitive analysis from what 16 five-minute bird counts conducted on one single day in April 2022 can provide. Much more data was required – both in volume and in spread of collection dates to show meaningful analysis.

Following on from the lack of data and the inadequacies of analysis, more assessment is required on the direct effect of proposed tree removals – both as feeding/roosting habitat, and as breeding habitat for protected bird species.

Additionally, detail is lacking on the number, species, grade and locations of replacement tree and shrub planting to replace trees that will be removed as part of the proposed project.

An assessment of how new tree and shrub plantings will actually benefit birdlife is required to show that it is more than simply an exercise in the planting of ornamental native trees into the landscape. Key questions include:

- Will planting comprise small grade sizes that require decades to grow to a size where they can be considered adequate replacement for lost trees?
- Will large specimens be brought in and planted on site?
- To what degree will replacement plantings provide specific bird habitat, such as roosting, nesting or feeding resource?
- To what degree will they contribute to an increase in the relative abundance of native bird species relative to exotic species?

Cryptic marsh birds

Historically, saltmarsh and freshwater swampbirds within the estuary area comprised buff weka, banded rail, spotless crane, marsh crane, pukeko, Australasian bittern and South Island fernbird. All of these have become locally extinct within the study area *per se* (from Pleasant Point Jetty to Southshore Spit tip), but pukeko, marsh crane and bittern persist in Raupo Bay and the Lower Avon/Bexley/Boys Island saltmarshes. Spotless crane may also have recently recolonized following the earthquakes, as has been the case at Travis Wetland, Cockayne Reserve and Charlesworth Reserve.

Despite habitat enhancements - including an improved tidal connection and regeneration of salt-tolerant vegetation on the landward edges - Jellicoe Saltmarsh has not supported swampbirds since before at least the 1980s. The tiny saltmarsh remnants around Penguin Street are no longer of sufficient size or quality to be suitable as habitat for marsh birds. In fact, at both Jellicoe Saltmarsh and Penguin Street, even pukeko have long been absent.

Review of cryptic marsh bird considerations in the Boffa Miskell Ltd report

The Boffa Miskell Ltd report (pages 69 & 110) correctly noted that marsh crane and Australasian bittern are unlikely to be breeding within the area south of Pleasant point Jetty. They also correctly state that the saltmarsh habitat within Jellicoe Saltmarsh may provide potential future breeding habitat. However, currently no cryptic marsh birds are present and they are not something that the proposed works need be mindful of.

It is my understanding that works between Pleasant Point jetty and the Bridge Street bridge have already been completed. If it turns out that further additional works are required, then bird management provisions around marsh birds would be necessary.

Coastal/estuarine avifauna

The Avon-Heathcote estuary/lhutai has long been recognized as a nationally and internationally important wetland for coastal/estuarine birdlife (Crossland 1993; Cromarty & Scott 1996), and this is not contested in the Boffa Miskell ecological impact assessment. Holdaway (1983) and (Crossland (1993, 2010, 2013, 2024) provide detail on which species occur, abundance levels and conservation significance. Distribution maps for various species are found in Crossland (1992) and in subsequent unpublished CCC and ECAN reports.

Baker (1969) closely monitored the dispersal and return of South Island pied oystercatchers (SIPO) from the main high tide roost by following banded birds (Figure 3). The daily movements he documented were endorsed by Knox & Kilner (1973) and I can confirm through ongoing monitoring that these movements have remained essentially unchanged from 1984/1985 until the present time - except for extensions further north and westwards as shown as blue arrows in Figure 3. These extensions developed as the mudflats recovered following cessation of industrial waste and poorly treated effluent discharge in the early 1970s. Bar-tailed godwits and variable have shown a similar dispersal pattern over the same timeframe. This provides a 50 year baseline of consistent dispersal/roosting behaviour. It is foreseeable that the wader flocks will continue this pattern into the future.

The movement pattern sees pied oystercatchers, variable oystercatchers and godwits roosting principally on exposed sandy islands (e.g. Figure 4) within the estuary near the southern tip of Southshore Spit. In very large tides they transfer to the ocean beach at the spit tip, while in stormy weather they may shift to the Linwood Paddocks or saltmarsh reserves on the western side of the estuary. However, on 90% of tidal cycles they use the main roosts (yellow dots labelled "MHWR" and "5" on the map below). Dispersal routes from the main high tide roosts to the feeding grounds follow the solid arrows shown in figure 6. Return movements back once the tide rises follow the dotted lines.

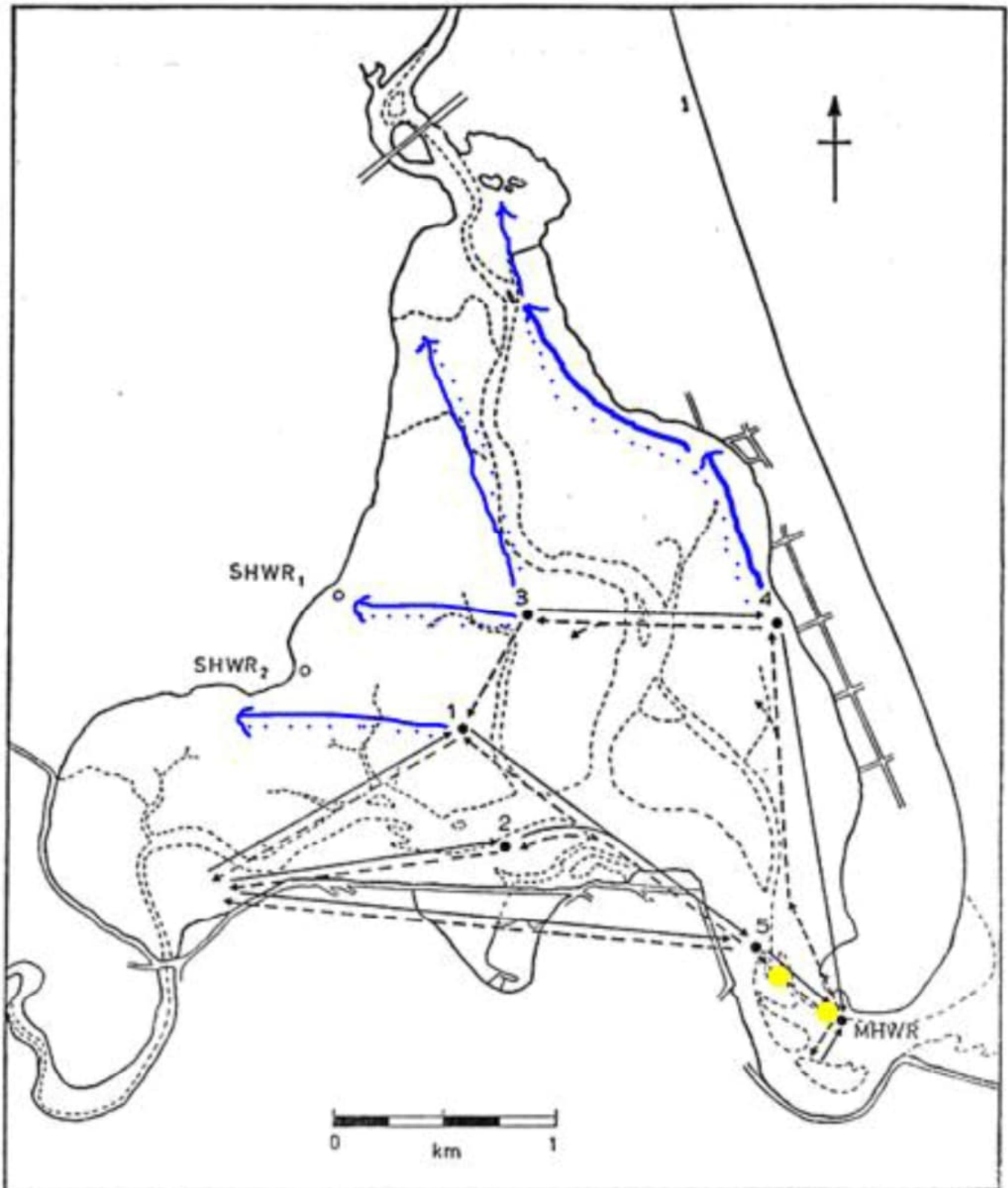


Figure 3. Map modified from Baker (1969), showing oystercatcher dispersal and return to high tide roosts. Movements shown in black were identified in the mid-late 1960s and have remained consistent for the last c.60 years. Blue lines show extensions to these movements that have been used consistently the mid-1980s.



Figure 4. *High tide roost of oystercatchers and godwits off the south-western tip of Southshore Spit.*

In relation to Southshore and South New Brighton Park coastal protection works, the key aspect of pied oystercatcher and godwit behaviour is the fact that as the tideline extends outwards, following high tide and the first mudflats become exposed, large numbers of both species disperse along the eastern shore of the estuary. Many flocks leap-frog those already feeding and push further up, feed anywhere along the spit, off Ebbtide Street, off the shoreline of South New Brighton Park, and further up beyond the Pleasant Point Jetty into Raupo Bay. At this time there is a relatively narrow zone of mudflat right along the estuary's eastern shore and many hundreds of birds can concentrate within 100m of the shoreline (IE: within a 100 m width disturbance footprint of the proposed protection works construction footprint).

It would be useful to monitor bird numbers and species assemblage roosting, loafing and feeding within this 100 m disturbance footprint throughout a complete annual cycle as there will be seasonal changes in line with the migration of various species to and from the estuary. I did not receive a brief to do this and unfortunately my c.40 years of monitoring data covers the high tide period when birds are concentrated (and more easily countable) on high tide roosts, rather than in the mid and low tide periods when birds are dispersed. However, between March and May 2025 I undertook a number of surveys at different stages of tide to provide some bird abundance data covering both the period when bar-tailed godwits are present and after their departure. Unlike the Boffa Miskell Ltd counts which covered a broad expanse of the estuary (see critique below), these surveys included only birds present within the 100m-wide disturbance footprint zone.

South New Brighton Park Sector

(Pleasant Point jetty to the north side of Jellicoe Saltmarsh)

This sector (Figure 5) corresponds with the southern part of the Boffa Miskell Ltd bird count Zone-1. The northern part (Raupo Bay) was excluded as it is my understanding that works have been completed in that area and have not impacted the shoreline. Approx. 8.35 hectares of mudflat and tidal waters in this sector were surveyed at different tide stages. Fourteen surveys were undertaken between March and May 2025 (Table 4).



Figure 5. South New Brighton Park Sector

Table 4: Counts of estuarine birds within the South New Brighton Park sector (from shoreline to 100m into the estuary), March & May 2025.

	5.3.2025	5.3.2025	5.3.2025	16.3.2025	16.3.2025	16.3.2025	16.3.2025	10.4.2025	10.4.2025	10.4.2025	10.4.2025	10.4.2025	28.4.2025	13.5.2025
	H Tide	mid tide falling	L Tide	L tide	mid tide	before H Tide	H Tide	mid Tide falling	Low tide	mid tide rising	before H Tide	H Tide	Mid tide falling	before H Tide
Pied Cormorant	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Little Cormorant	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W/F Heron	2	3	29	1	1	2	2	2	1	8	3	8	9	3
Royal Spoonbill	1	0	5	0	1	0	0	0	0	0	0	0	1	0
Black Swan	0	2	8	28	91	96	6	0	0	0	136	36	4	11
Canada Goose	0	0	0	0	270	21	0	0	0	0	37	0	0	2
Mallard	0	0	0	0	0	0	0	0	0	0	12	0	0	0
Harrier	0	0	0	0	1	0	0	0	0	0	0	0	0	0
V. Oystercatcher	0	0	0	0	0	3	0	1	0	0	0	0	0	0
SIP. Oystercatcher	1	19	25	14	99	29	0	5	45	12	3	59	116	0
S/W Plover	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Banded Dotterel	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Pied Stilt	0	4	1	3	2	6	0	0	0	4	2	8	2	0
Bar-tailed Godwit	0	0	0	0	2	2	0	0	0	0	0	0	48	0
Black-backed Gull	2	3	1	1	6	1	2	5	0	7	2	1	1	0
Red-billed Gull	28	101	0	172	202	169	25	11	88	47	24	77	360	86
Black-billed Gull	4	0	0	0	0	0	0	0	0	0	0	0	0	0
Caspian Tern	0	0	0	4	15	1	0	0	0	0	0	0	2	0
W/F Tern	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Total	39	132	69	223	691	333	36	24	137	78	219	189	543	102

The South New Brighton Sector supported highest bird numbers when the tide was falling as waders and gulls dispersing from high tide roosts spread northwards following the appearance of newly exposed mudflats and shallow water feeding habitats. Much lower bird numbers were present at low tide as the active feeding line of feeding birds has moved well out into the central mudflats of the estuary. Numbers increased again from mid tide until shortly before high tide when flocks of waders, gulls and waterfowl congregate after moving off the central estuary and prior to making the final return flight to high tide roosts. At high tide few birds remain as there are no exposed mudflats or edge habitats on all tides except the smallest neap tides. The species that remain are mainly a small number of herons and gulls but at times sizeable flocks of Black Swan raft just out from the shore.

Based on these observations (with the caveat that only the season of autumn was covered), there are two periods during the tidal cycle when bird densities within the 100m disturbance footprint are low and where disturbance impacts of shoreline-based construction would likely be relatively low. These periods are:

1. One hour before high tide until two hours after high tide (with an additional hour either side when there is a large spring tide which will keep the estuary at "high water" for longer). This provides a 3 to 5 hour work window.
2. Two hours either side of low tide. This provides a 4 hour window.



Figure 6. High tide birds around the shoreline in the South New Brighton Park sector are few, comprising species like White-faced Heron Royal Spoonbill and gulls.



Figure 7. At mid tide rising, protected bird species such as Red-billed Gulls, oystercatchers, godwits and herons roost or feed within the 100m disturbance footprint zone. Black swan feed or loaf along the tide line or in shallow water just offshore.



Figure 8. Most of the bird species using this area are fully protected or protected as gamebirds, including uncommon species such as this roosting flock of Caspian Terns (Threatened – nationally vulnerable).

Northern eastern shore sector (Jellicoe Saltmarsh down to the prominent point on the shoreline out from Kingfisher Lane)

This corresponds with Boffa Miskell bird count zone 2 but out to 100m offshore only. Approx. 13.25 hectares of mudflat and tidal waters were surveyed. This sector was surveyed fourteen times during March and May 2025.

This sector supports high concentrations of estuarine birds as the tide falls and flocks disperse northwards along the narrow band of mudflats stretching the full length of Southshore Spit. This sector is particularly important to Bar-tailed Godwits (At Risk – declining) for the 6-7 months that the full population is present on the estuary (ie; between mid-September and mid-March). It is also a notable feeding area for South Island Pied Oystercatchers (At Risk – declining), Variable Oystercatchers (At Risk – recovering), Banded Dotterels (At Risk – declining) and Pied Stilts (not threatened). These are native waders which present year-round, but with highest counts usually in winter or late summer (depending on species).



Figure 9: Northern eastern shore sector.

Table 5: Counts of estuarine birds within the northern eastern shore sector (from shoreline to 100m into the estuary), March & May 2025.

	5.3.2025	5.3.2025	5.3.2025	5.3.2025	16.3.2025	16.3.2025	16.3.2025	16.3.2025	10.4.2025	10.4.2025	10.4.2025	28.4.2025	13.5.2025	13.5.2025
	H Tide	after H tide	Mid tide falling	L Tide	L Tide	Mid Tide	before H Tide coming in	H Tide	Mid Tide	Mid tide rising	before H Tide	Mid tide falling	Mid tide rising	before H tide
Pied Cormorant	0	1	0	0	0	1	0	0	0	0	0	0	1	0
Little Cormorant	1	1	0	0	0	0	0	0	0	0	0	0	0	0
White Heron	0	0	0	0	0	0	0	0	0	0	0	0	0	0
W/F Heron	0	0	0	1	0	3	3	0	1	1	8	4	9	10
Royal Spoonbill	0	0	2	0	2	7	5	0	0	0	0	0	0	0
Black Swan	0	0	0	0	0	3	18	7	0	0	36	3	18	0
Canada Goose	0	0	0	0	0	0	17	0	0	0	0	0	4	0
Paradise Shelduck	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Mallard	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harrier	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V. Oystercatcher	0	0	0	0	0	2	1	0	0	0	0	1	0	0
SIP. Oystercatcher	19	0	44	9	23	70	48	3	34	67	59	156	26	2
S/W Plover	0	0	0	0	0	1	2	2	0	0	0	0	2	2
Banded Dotterel	0	0	0	0	0	0	0	0	3	0	0	0	0	0
Pied Stilt	4	3	4	0	3	8	16	9	0	4	8	2	0	0
Bar-tailed Godwit	0	0	325	0	5	84	365	0	0	5	0	16	0	0
Black-backed Gull	3	0	3	1	6	4	0	2	0	5	1	0	0	0
Red-billed Gull	23	168	370	8	98	75	76	65	85	69	77	130	54	148
Black-billed Gull	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Caspian Tern	0	1	0	0	0	0	3	0	0	0	0	1	0	0
W/F Tern	0	0	1	0	0	0	0	0	0	0	0	18	0	0
B/F Tern	0	0	0	0	0	0	0	0	0	0	0	4	0	0

**Figure 10.** High densities of godwits and other species feed within the 100m disturbance footprint on a daily basis between Sept and April.



Figure 11. Prior to their migration departure, Bar-tailed Godwits must feed up sufficiently to double their body weight, so they have enough fat reserves to power a flight to China and Korea. This photo (taken on 5 March 2025), shows godwits in a variety of plumage stages from the bright red breeding plumage of adults through various transitional stages to the plain speckled grey and whit of juveniles. The latter will remain on the estuary through the Austral winter when the adults have departed. They are feeding voraciously, very close to the shore, having flown here as soon as these upper feeding grounds have become exposed. (view southwards toward Heron Street).



Figure 12. Concentrations of godwits, oystercatchers and gulls close to shore in the bay between Godwit St and Ebbside Street.



Figure 13. Flocks of Red-billed Gulls roost on the shoreline at the end of Godwit Street, waiting for the tide to drop lower before dispersing over the low tide mudflats to feed. Beyond them, waders have already moved out to begin foraging on the first exposed sea grass beds..

Bird abundance drops after mid-tide (falling) through low-tide and through to mid-tide (rising) as the flocks follow the receding tide out into the central estuary up into the Raupo Bay or across to the western shore. Numbers build up again after mid tide (rising), as birds congregate into flocks, feed or loiter a while, then move to the high tide roosts as the waters rise. Some waders and gulls remain to form a small subsidiary roost on the beach at the Godwit Street Road end. No birds roost at the base of the rocky revetments, nor along the rocks/gabion baskets, or on top of the sea wall itself.



Figure 14. A scattering of estuarine birds remain as the incoming tide reaches the sea wall. The location of the small subsidiary high tide roost used by gulls, stilts, oystercatchers, grey teal and mallards on the beach at Godwit Street is arrowed. .

Based on these observations (and bird surveys in the area over many years in all months), there are two periods over the tidal cycle when bird densities close to shore along the northern eastern shore are sufficiently low for impacts within the 100m disturbance footprint to be relatively minor:

1. **Two hours before high tide until 1.5 hours after** (with an additional hour either side when there is a large spring tide which will keep the estuary at “high water” for longer). This provides a 3.5 to 4.5 hour work window.
2. **Two hours either side of low tide.** This provides a 4 hour work window.

Note: Seasonal works exclusions are needed from 10th September to 30th October when godwit flocks are actively arriving from migration and will feed close to shore as soon as the first mudflat is exposed. Likewise, at migration departure time they require longer feeding periods and minimal disturbance, which necessitates a works exclusion from 1st February to 15th April.



Figure 15. At full high tide all roosting sites are under water, except for structures like stormwater discharge pipes and small sections of rock cobble beach, which are utilized by gulls, but rarely by other estuarine bird species.

Middle eastern shore sector

(From the prominent point on the shoreline out from Kingfisher Lane to just south of Tern Street)

This corresponds with Boffa Miskell bird count zone 3 but extending out to 100m offshore only. Approx. 14.55 hectares of mudflat, tidal waters and saltmarsh were surveyed fourteen times during March and May 2025.

Bird abundance and densities along the middle section of the eastern shore are highest at the southern end as large wader flocks (totally 2000 – 7000 birds, depending on season) roost in close vicinity on sand banks around the spit tip and out in the estuary. As described by Baker (1969), these waders disperse northwards along the shoreline when the tide drops sufficiently to expose their mudflat and sea grass feeding grounds. A relatively wide delta emerges as water levels progressively fall, so the flocks of birds are able to fan out. After about mid-tide very few remain within 100m of the shore as birds have dispersed across the full breadth of the estuary.

There is generally no high tide roosting along the line of abandoned sea walls. The only regular roosting site is located just north of Penguin Street (shown in fig. 17), where a natural shoreline of remnant *Juncus* saltmarsh replaces concrete and rubble seawall. Numbers and frequency of birds using this roost has declined following the earthquakes. The decline in patch size, width and the condition of vegetation in the saltmarsh remnant, concomitant with an increase in disturbance as the adjacent dry land has become public open space has reduced the viability of this site as a safe bird roost.

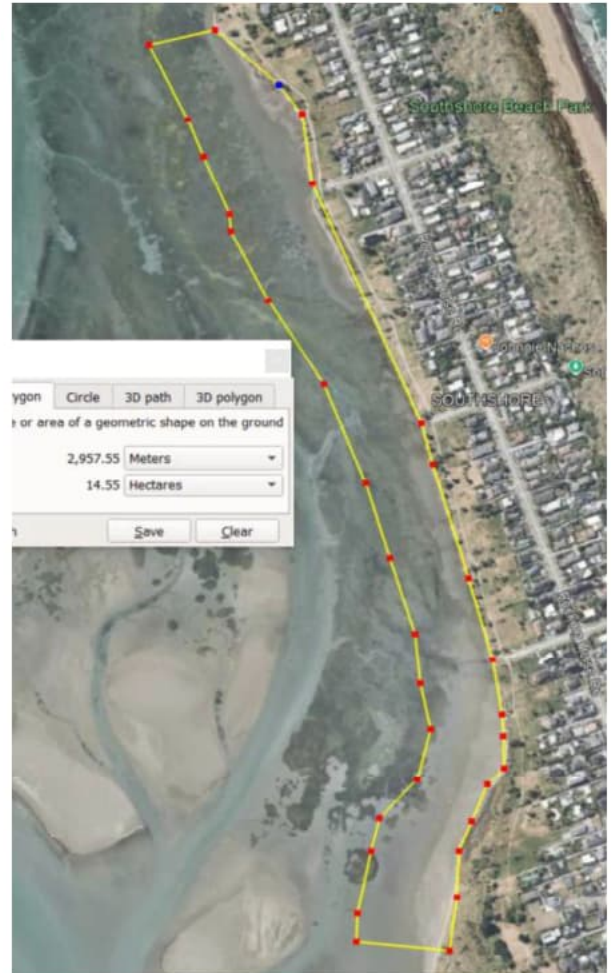


Figure 1: Middle eastern shore section.



Figure 16. Godwits and gulls feed along the middle eastern shore at mid tide, with two Royal Spoonbills (yellow) foraging in shallow water and a large flock of Black Swans (indicated in light blue) outside the 100m disturbance footprint, feeding over newly exposed sea grass beds.

Table 6: Counts of estuarine birds within the middle eastern shore sector (from shoreline to 100m into the estuary), March & May 2025.

	5.3.2025	5.3.2025	5.3.2025	5.3.2025	16.3.2025	16.3.2025	16.3.2025	16.3.2025	10.4.2025	10.4.2024	10.4.2025	28.4.2025	13.5.2025	13.5.2025
	H Tide	after H Tide	Mid Tide falling	L Tide	L Tide	Mid Tide	before H Tide	H Tide	Mid Tide	Mid tide rising	before H Tide	Mid tide	Mid tide rising	H Tide
Pied Cormorant	0	0	0	0	0	0	0	0	0	0	0	2	0	0
Little Cormorant	0	0	0	0	0	0	0	0	0	0	0	0	0	0
White Heron	0	0	0	0	0	0	0	0	0	0	0	1	0	3
W/F Heron	0	0	0	0	3	2	3	1	0	2	2	1	4	0
Royal Spoonbill	0	0	3	0	0	2	0	0	0	0	0	0	0	0
Black Swan	0	0	0	0	0	2	0	0	0	0	26	9	5	17
Canada Goose	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Paradise Shelduck	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Mallard	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harrier	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V. Oystercatcher	0	4	4	0	0	0	3	0	0	0	0	5	3	4
SIP. Oystercatcher	0	31	132	8	4	36	108	0	11	13	30	38	58	21
S/W Plover	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Banded Dotterel	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pied Stilt	0	0	0	0	0	0	0	10	0	0	0	0	0	0
Bar-tailed Godwit	0	0	490	0	0	1	36	0	0	0	0	0	10	0
Black-backed Gull	0	3	3	2	2	2	2	0	0	0	0	80	0	0
Red-billed Gull	0	11	15	0	6	9	5	11	3	5	6	60	11	142
Black-billed Gull	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Caspian Tern	0	0	3	0	0	1	0	0	0	0	0	2	0	0
W/F Tern	0	0	0	0	0	0	0	0	0	0	0	0	0	0
B/F Tern	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	49	650	10	15	55	157	23	14	20	64	198	93	187

**Figure 17.** South Island and Pied Oystercatchers and Variable Oystercatchers beginning to feed opposite the saltmarsh remnant near Penguin Street on 5 March 2025. The tide was too high for them to roost over highwater, but they arrived as a flock to roost as the tide began to fall and the first mudflats became exposed.



Figure 18. During March and April 2025, only small numbers of Black Swan (native protected gamebird) were counted within 100m of the eastern shore, but flocks sometimes numbering >500 regularly occur at other times, feeding over sea grass beds and rafting on the estuary at high tide. This photograph was taken in January 2024.

Based on long-term (40 years) monitoring and focused observations during March and April 2025, there are two periods during the tidal cycle when bird densities within the 100m disturbance footprint along the middle sector of the eastern shore are low and where disturbance impacts of shoreline-based construction would likely be relatively low. These periods are:

1. **Two hours before high tide until one hour after** (with an additional hour either side when there is a large spring tide which will keep the estuary at “high water” for longer). This provides a 3 – 4 hour work window.
2. **Three hours either side of low tide.** This provides a six-hour work window.

Note: Seasonal works exclusions are needed from 10th September to 30th October when godwit flocks are actively arriving from migration and will feed close to shore as soon as the first mudflat is exposed. Likewise, at migration departure time they require longer feeding periods and minimal disturbance, which necessitates a works exclusion from 1st February to 15th April.

Review of Boffa Miskell Ltd report

General

The consultants (Boffa Miskell Ltd, sub-contractors for Jacobs Ltd) undertook a mix of desk top assessments and site investigations to prepare their assessment of avian values and the ecological significance of the proposed coastal protection works for birdlife (page 4 of their report). Field work investigating estuarine birds comprised six fortnightly counts of coastal birds undertaken between 16th February and 29th April 2022 (page 13). They did not undertake surveys at other times of the year so had very limited bird abundance or distributional information for months and seasons outside their survey period. They conceded this on page 17 of their report.

Substantial concentrations of shorebirds along the eastern margin of the estuary were overlooked in the Boffa Miskell Ltd report. These bird aggregations are clearly evidenced through systematic count data and photographic documentation provided in this report. This omission highlights a significant gap in the field assessment and calls into question the reliability of the spatial conclusions drawn regarding avian use of the estuary. The Boffa Miskell Ltd ecologists appear to have conducted their bird surveys at stages in the tidal cycle which were either too high or too low to encounter the concentrations of birds close to the shoreline that I have outlined in this current report (see the information and count data provided in the preceding pages). Because they missed the birds, they failed to accurately identify potential adverse impacts on the many hundreds of estuarine birds that could foreseeably be located close to the construction works at certain stages of the daily tidal cycle. Instead, with reference to the intertidal mudflats, the consultants stated that “the avifauna species using the area were assigned Very Low to Low ecological value” (Executive summary, page. 5).



Figure 19. Large numbers of estuarine birds congregating close to the shoreline within 100m of construction activities.

The assumption by the Boffa Miskell Ltd ecologists appears to be that bird movements across the estuary are random and unpredictable on a daily basis. This assumption is inconsistent with well-established ecological research. Banding and tracking studies conducted in the Avon-Heathcote Estuary (Holdaway, 1983) and at numerous estuarine sites globally have shown that many shorebird species exhibit a high degree of **site fidelity**, returning to the same roosting and foraging locations on a daily basis. Movements are typically structured and habitual, not random. In addition, estuarine bird activity is closely tied to the tidal cycle. With each tide, mudflat feeding areas are predictably exposed and inundated, driving a repetitive pattern of movement. Flock behaviour, such as the dispersal of waders and other species along the eastern shoreline as the tide recedes following high water, has been observed and documented for over 60 years (Baker, 1969). This predictable behavioural pattern was not accounted for in the Boffa Miskell assessment.

Assessment of disturbance likelihood: methodological concerns

The standard approach to assessing the likelihood of disturbance to bird species involves the use of species-specific tolerance distances—commonly referred to as flight initiation distances (FID) or flushing distances. Generally, when multiple species are involved, a precautionary "catch-all" buffer distance would be used. This demarcates an invisible line beyond which all bird species are unlikely to react to disturbance, but different species will react at differing distances inside. This simplifies assessment and ensures that impacts are conservatively estimated. In Canterbury, a **buffer width of 100m** is commonly used to represent the likely disturbance threshold for most open-habitat coastal and estuarine bird species. This distance is supported by ecological literature and routinely applied by consenting authorities such as Environment Canterbury (ECAN), Christchurch City Council (CCC), and Selwyn District Council (SDC).

In their report (page 115), Boffa Miskell consultants deviated from the 100m distance and instead came up with a **buffer width of 45m** based on published FID values for an eclectic selection of 14 bird species (Table 22 in their report), which notably excludes key species such as godwits and oystercatchers despite the fact that FID data for these is available) This table Instead listed an unrepresentative selection of species, including several species of limited relevance to the shoreline under investigation, such as welcome swallow, spur-winged plover, Australasian bittern, and black-backed gull.

This approach is methodologically flawed. By including only a subset of the relevant bird assemblage—while simultaneously incorporating species either absent from the site or of no conservation concern—the analysis yields a buffer distance that is likely underestimated. Further compounding this issue, bird counts were conducted at suboptimal times, leading to an underestimation of the number of birds using nearshore habitats. The impact assessment is further diluted by averaging bird distributions across almost half of the estuary's width (see Fig. 1 in this report), which masks the significance of bird activity near the shoreline—precisely where disturbance impacts from construction would be most acute.

Consequently, the methodology employed lacks robustness and does not provide a credible basis for the conclusions drawn in the wider assessment of ecological value and impact presented in the Boffa Miskell report.

Given that this assessment forms part of a resource consent application, adherence to best practice is essential. A standard 100-metre buffer should have been applied, encompassing the zone from the construction footprint to 100 metres into the estuary. In addition, a comprehensive evaluation should have been conducted to identify bird species likely to be present at various tidal stages and times of year, including details on their abundance, behaviours, and areas of concentrated activity near the shoreline.



Figure 20. Part of a flock of hundreds of waterfowl taking flight at the approach of an observer at just under 100m distance at Lake Ellesmere/Te Waihora. Photo taken with a 200x zoom lens camera. These same birds (Black Swan, Paradise Shelduck, Grey Teal) migrate to the Avon-Heathcote Estuary and occur along the eastern shore. Flight initiation distances quoted by the Boffa Miskell report were gleaned from an Australian report and not calibrated with the behaviour of the individual species in New Zealand or Canterbury.

Survey scale and representation of avifauna presence

Rather than adopting the standard and logical methodology of focusing on the defined 100m-wide disturbance footprint, the consultants instead conducted bird counts extending from the estuary shoreline well into the central areas of the estuary (see page 14 of their report and the distribution maps on pages 61 - 68). This approach created excessively large survey zones—often hundreds of metres wide—that vastly exceeded the area relevant to potential disturbance.

For example, in the South New Brighton Park shoreline area (referred to as “Count Zone 1”), birds were surveyed across 84.81 hectares, whereas the actual disturbance footprint in this location comprises only 8.35 hectares (refer to Figure 5 of this report). Similarly, in the northeastern shoreline (“Count Zone 2”), their survey area spanned 71.89 hectares, although only 13.25 hectares were within the expected zone of impact. In the mid-eastern shoreline (“Count Zone 3”), a total of 115.81 hectares was surveyed, despite the fact that only 14.5 hectares were relevant to the disturbance footprint.

Subsequent analysis was based on bird numbers recorded within these expansive zones, severely undermining the accuracy of the findings. For instance, the consultants reported only 167 Pied Oystercatchers within their 45m buffer zone—representing just 0.8% of the total individuals recorded across the full extent of their survey area. Similarly, they recorded only 80 Bar-tailed Godwits within their buffer, or 1.0% of the total godwits

observed. These figures are inconsistent with the much higher numbers documented in the current report and significantly under-represent the species actually present within the likely impact zone.

This approach effectively masked the true avifaunal presence within the disturbance footprint. The inclusion of bird numbers from a much broader area diluted the analysis and obscured meaningful conclusions about the potential for disturbance in the immediate vicinity of the proposed works.

Table 11 (page 59 of their report), which pools survey data, further illustrates these issues. The table fails to isolate data specific to the works area and disturbance zone. It does not differentiate between tidal stages or between birds observed close to shore versus those farther afield. Moreover, the presence of suspiciously rounded maximum counts—such as exactly 1000 South Island pied oystercatchers, 600 bar-tailed Godwits, and 250 black-backed gulls—raises concerns regarding the veracity of the field data. Such neat totals are rarely observed in real-world surveys and warrant scrutiny.

The practice of aggregating data across multiple tidal stages—particularly given that few birds are typically present at high tide—and calculating average bird densities over expansive survey areas is at best uninformative. At worst, it introduces significant bias. For example, large low-tide mudflat areas may contain few birds, as most individuals tend to concentrate along the tide line, which is dynamic and shifts over time.

To highlight the scale of this discrepancy, Table 7 (below) presents my combined bird count data for the northern and middle eastern shorelines together (ie; Tables 5 & 6 combined). The counts were undertaken between April 2024 and May 2025 from within the 100m disturbance footprint. The total area surveyed was 27.8-ha, only 14.8% of the 187.7 ha surveyed by Boffa Miskell in their corresponding count zones 2 and 3.

	29.4.2024	21.6.2024	5.3.2025	5.3.2025	5.3.2025	16.3.2025	16.3.2025	16.3.2025	16.3.2025	10.4.2025	10.4.2025	10.4.2025	28.4.2025	13.5.2025	13.5.2025
	Mid tide	after H tide	H tide	Mid tide falling	L Tide	L Tide	Mid Tide rising	before H Tide	H Tide	Mid Tide	Mid tide rising	before H Tide	Mid tide falling	Mid tide rising	before H tide
Pied Cormorant	0	0	0	0	0	0	1	0	0	0	0	0	2	1	0
Little Cormorant	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
White Heron	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
W/F Heron	1	2	0	0	1	3	5	6	1	1	2	6	5	13	13
Royal Spoonbill	0	0	0	5	0	2	9	5	0	0	0	0	0	0	0
Black Swan	497	110	0	0	0	0	5	18	7	0	0	10	12	23	17
Canada Goose	0	0	0	0	0	0	0	17	0	0	0	0	0	4	0
Paradise Shelduck	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
Mallard	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harrier	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
V. Oystercatcher	5	4	0	4	0	0	2	4	0	0	0	0	6	3	4
SIP. Oystercatcher	252	336	19	172	17	27	106	156	3	45	80	29	194	84	23
S/W Plover	2	5	0	0	0	0	1	2	3	0	0	0	0	2	2
Banded Dotterel	0	16	0	0	0	0	0	0	0	3	0	0	0	0	0
Pied Stilt	28	9	4	4	0	3	8	16	19	0	4	8	2	0	0
Bar-tailed Godwit	9	0	0	815	0	5	85	401	0	0	5	0	16	10	0
Black-backed Gull	1	6	3	6	3	8	6	2	2	0	5	1	80	0	0
Red-billed Gull	125	84	23	385	8	104	84	81	76	88	74	71	190	65	290
Black-billed Gull	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Caspian Tern	0	0	0	3	0	0	1	3	0	0	0	0	3	0	0
W/F Tern	0	0	0	1	0	0	0	0	0	0	0	0	18	0	0
B/F Tern	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0
Total	920	572	50	1395	29	152	313	712	111	137	170	125	533	209	349

Table 7. Combined counts of estuarine birds for the 100m-wide disturbance buffer zone within the north and middle eastern shore sectors, April 2024 – May 2025. Note that total bird numbers ranged from 29 individuals at low tide on 16 March to 1395 birds at mid tide (falling) on 5 March 2025. Note that only the autumn months were covered but In previous years, during the peak wader season from December to February, up to 2,000 birds have been recorded within this 100m-wide zone on some dates (pers. obs.; S. Butcher, pers. comm.).

By way of an example to show that the Boffa Miskell Ltd substantially under-represented both the numbers of birds that occur close to the estuary's eastern shoreline and the proportion of the total population these represent, the count I made on the mid tide (falling) on 5 March 2025 provides a calibration. A few hours earlier I had completed a wader census for the whole Avon-Heathcote Estuary, reaching totals of 3504 South Island pied oystercatchers, 140 variable oystercatcher, 145 pied stilt, 52 spur-winged plovers and 1502 bar-tailed godwits, totaling some 5343 waders. In addition, 44 white-faced Herons and 81 Royal Spoonbills were censused. At mid tide (falling) some 54% of all godwits on the estuary, 4.9% of all pied oystercatchers, and additionally an estimate of about 50% of all Red-billed Gulls were within the 100m wide disturbance footprint buffer area along the northern and middle eastern shore (ie; Southshore Spit). These are far higher numbers and proportions than the 1% of godwits and 0.8% of pied oystercatchers (of just part of the estuary population – not even the full population) that Boffa Miskell deduced from their monitoring at the same time of year in 2022.

Limitations in the assessment of ecological values and effects

Despite relying on what has been demonstrated to be flawed bird data, the Boffa Miskell builds a detailed assessment of ecological values and potential ecological effects on birdlife in their report (pages 17–23). Their evaluation is structured using the EIANZ Ecological Impact Assessment (EcIA) guidelines matrix (Roper-Lindsay et al., 2018), a framework developed in part by a former staff member of the consultant company. While Boffa Miskell promotes this methodology as a de facto national standard, it is, in reality, only one of several possible approaches to ecological assessment. It is noteworthy that the EIANZ EcIA framework has faced increasing criticism in recent years. The Environment Court has expressed concerns about its applicability and robustness, and several expert ecologists have identified limitations in its ability to adequately assess both ecological values and potential effects. These shortcomings are particularly apparent in the context of the Southshore and South New Brighton Coastal Protection Works consent application. I see no value in using EIANZ EcIA as a framework for assessing this consent. My recommendation is that the analysis should be kept simpler, focused on the physical areas and bird populations located within the foreseeable disturbance footprints of the proposed works and subsequent use by people.

In this case, the consultants have not collected sufficient data on local bird populations across the full annual cycle, nor have they adequately assessed bird density and distribution within the area likely to be affected by the proposed works. As a result, their ecological conclusions are based on an incomplete understanding of the avifaunal community.

Further compounding these issues, their analysis (see pages 17, 69–75) places undue emphasis on bird species classified by the Department of Conservation as *threatened* or *at risk*. However, this focus misinterprets the requirements of the Resource Management Act 1991 (RMA), specifically Section 6(c), which mandates the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna—regardless of their conservation status. In the context of the Avon–Heathcote Estuary, several indigenous bird species that are not classified as *threatened* or *at risk* occur in numbers that comprise significant proportions of their national populations or even international populations. These include black swan, grey teal, New Zealand shoveler, paradise shelduck, and pied stilt, among others, and the assessment should have included greater consideration of these.

Effects of new mudflat habitat

The Boffa Miskell Ltd report presents a case that the overall increase of 879 m² of mudflat area will be positive for an many bird species and deliver a net gain (pages 112-114, 134). This gain is derived from the difference in a calculation of 1826 m² of mudflat lost and 2706m² mudflat gained. It comprises a series of little pockets of mudflat here and there along the length of the project. This total area of mudflat gain is tiny – the size of a single residential building section and its highly fragmented – not in one contiguous block. The gains comprise shoreline habitat which tends to get smothered in weed/algal accumulation and tidal debris. These areas support very limited benthic organisms and unfortunately have almost no avian habitat value – particularly to the long list of species Boffa Miskell have assessed.



Figure 21. *Tiny pockets of new mudflat will likely become debris traps and offer no benefit to estuarine birdlife.*

Effects of coastal squeeze

The consultant's report (pages 108–109, 134) does not adequately address the ecological implications of *coastal squeeze* on avifauna within the Avon–Heathcote Estuary. Coastal squeeze refers to the progressive loss of intertidal habitats due to the combined effects of sea-level rise and the presence of hard coastal infrastructure that prevents natural inland habitat migration. According to recent projections from NIWA and Christchurch City Council experts, both estuary bed subsidence and sea-level rise are expected to continue, which may result in a reduction in the extent of intertidal mudflats.

These intertidal areas are critical feeding habitats for a wide range of bird species, including waders, gulls, and some waterfowl, which rely on exposed mudflats, seagrass beds, and shallow waters to meet their daily feeding requirements. The report fails to account for the likely outcome that, as central mudflats diminish, bird populations will increasingly concentrate their foraging efforts around the estuary margins. This shift would heighten their exposure to disturbance, predation, and other pressures associated with proximity to the shoreline.

Furthermore, the planned and existing coastal protection structures along the estuary's eastern shoreline—such as sea walls and rock revetments—will prevent the natural landward migration of intertidal, saltmarsh, and salt meadow habitats. This will likely eliminate future opportunities for shoreline roosting and nesting by coastal and estuarine bird species. The report provides insufficient consideration of this constraint and its ecological consequences.

In addition, suitable high tide roosting sites are already in decline around the estuary. For example, at Southshore Spit along the eastern shoreline of the estuary, two previously reliable shoreline roosts - the beach at Godwit Street and the saltmarsh north of Penguin Street - now experience more frequent inundation than before the Canterbury earthquakes. This is arguably an already-occurring local manifestation of coastal squeeze.



Figure 22. A mix of three wader species, gulls and ducks roosting over high tide at the Godwit Street beach in April 2008, two years prior to the earthquakes. Now in 2025, high tides more frequently inundate this location, leaving minimal space for roosting birds. Gulls still frequent this roosting site in numbers, but wader numbers have declined.

Effects of increased public access and recreational use along the shoreline and mudflats

The proposed coastal protection works incorporate features that will enhance public access to the estuary shoreline and mudflats, including the installation of ramps and stairs to facilitate movement from dry land to the estuary bed. There is also a high likelihood that the recreational use of watercraft will increase. The Boffa Miskell Ltd report (page 108) acknowledges that these changes may result in increased human use of the estuary margin. It is therefore reasonable to expect a corresponding rise in dog activity, given that dogs commonly accompany people during recreational outings.

Despite this, the report concludes that such an increase in access “*will not be of a magnitude likely to affect estuarine habitats and organisms*”. It further states that these changes are expected to result in “*a low magnitude of effect, resulting in a minor shift away from existing baseline conditions*”, and ultimately asserts that “*the level of effect will not affect the ecological values that contribute to the ecological significance of the estuary*”.

This conclusion does not align with long-term observational data. From the pre-earthquake period (prior to late 2010) through to the present day (mid-2025), human activity along the eastern shoreline of the estuary has been relatively limited, primarily involving local residents engaging in passive recreation. Most visitors comply with the Christchurch City Council Dog Control Bylaw (2016), and dogs are typically kept under control within a

designated '*passing through*' zone. These local dogs also tend to be more habituated to estuarine birdlife and are generally less prone to disturbing wildlife compared to dogs brought in by non-local visitors.

Once the coastal protection infrastructure is complete, the surrounding park areas are landscaped, and Southshore Spit is promoted as a new coastal reserve, it is highly foreseeable that recreational use—particularly by dog walkers—will increase substantially. With nearly 3 km of uninterrupted shoreline and improved public access, the area may inadvertently become a popular destination for off-leash dog exercise. Such an increase in activity is likely to result in levels of disturbance well beyond what could reasonably be described as a “minor shift” from existing baseline conditions.

Contrary to the limited scope of Boffa Miskell’s fieldwork, evidence presented in Table 7 of this report demonstrates that significant numbers of estuarine birds regularly occur in close proximity to the Southshore Spit shoreline. During falling tides, birds can be concentrated at high densities in these areas, either feeding or waiting for the central mudflats to become exposed. At such times, alternative mudflat roosting and foraging options are limited or unavailable, making these shoreline habitats critically important. Under these conditions, any increase in human and dog activity can reasonably be expected to result in elevated levels of disturbance, which in turn is likely to have adverse ecological effects on bird populations that rely on the estuary edge for key parts of their daily and seasonal cycles.



Figure 23. Two large dogs, let loose to roam freely by their non-local owner on 16 March 2025. They spent a full 20 minutes chasing birds

The Boffa Miskell report (page 108) asserts that “the level of effect will not affect the ecological values that contribute to the ecological significance of the estuary.” However, this statement is open to challenge, particularly when considered in light of the precedent set by the construction of the coastal pathway along the southern shore of the Avon-Heathcote Estuary. That project resulted in the permanent loss of a critical high-tide roosting site at Beachville Road (Figures 24 & 25), despite prior ecological advice aimed at avoiding such outcomes.

Before construction, the Beachville Road site was the most significant high-tide roost for several species of conservation concern on the estuary, including the white-fronted tern (At Risk – Declining) and the black-fronted tern (Threatened – Nationally Endangered). It also regularly supported red-billed gulls (Threatened – Nationally Endangered), variable oystercatchers (At Risk – Recovering), South Island pied oystercatchers (At Risk – Declining), and black-billed gulls (At Risk – Declining). Ecologists had recommended that the pathway be routed along the edge of Redcliffs Park—on the opposite side of the road from the bird roost—to minimise disturbance.

However, this advice was not followed. Instead, the pathway alignment was chosen based on recreational preferences, placing it directly along the shoreline. Although a short section of native planting was used as a buffer, the majority of the shoreline roosting area was displaced. The final blow to this habitat was the installation of a park bench overlooking the last remnant of semi-protected roosting space.



Figure 24. The Beachville Road roost in c.2011 following the earthquakes with flocks of terns and gulls present.



Figure 25. The Beachville Road roost site in 2015 (top) when still functioning as a bird roosting site; and in 2024 (bottom) with the coastal pathway having rendered the roost untenable for terns, gulls and waders. Yellow areas show the available roosting extent in both periods. The intrusive park bench is arrowed.

Ironically, this section of the pathway was partially funded through a government grant promoting it as a '*rare shorebird sanctuary*'. Yet from the time it was completed in 2016, the roost ceased to function. White-fronted tern numbers, which had previously exceeded 1,000 individuals (representing more than 1% of the global population), have since dropped to fewer than 100 birds in most years. Black-fronted tern numbers fell from over 50 to fewer than 10. This case provides a clear counterexample to the claim in the Boffa Miskell report that increased human activity and infrastructure development along the estuary will not adversely affect its ecological values. In reality, the Beachville Road outcome demonstrates that access infrastructure can cause the loss of ecological values – even erosion of the international significance of the estuary.

Nesting/roosting habitat

The consultants undertook two nesting/roosting surveys in trees along the estuary edge of South New Brighton Park and Southshore on 20 April 2022 and 26 November 2023 (Pages 14, 55-56 of the Boffa Miskell report). Their findings were similar to my observations that a mix of birds roost and nest in the trees, and that there has been progressive loss of valuable habitat trees as many have died and fallen/been removed.

Key species of conservation concern potentially nesting in estuary-edge trees at the times that the proposed works are underway include white-faced heron and New Zealand kingfisher. Cormorants/shags have not been observed nesting in any trees along this shoreline – although they do roost at times. Bush birds like kereru, bellbird, shining cuckoo and the introduced but legally protected little owl, may possibly nest in these trees, but they are far more likely to occupy trees deeper into the woodland.

My recommendations are that pre-works nest searches are required in any trees to be felled and in the surrounds of the works area. Accidental nest discovery protocols should be in place for any nests found subsequently during the project. These are to pull back 20m and phone the designated team ornithologist for next steps advice.



Figure 26. One of a number of white-faced herons that roost and nest in the trees overlooking the estuary at South New Brighton Park.

References

- Baker, A. J. (1969). *The comparative biology of New Zealand oystercatchers* (Master's thesis). University of Canterbury.
- Boffa Miskell. (2023). *Southshore and South New Brighton Park flood protection works: Ecological assessment* [Unpublished report]. Prepared for Christchurch City Council.
- Cromarty, P., & Scott, D. A. (1996). *A directory of wetlands in New Zealand*. Wellington, New Zealand: Department of Conservation; IWRB, Ramsar Convention Bureau.
- Crossland, A. C. (1992). Birds of the estuary. In S.-J. Owen (Ed.), *The estuary where our rivers meet the sea: Christchurch's Avon-Heathcote Estuary and Brooklands Lagoon* (pp. 63–97). Christchurch, New Zealand: Parks Unit, Christchurch City Council.
- Crossland, A. C. (1993). *Birdlife of the Avon-Heathcote Estuary and rivers, and their margins* (Canterbury Conservancy Technical Report Series No. 6). Christchurch, New Zealand: Department of Conservation.
- Crossland, A. C. (2010). The Avon-Heathcote Estuary and the Bromley Oxidation Ponds, Christchurch, New Zealand: An important area for waterbirds. *Stilt*, 57, 5–10.
- Crossland, A. C. (2013). Wetland bird monitoring at the Avon-Heathcote Estuary and Bromley Oxidation Ponds, Christchurch: August 2009 to July 2010. *Notornis*, 60, 151–157.
- Crossland, A. C. (2024). *Te Ihutai/Avon-Heathcote Estuary: Bird and lizard checklist*. Report for the Parks Unit, Christchurch City Council.
- Holdaway, R. N. (1983). Class Aves (birds). In M. B. Jones (Ed.), *Animals of the estuary shore* (pp. 103–148). Christchurch, New Zealand: University of Canterbury.
- Knox, G. A., & Kilner, A. R. (1973). *The ecology of the Avon-Heathcote Estuary*. Report for the Christchurch Drainage Board, Christchurch, New Zealand.



Appendix 1: Reviewer experience and sources of baseline information

I currently work as an ecologist/ornithologist in the CCC Parks Biodiversity Team but have worked from 1997-1999 and 2002-2019 in similar roles with Council's Waterways and Wetlands and Regional Parks teams respectively. I also hold the positions of Records Appraisal Committee member and South Island coordinator of the national wader census.

I have been monitoring wetland birds on the Ihutai-Avon-Heathcote Estuary since 1984 (41 years) and have produced many reports and papers on the site, some of which were referenced in the Boffa Miskell Ltd Ecological Impact Assessment (EIA) under review. Notable accounts of bird status, population level and distribution which I have produced for the Avon-Heathcote Estuary include:

Classified Summarised Notes contributions. (1985–2002). *Notornis*.

Crossland, A. C. (1992). Birds of the estuary. In S.-J. Owen (Ed.), *The estuary where our rivers meet the sea: Christchurch's Avon-Heathcote Estuary and Brooklands Lagoon* (pp. 63–97). Christchurch: Parks Unit, Christchurch City Council.

Crossland, A. C. (1993). *Birdlife of the Avon-Heathcote Estuary and Rivers, and their margins* (Canterbury Conservancy Technical Report Series No. 6). Christchurch: Department of Conservation.

Crossland, A. C. (1999). A summary of birdlife values of the Avon-Heathcote Estuary and Bromley Oxidation Ponds. In Anon., *Estuary Green Edge, Te Ihutai: Final report, December 1999* (Appendix A). Christchurch: Woodward Clyde.

Crossland, A. C. (2001). Long-term changes in numbers of Variable Oystercatchers (*Haematopus unicolor*) at two wintering sites in Canterbury, South Island, New Zealand. *Stilt*, 40, 2–6.

Crossland, A. C. (2003). *Ecological values and wildlife opportunities of the Lower Heathcote Valley floodplain*. Report for the Parks & Waterways Unit, Christchurch City Council.

Crossland, A. C. (2005). A national biodiversity hot-spot from the treatment of urban wastewater – the Bromley Oxidation Ponds and Te Huingi Manu Wildlife Refuge, Christchurch. In *Greening the city: Bringing biodiversity back into the urban environment: Proceedings of Royal New Zealand Institute of Horticulture Conference, 21–24 October 2003* (pp. 189–198).

Crossland, A. C. (2009a). *Assessment of the importance of the Avon-Heathcote Estuary area to birdlife: With reference to criteria under the Ramsar Convention for the identification of wetlands of international importance*. Report for Christchurch City Council and the Avon-Heathcote/Ihutai Estuary Trust.

Crossland, A. C. (2009b). Monthly abundance of Eastern Bar-tailed Godwit *Limosa lapponica baueri* in central Canterbury, South Island, New Zealand. *Stilt*, 55, 16–19.

Crossland, A. C. (2010a). The Avon-Heathcote Estuary and the Bromley Oxidation Ponds, Christchurch, New Zealand: An important area for waterbirds. *Stilt*, 57, 5–10.

Crossland, A. C. (2010b). *Avon-Heathcote Estuary waterbird identification guide*. Report for the Parks Unit, Christchurch City Council.

Crossland, A. C. (2011). *Avon-Heathcote Estuary pre- and post-February 2011 earthquake waterbird census data*. Report for the Parks Unit, Christchurch City Council.

- Crossland, A. C. (2013). Wetland bird monitoring at the Avon-Heathcote Estuary and Bromley Oxidation Ponds, Christchurch: August 2009 to July 2010. *Notornis*, 60, 151–157.
- Crossland, A. C., & Roberts, J. (2014). *Ecological justification for gravel renourishment on bird nesting/roosting islands in tidal wetlands around the Avon-Heathcote Estuary*. Report for the Parks Unit, Christchurch City Council.
- Crossland, A. C. (2017). *Core bird roosting locations along Southshore Spit*. Report for the Parks Unit, Christchurch City Council.
- Crossland, A. C. (2019). *Inspection of trees along the shoreline of South New Brighton Reserve in relation to current use by native birds*. Report for the Parks Unit, Christchurch City Council.
- Crossland, A. C. (2021). *Update on bird populations on the Avon-Heathcote Estuary (Ihutai) & Bromley Oxidation Ponds*. Report for the Parks Unit, Christchurch City Council.
- Crossland, A. C. (2023). *Avon-Heathcote Estuary/Ihutai Estuary: Linwood Paddocks, Linwood Avenue Canal, Charlesworth Reserve, Heathcote Bay bird checklist*. Report for the Parks Unit, Christchurch City Council.
- Crossland, A. C. (2024a). *Lower Heathcote-Ferrymead Floodplain: Avian biodiversity status & management guidelines*. Report for the Parks Unit, Christchurch City Council.
- Crossland, A. C. (2024b). *Te Ihutai/Avon-Heathcote Estuary: Bird and lizard checklist*. Report for the Parks Unit, Christchurch City Council.
- Crossland, A. C. (2025). *Charlesworth Reserve: Ecological restoration and development plan*. Report for the Parks Unit, Christchurch City Council.
- Harris, R., & Crossland, A. C. (1990). *The Avon-Heathcote Estuary: Wildlife and recreation potential of the western margins*. Report for the Parks Unit, Christchurch City Council.