

**BEFORE THE WHANGAREI DISTRICT COUNCIL AND NORTHLAND REGIONAL  
COUNCIL**

**IN THE MATTER** of the Resource Management Act 1991

**AND**

**IN THE MATTER** of a resource consent application by Northport  
Limited under section 88 of the Resource  
Management 1991 for a port expansion project  
at Marsden Point

**APPLICATION NO.** APP.005055.38.01

LU 2200107

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**STATEMENT OF EVIDENCE OF LEIGH SANDRA BULL**

**COASTAL AVIFAUNA**

**24 August 2023**

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**Counsel instructed:**

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## INTRODUCTION

### Qualifications and experience

1. My name is Leigh Sandra Bull.
2. I am a Senior Ecologist and Director of BlueGreen Ecology Ltd. I hold the qualifications of Bachelor of Science (Zoology), Masters of Science with Honours (Ecology) and PhD (Ecology) from Victoria University of Wellington. The topics of my MSc and PhD theses were kororā / little penguins and shearwaters respectively.
3. I have worked as a professional ecologist for 20 years (not including 11 years tertiary study). My area of specialisation is ornithology, particularly oceanic and coastal avifauna. Overall, I have authored (and co-authored) over 20 publications in scientific peer reviewed journals, primarily relating to seabirds.
4. I have significant experience conducting surveys and monitoring of seabirds, coastal and wading birds in New Zealand (mainland, offshore and sub-Antarctic islands), New Caledonia, Tonga and France.
5. Before joining BlueGreen Ecology Ltd in April 2023, I was a Partner at Boffa Miskell Ltd (BML), where I worked as a consulting ecologist for 16 years. Prior to joining BML, I held positions at the Department of Conservation (DOC), Université Paris Sud XI, and as an independent contractor to NIWA. While working for DOC my positions were as a Species Protection Officer in the Biodiversity Recovery Unit, and as a Senior Technical Support Officer in the Marine Conservation Unit.
6. While working at BML, I prepared numerous ecological assessments for major infrastructure projects, and have extensive experience working on the coastal and seabird aspects of a range of projects in the marine and coastal environments including windfarms (onshore and offshore), coastal pathways, reclamations, port activities (Whangarei, Wellington and Lyttelton), marina construction, aquaculture and dredging.
7. I have appeared as an expert witness before Council hearings, Environment Court hearings, Board of Inquiry hearings and at a Decision-Making Committee hearing for marine consents associated with Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012.
8. My professional memberships include the New Zealand Ornithological Society and the Environment Institute of Australia and New Zealand (EIANZ). I am a Certified

Environmental Practitioner (Ecology Specialist) with the EIANZ and am bound by the Institute's code of ethics.

9. I was engaged by Northport Ltd in 2019 to prepare an assessment of effects for the project in relation to coastal avifauna. I am familiar with the application site and the surrounding locality, and am the author of the following reports for this project:
  - (a) Boffa Miskell (2022a). *Northport Eastern Expansion: Coastal Avifauna Assessment*. Report prepared by Boffa Miskell Limited for Northport Ltd, dated 3 October 2022.
  - (b) Boffa Miskell Limited (2022b). *Northport Eastern Expansion: Additional Winter 2022 Avifauna Data Analysis*. Report prepared by Boffa Miskell Limited for Northport Ltd, dated 24 November 2022.
10. Through the preparation of the coastal avifauna assessment, I attended meetings with the relevant subject matter experts from both the Department of Conservation and Northland Regional Council to discuss their comments on a draft version of the report.
11. I have read the relevant parts of the application; submissions; and the Section 42A Report.

### **Code of Conduct**

12. I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note (2023) and I agree to comply with it. In that regard, I confirm that this evidence is written within my expertise, except where I state that I am relying on the evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

### **SCOPE OF EVIDENCE**

13. In my evidence, I:
  - (a) Provide an executive summary of my key conclusions;
  - (b) Describe the methods to collect coastal avifauna data and assess the effects of the proposal;
  - (c) Present an overview of the existing environment as it relates to the Whangarei Harbour and project footprint;

- (d) Provide a summary of effects identified on coastal avifauna as a result of the construction and operation of the proposal;
- (e) Consider the application against the National Policy Statement for Indigenous Biodiversity (NPS-IB);
- (f) Respond to the relevant issues raised in the s42A Report;
- (g) Respond to submissions raised; and
- (h) Comments on draft proposed conditions advanced by Northport.

## EXECUTIVE SUMMARY

14. Desktop research and targeted field surveys were used to gather information to inform the coastal avifauna assessment for Northport's proposed reclamation.
15. Coastal avifauna surveys conducted from One Tree Point to the Channel Infrastructure ("CINZ") jetty recorded a total of 21 species utilising the area, including five species classified as *Threatened* and 12 classified as *At Risk*.
16. The methods used to undertake the assessment were consistent with the EIANZ (2018) guidelines for undertaking ecological impact assessments, whereby ecological values are assigned to species, and the magnitude of effects identified in order to determine the overall level of effect of the proposal.
17. The potential construction and operational effects that were assessed included permanent habitat loss, mortalities, disturbance and displacement (forms of habitat loss), impacts on food supply and foraging ability, artificial lighting, pollution and cumulative effects.
18. The potential overall effects of the construction and operation of the proposed eastern reclamation will be Low to Very Low, taking account of the management and mitigation measures proposed:
  - (a) The provision and ongoing maintenance of additional high tide roosting habitat for the term of the consent, such as the re-creation of a historic sandbank to function as a high tide roost on the western side of Northport prior to construction commencing;
  - (b) Preparation and implementation of an Avifauna section within the projects Construction and Environmental Management Plan (CEMP) that outlines

measures to avoid direct impacts (mortalities) of construction on variable oystercatcher and little penguin / kororā;

- (c) The implementation of some form of underwater noise mitigation for all piling activities using hydraulic impact hammer such that a safe underwater passage is maintained for kororā traversing in and out of the harbour; and
- (d) Operational lighting to be hooded and orientated downwards to avoid attraction and potential mortalities of seabirds on the Project site.

## **METHODOLOGY**

- 19. A combination of desktop and field data was used to inform the coastal avifauna assessment.
- 20. Targeted coastal avifauna field investigations included:
  - (a) Shorebird nesting surveys undertaken by 4Sight Consulting Ltd (*'4Sight'*) during the 2018/19 and 2019/20 breeding seasons. The objective of these surveys was to identify species that may be nesting on the Northport site and adjacent coastal margins to the immediate west and east (refer to Map 1 for the area surveyed during the nesting bird surveys).
  - (b) Wading bird surveys undertaken by 4Sight during the spring / summer of 2017/18 and 2019/20, and winter of 2021 and 2022. The objective of these surveys was to record how and what wading bird species were using the coastal and intertidal areas to the west and east of Northport (refer to Map 1 for the area surveyed during the wading bird surveys).
  - (c) Little penguin / kororā surveys were conducted by myself (December 2019) and a DOC-certified species detection dog and handler (June 2021) along the riprap edges of the Northport site (refer to Map 1 for the area included in the penguin surveys).
- 21. The following potential construction and operational phase effects (both direct and indirect) on coastal avifauna were considered for this assessment:
  - (a) Direct / permanent loss of habitat;
  - (b) Injuries and / or mortalities;
  - (c) Disturbance and displacement (effective habitat loss);

- (d) Food supply and foraging ability;
  - (e) Artificial lighting;
  - (f) Pollution; and
  - (g) Cumulative effects.
22. My assessment of the potential effects from construction sediment and operational phase stormwater discharges on coastal avifauna habitat and food resources was informed by the outputs of the marine ecology assessment<sup>1</sup> (which is discussed by Dr Kelly in his evidence).
23. I assessed the level of the Project's potential adverse effects on coastal avifauna ecological values following the Environment Institute of Australia and New Zealand (EIANZ) impact assessment guidelines<sup>2</sup>, which uses an assessment matrix (refer to Table 15 in Appendix 1) that incorporates ecological value (Table 16 in Appendix 1) and effect magnitude (Table 17 in Appendix 1). For the purpose of this assessment, I took a species rather than habitat focus, and as such the population criteria (text italicised and bolded in Table 17) has been applied for the assessment of effects. The population proportion thresholds that have been applied to each magnitude level are as follows:
- (a) Very High: >50% of the population affected;
  - (b) High: 20-50% of the population affected;
  - (c) Moderate: 10-20% of the population affected;
  - (d) Low: 1-10% of the population affected;
  - (e) Negligible: <1% of the population affected.
24. For the purpose of this assessment, I determined the magnitude of effect at the local scale; that being the wider Whangarei Harbour. This area includes the coastline and harbour waters to the west of a line drawn from Busby Head in the north to Ruakaka Estuary in the south. This scale was deemed appropriate based on the habitat types within that area and the manner in which the species being assessed use those habitats and is consistent with the "system-wide approach" under Policy D.2.18(5) of the proposed Northland Regional Plan.

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<sup>1</sup> Coast & Catchment (2022). Northport expansion project: Assessment of marine ecological effects. Report No. 2021-24 prepared by Coast & Catchment for Northport Ltd.

<sup>2</sup> Roper-Lindsay, J., Fuller, S. A., Hooson, S., Sanders, M. D., & Ussher, G. T. (2018). Ecological impact assessment (Ecia). EIANZ guidelines for use in New Zealand: Terrestrial and freshwater ecosystems (2nd ed.). Environment Institute of Australia and New Zealand.

25. As noted in Section 2.2.1.2 of Boffa Miskell (2022a), due to timing constraints the original coastal avifauna assessment did not include analysis of winter 2022 wading bird survey data. Rather, an update of the assessment based on all four seasons of wading bird data (i.e. spring / summer 2017/18 and 2019/20, winter 2021 and 2022) was subsequently prepared (Boffa Miskell 2022b). As such, it is the results of the updated assessment that are presented here in my evidence. The original findings in my report have not materially changed as a result of the winter 2022 wading bird survey data analysis. That data provides additional robustness to my assessment.

## **OVERVIEW OF THE EXISTING ENVIRONMENT**

### **Wider Whangarei Harbour**

26. The Whangarei Harbour is approximately 100 km<sup>2</sup> in area. There is a diversity of habitats available in the wider harbour for coastal avifauna, including:
- (a) Saltmarsh and mangrove communities that provide important breeding and feeding habitat for banded rail, fernbird, herons, and shag species.
  - (b) Several islands on which seabirds breed (e.g. grey-faced petrel, kororā, white-fronted tern and red-billed gull).
  - (c) High tide roost sites for wading birds (e.g. Port Whangarei, Portland, Skull Creek, Takahiwai, Marsden Bay, Northern Harbour and Airport, and Ruakaka).
  - (d) Extensive intertidal mudflats (approximately 4,600 ha) provide foraging habitat for wading and coastal birds. Within the lower harbour, approximately 58% of the marine area habitat is intertidal flats.
27. Given the diversity and extent of available habitats, it is not surprising that a total of 73 bird species, comprising 21 introduced and 53 native species, have been recorded in the wider Whangarei Harbour area (refer to Boffa Miskell (2022a) Appendix 5 for complete species list). Of the 53 native species, 37 are primarily associated with freshwater, coastal or oceanic habitats.

### **Marsden Bay – Northport**

28. To the immediate west of Northport, a Significant Ecological Area (SEA; “Area C”) has been identified in the Northland Regional Plan. The area is described in Northland Regional Council’s Significant Ecological Marine Area Assessment Sheet<sup>3</sup> as follows:

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<sup>3</sup> <https://www.nrc.govt.nz/media/etyjek2d/whangareiharboursignificantecologicalmarineareaassessmentsheet.pdf>

This area comprises shallow intertidal and subtidal sandy soft bottom habitats stretching from One Tree Point to Marsden Bay. These habitats are flushed with considerable oceanic waters on incoming tides as well as the nutrients and plankton of the harbour waters. In the subtidal part of this area, in most years, scallops can be found there. Seagrass beds are returning to this area following a trend in the last four years in much of the harbour habitats suitable for seagrass. These shellfish and seagrass communities and associated benthic invertebrates are a major food source for shorebirds and a significant nursery and feeding area for many coastal fish species.

29. A total of 22 species were recorded during the wading bird surveys for the project, including five *Threatened* and 12 *At Risk* species (Table 1).

**Table 1: Native coastal avifauna species recorded during the Northport wading bird surveys**

SPECIES		SPP CODE	THREAT CLASSIFICATION <sup>4</sup>
Black-fronted tern	<i>Chlidonias albostratus</i>		<i>Threatened – Nationally Endangered</i>
Reef heron	<i>Egretta sacra sacra</i>	RF	<i>Threatened - Nationally Endangered</i>
Caspian tern	<i>Hydroprogne caspia</i>	CTe	<i>Threatened - Nationally Vulnerable</i>
Northern NZ dotterel	<i>Charadrius obscurus aquilonius</i>	NZD	<i>Threatened - Nationally Increasing</i>
Wrybill	<i>Anarhynchus frontalis</i>	Wry	<i>Threatened - Nationally Increasing</i>
Banded dotterel	<i>Charadrius bicinctus bicinctus</i>	BDo	<i>At Risk - Declining</i>
Bar-tailed godwit	<i>Limosa lapponica baueri</i>	BtG	<i>At Risk - Declining</i>
Black-billed gull	<i>Larus bulleri</i>		<i>At Risk - Declining</i>
Lesser knot	<i>Calidris canutus rogersi</i>	Lkn	<i>At Risk - Declining</i>
Red-billed gull	<i>Larus novaehollandiae scopulinus</i>	RbG	<i>At Risk - Declining</i>
South Island pied oystercatcher	<i>Haematopus finschi</i>	SIPO	<i>At Risk - Declining</i>
White-fronted tern	<i>Sterna s. striata</i>	WfT	<i>At Risk - Declining</i>
Pied shag	<i>Phalacrocorax v. varius</i>	Psh	<i>At Risk - Recovering</i>
Variable oystercatcher	<i>Haematopus unicolor</i>	VOC	<i>At Risk - Recovering</i>
Black shag	<i>Phalacrocorax carbo novaehollandiae</i>	BSh	<i>At Risk - Relict</i>
Little shag	<i>Phalacrocorax melanoleucos brevirostris</i>	LSh	<i>At Risk - Relict</i>
Royal spoonbill	<i>Platalea regia</i>	RSp	<i>At Risk - Naturally Uncommon</i>
Pied stilt	<i>Himantopus h. leucocephalus</i>	PSt	<i>Not Threatened</i>
Southern black-backed gull	<i>Larus d. dominicanus</i>	SBBG	<i>Not Threatened</i>
White-faced heron	<i>Egretta novaehollandiae</i>	WfH	<i>Not Threatened</i>
Eastern curlew	<i>Numenius madagascariensis</i>		<i>Vagrant</i>
Asiatic whimbrel	<i>Numenius phaeopus variegatus</i>		<i>Migrant</i>

## One Tree Point to CINZ

30. The general patterns of distribution and abundance of the major shorebird groups recorded during the Northport wading bird surveys were as follows:

<sup>4</sup> Robertson et al. (2021). Conservation status of New Zealand birds, 2021. *New Zealand Threat Classification Series No. 36*. Department of Conservation.



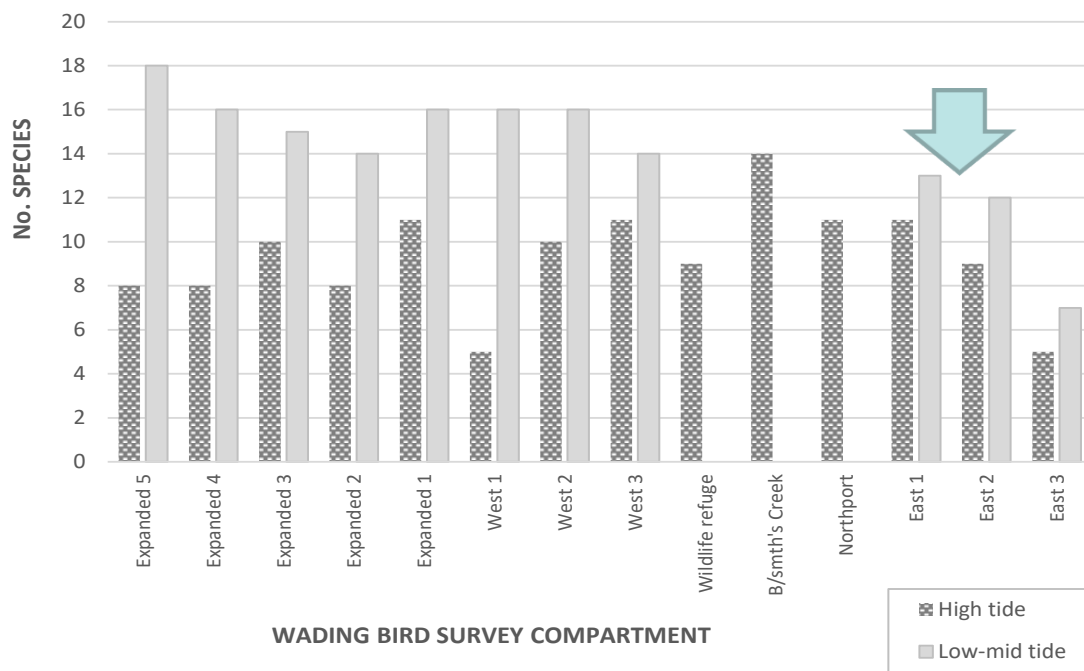
- (a) Dotterels were recorded along much of the coastal margin from One Tree Point to CINZ, as well as the Northport site (Map 2).
- (b) International migrant waders (bar-tailed godwit and lesser knot) were recorded primarily around the Blacksmith's Creek area, though a few godwit were also recorded further west up to One Tree Point and to the east of Northport. A single eastern curlew and Asiatic whimbrel were both recorded at the northern end of the bay, in survey areas Expanded 5 and 3 respectively (Map 3).
- (c) Oystercatchers and stilt were primarily recorded to the east of Northport and adjacent to the Marsden Cove Marina channel but extended all the way to One Tree Point (Map 4).
- (d) Gulls and terns were recorded dispersed along the coast, with large concentrations of red-billed gull to the east of Northport (Map 5).
- (e) Heron and spoonbill were recorded in relatively low numbers along the coast, primarily to the west of Northport (Map 6).
- (f) Shags were recorded in low numbers and primarily associated with the port, though a few birds were recorded in the Blacksmith's Creek / Wildlife Refuge area and along to One Tree Point (Map 7).

### **Eastern Expansion Area**

- 31. Comprehensive analyses of the coastal avifauna data collected for the Northport project across all the survey compartments (refer to Map 1) was included in the assessment documents (Boffa Miskell 2022a & 2022b). As such, rather than repeating all that analyses in this evidence, below I summarise the general patterns of activity as they relate to the area that will be impacted by the proposed eastern expansion.

#### *Species diversity*

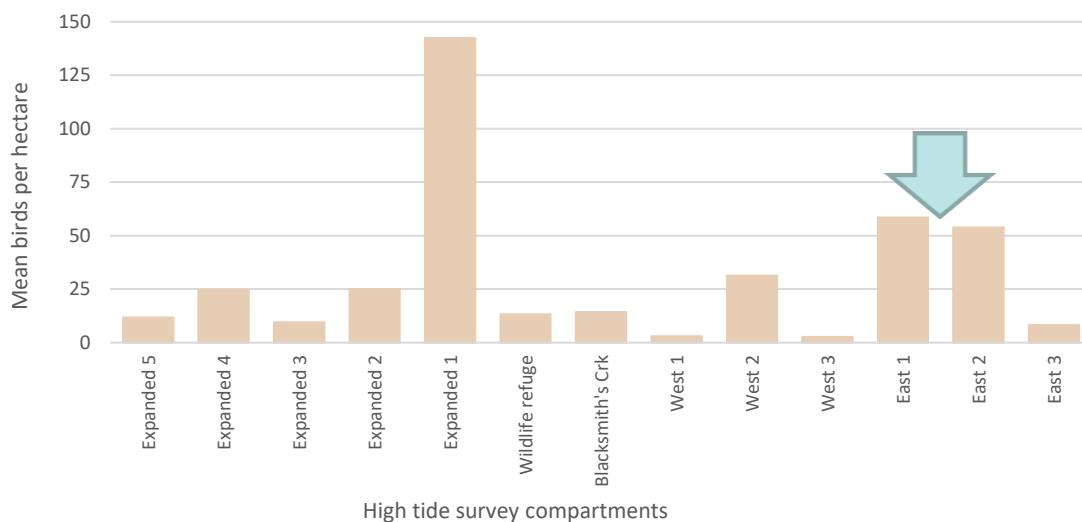
- 32. Species diversity recorded during the wading bird surveys varied across the compartments (see Figure 1), with higher diversity recorded at all sites during the low-mid tide phase. In general, the eastern compartments recorded lower species diversity during the low-mid tide surveys relative to the other compartments.



**Figure 1: Species diversity recorded during the wading bird survey periods. (Green arrow denotes the survey compartments in which the proposed reclamation is located)**

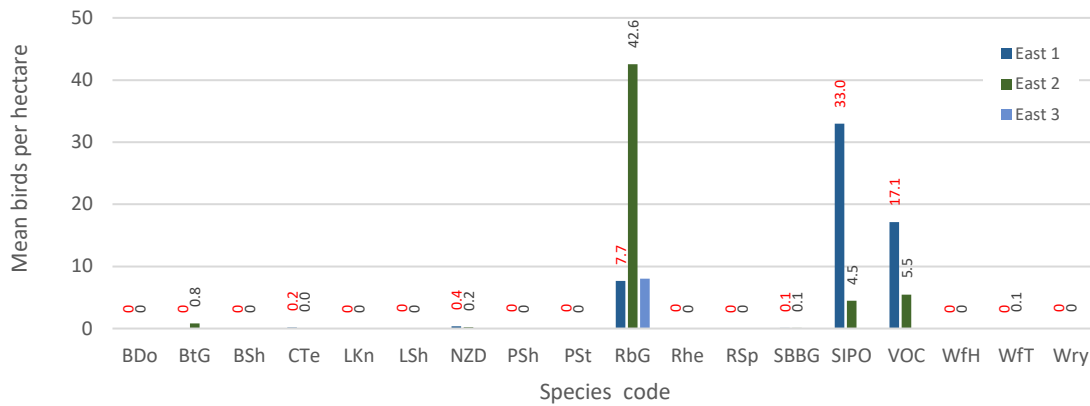
### High tide activity

33. Similar levels of bird densities were recorded in East 1 and East 2 during high tide (refer Figure 2); with the highest overall density recorded in Expanded 1 (to the west of Northport)



**Figure 2: Mean density of birds recorded during all high tide surveys. (Green arrow denotes the survey compartments in which the proposed reclamation is located)**

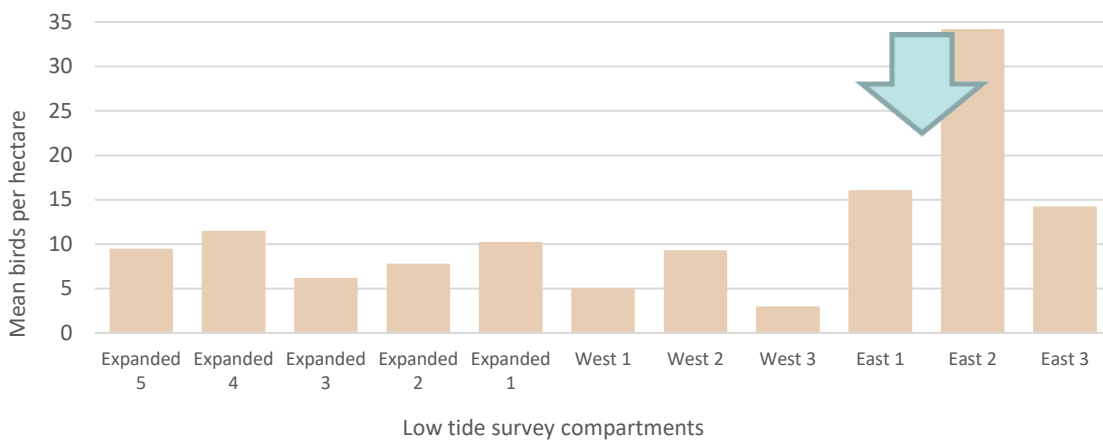
34. The species for which the highest mean densities were recorded during high tide in East 1 were SIPO and variable oystercatcher (Figure 3), and red-billed gull in East 2 (Figure 3).



**Figure 3: Mean birds recorded per hectare during high tide surveys at the eastern sites during all survey periods, with data labels provided for compartments East 1 (red) and East 2 (black). (Refer to Table 1 for species codes)**

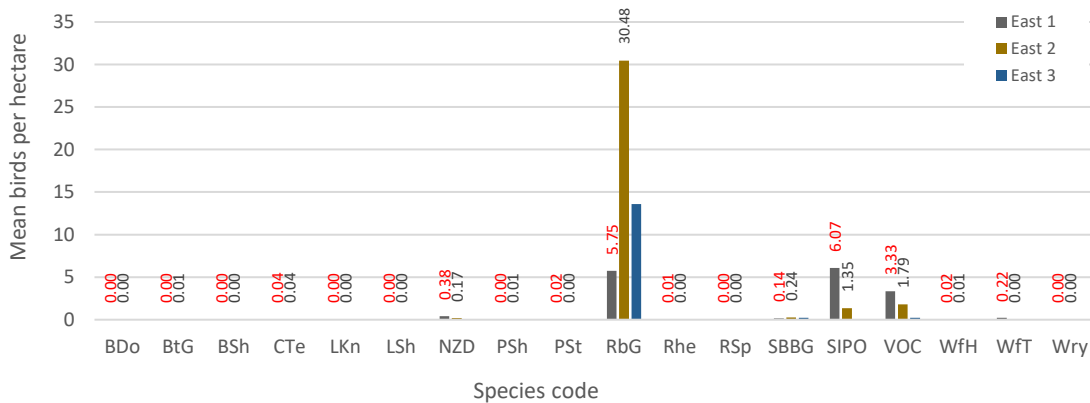
### Low-mid tide activity

35. The highest bird densities during the low-mid tide were recorded within the eastern compartments (Figure 4), with the highest overall density being recorded in East 2.



**Figure 4: Mean density of birds recorded during low/mid tide surveys over all the survey periods. (Green arrow denotes the survey compartments in which the proposed reclamation is located)**

36. The species for which the highest mean densities were recorded during low-mid tide in East 1 were SIPO, followed by red-billed gull and variable oystercatcher (Figure 5). Whereas in East 2, red-billed gull recorded the highest density (refer to Figure 5).



**Figure 5: Mean birds recorded per hectare during low and mid tide surveys at the eastern sites over all the survey periods, with data labels provided for compartments East 1 (red) and East 2 (black). (Refer to Table 1 for species codes)**

### *Nesting*

37. No species were recorded nesting within the eastern compartments that will be directly impacted by the reclamation. However, a pair of variable oystercatcher was recorded breeding on top of the tug bay revetment (refer to Map 8).

### *Overall*

38. Overall, the coastal areas surveyed from One Tree Point to CINZ jetty, the eastern compartments where the proposed expansion will occur, were found to provide habitat for the some of the main concentrations of variable oystercatcher, SIPO and red-billed gull.

## **ASSESSMENT OF EFFECTS ON COASTAL AVIFAUNA**

### **Direct / permanent loss of habitat**

#### *Construction*

39. Approximately 6.6 ha of habitat above chart datum (CD) and 5.1 ha of habitat below CD will be lost beneath the proposed reclamation.
40. The proportion of the local Whangarei Harbour population for each species recorded within the footprint of the eastern reclamation (i.e. East 1 and East 2 compartments) during low-mid and high tides was used to determine the magnitude of effect, and therefore the overall level of effect associated with the permanent loss of habitat as a result of construction of the project (Table 2).

**Table 2: Assessment of potential effects of permanent habitat loss on the local coastal avifauna populations without mitigation (NB: Values in red indicate the higher of the two proportions and on which the magnitude has been determined)**

SPECIES	EST. WHANGAREI HBR POP	PROPORTION WHANG. HBR POP WITHIN E1 &/or E2		VALUE <sup>5</sup>	MAGNITUDE OF EFFECT <sup>6</sup>	LEVEL OF EFFECT <sup>7</sup>
		Low-mid tide	High tide			
Banded dotterel	~700 birds	0.01%	0	High	Negligible	Very Low
Bar-tailed godwit	~2,800 birds	0.00%	0.05%	High	Negligible	Very Low
Black shag	>10 birds	0	0	-	-	-
Caspian tern	50-100 pairs	0.35%	0.47%	Very High	Negligible	Low
Lesser knot	~800 birds	0	0	-	-	-
Little shag	>10 birds	0	0.21%	Moderate	Negligible	Very Low
NZ dotterel	~80 birds	3.6%	1.6%	Very High	Low	Moderate
Pied shag	>50 birds	0.1%	0.04%	Moderate	Negligible	Very Low
Pied stilt	~800 birds	0.01%	0.003%	Low	Negligible	Very Low
Red-billed gull	>1,190 pairs	5.8%	4.08%	High	Low	Low
Reef heron	>10 pairs?	0.2%	0.11%	Very High	Negligible	Low
Royal spoonbill	~40 birds	0	0	-	-	-
SBBG	Abundant	0.16%	0.05%	Low	Negligible	Very Low
SIPO	~2,500 birds	1.6%	3.4%	High	Low	Low
VOC	~350 birds	7.4%	14.3%	Moderate	Moderate	Moderate
White-faced heron	~100 birds	0.1%	0	Low	Negligible	Very Low
White-fronted tern	>100 birds	1.3%	0.11%	High	Low	Low
Wrybill	~150 birds	0.02%	0.03%	Very High	Negligible	Low

41. Despite a greater proportion of the New Zealand dotterel population being recorded within the proposed reclamation area during low-mid tide (3.6%) than high tide (1.6%), I consider the magnitude of effect in relation to the loss of foraging habitat will in fact be Negligible. This determination has been formed with regard to the benthic macroinvertebrate data that was collected, and which identified a more diverse and abundant prey source on the western side of Northport (refer to Map 9) than that on the eastern side. Consequently, I do not consider that the loss of the intertidal habitat under the eastern expansion will detrimentally impact the foraging ability and food supply of the Whangarei population of New Zealand dotterel.
42. The overall Moderate level of effect from permanent habitat loss on New Zealand dotterel and variable oystercatcher is associated with the permanent loss of high tide habitat, the proportion of the local populations utilising the high tide roost area, and the relative scarcity of such habitat in the wider Whangarei Harbour.

<sup>5</sup> Refer to Table 14 (page 13).

<sup>6</sup> Refer to Table 15 (page 13) and criteria listed in paragraphs 22(a)-(e) (page 4).

<sup>7</sup> Refer to Table 13 (page 13).

43. As such, measures were developed to address this potential Moderate level of effect on New Zealand dotterel and variable oystercatcher through the creation of high tide roosting habitat on the western side of Northport (refer to Paragraphs 70 to 75 below).
44. Thus, based on the re-creation of the sandbank on the western side of Northport prior to construction commencing, and its ongoing maintenance (for the life of the consent), the potential effect of the loss of roosting habitat associated with the eastern reclamation will be Low for New Zealand dotterel and variable oystercatcher.

### **Injuries and / or mortalities**

45. The mobile nature of most avifauna species means that the potential for direct mortalities associated with construction or operational activities are likely to be confined to birds that may be breeding or, in the case of kororā, moulting within the Project footprint. I have proposed appropriate measures to safeguard against these effects eventuating, and these have been incorporated into the draft conditions proposed by Northport.

### *Construction*

46. The species for which potential for injuries and / or mortalities may result from the construction of the Project relate to variable oystercatcher and kororā that may be nesting or, in the case of kororā only, moulting within the Project footprint. Such effects can be avoided<sup>8</sup> through pre-construction surveys and establishment of exclusion zone zones around breeding (and moulting) birds. On that basis, I determined that the potential effects of injuries and / or mortalities on the local populations of variable oystercatcher and kororā will be Very Low (Table 3).

**Table 3: Assessment of potential effects of construction mortalities on the local coastal avifauna populations**

SPECIES	EST. WHANGAREI HBR POP	ECOLOGICAL VALUE <sup>5</sup>	MAGNITUDE OF EFFECT <sup>6</sup>	LEVEL OF EFFECT <sup>7</sup>
Kororā	>100 birds	High	Negligible	Very Low
VOC	~350 birds	Moderate	Negligible	Very Low

### *Operational*

47. To date, variable oystercatcher, pied stilt and northern NZ dotterel have all been recorded breeding on the existing and operational Northport site (refer to Map 8). As such, I consider level of effects of injuries and / or mortalities during the operational phase of the eastern expansion on the local (wider Whangarei Harbour) coastal avifauna

<sup>8</sup> Further details of these measures are provided in Section 6.2.1 of Boffa Miskell (2022a).

populations of species breeding on the existing Northport will be Low to Very Low (Table 4).

**Table 4: Assessment of potential effects of operational mortalities of nesting birds on local coastal avifauna populations**

SPECIES	EST. WHANGAREI HBR POP	BREEDING ON NORTHPORT	ECOLOGICAL VALUE <sup>5</sup>	MAGNITUDE OF EFFECT <sup>6</sup>	LEVEL OF EFFECT <sup>7</sup>
NZ dotterel	~80 birds	1 pair	Very High	Negligible	Low
Pied stilt	~800 birds	1 pair	Low	Negligible	Very Low
VOC	~350 birds	2 pairs	Moderate	Negligible	Very Low

## Disturbance and displacement

48. Indirect disturbance to foraging, roosting or nesting birds could occur during both the construction (e.g. noise, vibration and plant movement) and operational (e.g. plant movement on the Port and potential increased recreational pressure on the area of remaining beach) phases of the Project.

### Construction

49. Using a flight initiation distance (FID)<sup>9</sup> of 45 m<sup>10</sup>, the zone of influence associated with construction disturbance will potentially effect species utilising compartments East 1 and East 2. The proportion of the local Whangarei populations for each species utilising these compartments during low-mid and high tide were then used to determine the potential level of effect associated with construction disturbance and displacement (Table 5).
50. With regards Northern NZ dotterel, despite the proportion of the local population foraging within East 3, I in fact consider the magnitude of effect in relation to construction disturbance to be Negligible. This is based on the availability of a more diverse and abundant food source nearby on the western side of Northport (refer to Map 9), such that any birds that are disturbed by construction will not have to expend significant amounts of energy to locate food. Rather, the overall Moderate level of effect that has been identified for New Zealand dotterel is in relation to construction phase disturbance to birds roosting on the eastern high tide habitat.
51. With respect to underwater noise disturbance associated with piling activities, foraging kororā will be exposed to the greatest disturbance due to the amount of time they spend underwater. Kororā have been reported breeding along the north-eastern shoreline of the Whangarei Harbour entrance, including around Reotahi Bay to High Island area,

<sup>9</sup> Defined as the distance at which a bird flees from perceived danger.

<sup>10</sup> As noted in Section 6.3 of Boffa Miskell (2022a), this distance is the highest for the species which FID's have been measured and which were recorded within or adjacent to the Project site.

Calliope Island, Home Point to Busby Head and Smugglers Bay.<sup>11,12,13</sup> As such, it is likely that most birds forage outside of the harbour, and that less than 10% of the local population would forage within the Whangarei Harbour, and thereby only a small proportion of the local population would be exposed to the potential effects of underwater noise disturbance when the hydraulic impact hammer is being used.

**Table 5: Assessment of potential effects of construction disturbance and displacement on the local coastal avifauna populations without mitigation** (NB: Values in red indicate the higher of the two proportions and on which the magnitude has been determined)

SPECIES	EST. WHANGAREI HBR POP	PROPORTION WHANG. HBR POP WITHIN E1 &/or E2		ECOLOGICAL VALUE <sup>5</sup>	MAGNITUDE OF EFFECT <sup>6</sup>	LEVEL OF EFFECT <sup>7</sup>
		Low-mid tide	High tide			
Banded dotterel	~700 birds	0.01%	0	High	Negligible	Very Low
Bar-tailed godwit	~2,800 birds	0.00%	0.05%	High	Negligible	Very Low
Black shag	>10 birds	0	0	-	-	-
Caspian tern	50-100 pairs	0.35%	0.47%	Very High	Negligible	Low
Lesser knot	~800 birds	0	0	-	-	-
Little shag	>10 birds	0	0.21%	Moderate	Negligible	Very Low
NZ dotterel	~80 birds	3.6%	1.6%	Very High	Low	Moderate
Pied shag	>50 birds	0.1%	0.04%	Moderate	Negligible	Very Low
Pied stilt	~800 birds	0.01%	0.003%	Low	Negligible	Very Low
Red-billed gull	>1,190 pairs	5.8%	4.075%	High	Low	Low
Reef heron	>10 pairs?	0.2%	0.11%	Very High	Negligible	Low
Royal spoonbill	~40 birds	0	0	-	-	-
SBBG	Abundant	0.16%	0.05%	Low	Negligible	Very Low
SIPO	~2,500 birds	1.6%	3.4%	High	Low	Low
VOC	~350 birds	7.4%	14.3%	Moderate	Moderate	Moderate
White-faced heron	~100 birds	0.1%	0	Low	Negligible	Very Low
White-fronted tern	>100 birds	1.3%	0.11%	High	Low	Low
Wrybill	~150 birds	0.02%	0.03%	Very High	Negligible	Low
Kororā	>100 birds	-	-	High	Low	Low

52. The overall Moderate level of effect from construction on New Zealand dotterel and variable oystercatcher is being driven by the temporary disturbance to birds roosting during high tide. As such, measures were developed to address this potential level of

<sup>11</sup> Munro, M. (1971). Birds of Whangarei Harbour. *Notornis*, 18(3), 202–206.

<sup>12</sup> Parrish, G. R. (1985). *Whangarei Harbour wildlife survey* (NZ Wildlife Service Technical Report No. 8). New Zealand Wildlife Service, Department of Internal Affairs.

<sup>13</sup> Pierce, R. J. (2005). *General patterns of bird use of Whangarei Harbour, March 2005* (Wildland Consultants Report No. 1047). Prepared by Wildland Consultants Ltd for Northland Regional Council.



effect on New Zealand dotterel and variable oystercatcher through the creation of high tide roosting habitat on the western side of Northport (refer paragraphs 70 to 75 below).

53. Thus, based on the re-creation of the sandbank on the western side of Northport prior to construction commencing, the potential effect of the loss of roosting habitat associated construction disturbance will be Low for New Zealand dotterel and variable oystercatcher.
54. While an overall Low level of effect from underwater noise disturbance associated with the use of hydraulic impact hammer is anticipated, it is recommended that some form of underwater noise mitigation may need to be implemented during those piling activities to ensure a safe underwater passage route (i.e. to ensure that underwater noise levels do not exceed an effects threshold for kororā) for birds traveling past the piling works. Details of the form of noise mitigation to be used will be provided in the project's Avifauna section of the CEMP.

#### *Operational*

55. With regards to operational disturbance, the 45 m disturbance zone around the Project footprint was applied. In addition, there may also be an effect on those birds currently roosting and / or foraging within compartment East 3 due to displacement by birds from compartments East 1 and East 2. There is also the potential for disturbance and displacement of species in compartment East 3 due to potential increased recreational pressure on that area following the construction of the eastern reclamation.
56. As such, the proportion of the local Whangarei Harbour population for each species recorded in East 3 (adjacent to the eastern reclamation footprint) during high and low-mid tides was used to determine the magnitude of effect, and therefore the overall level of potential effect associated with operational disturbance of the project on those local Whangarei Harbour populations (Table 6). Overall, I determined that the potential operational effects on local (Whangarei Harbour) coastal avifauna species will be Low to Very Low.

**Table 6: Assessment of potential effects of operational disturbance and displacement on the local coastal avifauna populations (NB: Values in red indicate the higher of the two proportions and on which the magnitude has been determined)**

SPECIES	EST. WHANGAREI HBR POP	PROPORTION WHANG. HBR POP WITHIN E3		ECOLOGICAL VALUE <sup>5</sup>	MAGNITUDE OF EFFECT <sup>6</sup>	LEVEL OF EFFECT <sup>7</sup>
		Low-mid tide	High tide			
Banded dotterel	~700 birds	0	0	-	-	-
Bar-tailed godwit	~2,800 birds	0	0	-	-	-
Black shag	>10 birds	0	0	-	-	-
Caspian tern	50-100 pairs	0.013%	0	Very High	Negligible	Low
Lesser knot	~800 birds	0	0	-	-	-
Little shag	>10 birds	0	0	-	-	-
NZ dotterel	~80 birds	0.05%	0.03%	Very High	Negligible	Low
Pied shag	>50 birds	0.05%	0	Moderate	Negligible	Very Low
Pied stilt	~800 birds	0	0	-	-	-
Red-billed gull	>1,190 pairs	0.99%	0.51%	High	Negligible	Very Low
Reef heron	>10 pairs?	0	0	-	-	-
Royal spoonbill	~40 birds	0	0	-	-	-
SBBG	Abundant	0.037%	0.013%	Low	Negligible	Very Low
SIPO	~2,500 birds	0.002%	0	-	-	-
VOC	~350 birds	0.113%	0.036%	Moderate	Negligible	Very Low
White-faced heron	~100 birds	0	0	-	-	-
White-fronted tern	>100 birds	0	0	-	-	-
Wrybill	~150 birds	0	0.017%	Very High	Negligible	Low

## Food supply and foraging ability

### Construction

57. Sediment mobilisation and increased turbidity generated by the dredging process has the potential to adversely affect marine biota in surrounding areas. The potential indirect effects on coastal avifauna are:
  - (a) Food supply – Changes in ability of wading shorebirds to access food or a decrease in food supply due to the deposition of sediment in the intertidal foraging areas; and / or
  - (b) Foraging ability – Changes in the ability of visual predators (e.g. species such as penguins, shags and terns) to detect prey in the water due to increased suspended sediment (TSS) in the water column.
58. Based on the depth and duration of the suspended and deposited sediment to the east of Northport associated with the dredging activity, and the effects of this on the marine fauna that form the diet of the coastal birds, I consider the magnitude of effects to be

Negligible for all species. As such, I determined the potential effects on food supply and foraging activity on local (Whangarei Harbour) coastal avifauna species to be Low to Very Low (Table 7).

**Table 7: Assessment of potential effects of construction sediment suspension and deposition on food supply and foraging activity of local coastal avifauna populations**

SPECIES	EST. WHANGAREI HBR POP	ECOLOGICAL VALUE <sup>5</sup>	MAGNITUDE OF EFFECT <sup>6</sup>	LEVEL OF EFFECT <sup>7</sup>
Banded dotterel	~700 birds	High	Negligible	Very Low
Bar-tailed godwit	~2,800 birds	High	Negligible	Very Low
Black shag	>10 birds	Moderate	Negligible	Very Low
Caspian tern	50-100 pairs	Very High	Negligible	Low
Lesser knot	~800 birds	High	Negligible	Very Low
Little shag	>10 birds	Moderate	Negligible	Very Low
NZ dotterel	~80 birds	Very High	Negligible	Low
Pied shag	>50 birds	Moderate	Negligible	Very Low
Pied stilt	~800 birds	Low	Negligible	Very Low
Red-billed gull	>1,190 pairs	High	Negligible	Very Low
Reef heron	>10 pairs?	Very High	Negligible	Low
Royal spoonbill	~40 birds	Moderate	Negligible	Very Low
SBBG	Abundant	Low	Negligible	Very Low
SIPO	~2,500 birds	High	Negligible	Very Low
VOC	~350 birds	Moderate	Negligible	Very Low
White-faced heron	~100 birds	Low	Negligible	Very Low
White-fronted tern	>100 birds	High	Negligible	Very Low
Wrybill	~150 birds	Very High	Negligible	Low
Kororā	>100 birds	High	Negligible	Very Low

### Artificial lighting

59. There is already a level of artificial lighting present in the existing environment (e.g. Northport, CINZ and residential development). The proposed lighting for the Project will not significantly increase the existing ambient levels or increase the range of species that might be affected.
60. However, there will be a small cumulative increase in lighting on the coastal margin and as a matter of good practice I recommend efforts to minimise construction and operational lighting where it can reasonably be carried out. These measures are to be specified in the Construction Environmental Management Plan, and in my view would include:
  - (a) Lighting should be kept to the minimum required for safe operation; and

- (b) Wherever practicable lighting should be directed downwards and shielded to reduce light projecting horizontally towards coastal waters and avoid light projecting vertically to passing birds.

61. Based on the above measures, I consider the magnitude of potential adverse effect to be Negligible for all species and have determined the potential effects of attraction to artificial lighting causing fatalities or impacting foraging of local populations of coastal avifauna species as Low to Very Low (Table 8).

**Table 8: Assessment of potential effects of attraction to operational artificial lighting causing fatalities on local populations of coastal avifauna**

SPECIES	EST. WHANGAREI HBR POP	ECOLOGICAL VALUE <sup>5</sup>	MAGNITUDE OF EFFECT <sup>6</sup>	LEVEL OF EFFECT <sup>7</sup>
Banded dotterel	~700 birds	High	Negligible	Very Low
Bar-tailed godwit	~2,800 birds	High	Negligible	Very Low
Black shag	>10 birds	Moderate	Negligible	Very Low
Caspian tern	50-100 pairs	Very High	Negligible	Low
Lesser knot	~800 birds	High	Negligible	Very Low
Little shag	>10 birds	Moderate	Negligible	Very Low
NZ dotterel	~80 birds	Very High	Negligible	Low
Pied shag	>50 birds	Moderate	Negligible	Very Low
Pied stilt	~800 birds	Low	Negligible	Very Low
Red-billed gull	>1,190 pairs	High	Negligible	Very Low
Reef heron	>10 pairs?	Very High	Negligible	Low
Royal spoonbill	~40 birds	Moderate	Negligible	Very Low
SBBG	Abundant	Low	Negligible	Very Low
SIPO	~2,500 birds	High	Negligible	Very Low
VOC	~350 birds	Moderate	Negligible	Very Low
White-faced heron	~100 birds	Low	Negligible	Very Low
White-fronted tern	>100 birds	High	Negligible	Very Low
Wrybill	~150 birds	Very High	Negligible	Low
Grey-faced petrel	<100 pairs	Low	Negligible	Very Low

## Pollution

### Construction

62. Dredging operations can potentially release toxins into the marine environment through the remobilisation of contaminated sediments.
63. Overall, the Marine Ecology assessment (Coast & Catchment 2022) for the eastern reclamation proposal determined that the magnitude of adverse effect of remobilised contaminants on the marine habitat and biota would be negligible for all potentially affected species. As such, I consider the magnitude of the potential adverse

effect to be Negligible for all coastal avifauna species, and therefore determined the potential effects of pollution associated with the construction of the eastern reclamation on local populations to be Low to Very Low (Table 9).

**Table 9: Assessment of potential effects of construction-related pollution on local populations of coastal avifauna**

SPECIES	EST. WHANGAREI HBR POP	ECOLOGICAL VALUE <sup>5</sup>	MAGNITUDE OF EFFECT <sup>6</sup>	LEVEL OF EFFECT <sup>7</sup>
Banded dotterel	~700 birds	High	Negligible	Very Low
Bar-tailed godwit	~2,800 birds	High	Negligible	Very Low
Black shag	>10 birds	Moderate	Negligible	Very Low
Caspian tern	50-100 pairs	Very High	Negligible	Low
Lesser knot	~800 birds	High	Negligible	Very Low
Little shag	>10 birds	Moderate	Negligible	Very Low
NZ dotterel	~80 birds	Very High	Negligible	Low
Pied shag	>50 birds	Moderate	Negligible	Very Low
Pied stilt	~800 birds	Low	Negligible	Very Low
Red-billed gull	>1,190 pairs	High	Negligible	Very Low
Reef heron	>10 pairs?	Very High	Negligible	Low
Royal spoonbill	~40 birds	Moderate	Negligible	Very Low
SBBG	Abundant	Low	Negligible	Very Low
SIPO	~2,500 birds	High	Negligible	Very Low
VOC	~350 birds	Moderate	Negligible	Very Low
White-faced heron	~100 birds	Low	Negligible	Very Low
White-fronted tern	>100 birds	High	Negligible	Very Low
Wrybill	~150 birds	Very High	Negligible	Low
Kororā	>100 birds	High	Negligible	Very Low
Grey-faced petrel	<100 pairs	Low	Negligible	Very Low

### Operational

64. Stormwater run-off from the operating port has the potential to collect and transport pollutants in the receiving marine environment. The existing stormwater system will be extended and upgraded to accommodate runoff from the proposed reclamation area.
65. There are nine consents<sup>14</sup> for stormwater discharges to the Marsden Bay area that discharge from multiple outfalls along the shore.
66. As noted in Section 6.4 of the marine ecology assessment<sup>1</sup> with respect to Northport's stormwater discharges, *"results from the monitoring indicate that Northport has displayed a high level of compliance with its conditions of consent, and that the quality of discharged stormwater is reasonably good. Little, if any, need for dilution in the mixing*

<sup>14</sup> Stormwater discharge consents are held by Channel Infrastructure, Northport, Northland Port Corporation, Marsden Cove Ltd, Marsden Maritime Holdings Ltd and Whangārei District Council).

zone was required to achieve compliance, or reduce concentrations to levels below ANZG (2018) 95% protection guideline values (Poynter, 2021)”.

67. Thus, based on the available information in relation to stormwater contaminants, the marine ecology assessment<sup>1</sup> concluded that Northport’s current discharge poses little ecological risk.
68. Given the intended use of the proposed reclamation area for container handling, the stormwater contaminant loads from the proposed reclamation are expected to be relatively low.<sup>15</sup> Discharge water quality is therefore expected to be similar to, or better than, that provided by the existing system (due to inputs of cleaner stormwater), but discharge loads may increase slightly.
69. Based on the above measures, I consider the magnitude of the potential adverse effect to be Negligible for all species, and have therefore determined the potential effects of pollution associated with the operation of the eastern reclamation on local (wider Whangarei Harbour) coastal avifauna species as Low to Very Low (Table 10).

**Table 10: Assessment of potential effects of pollution on local populations of coastal avifauna**

SPECIES	EST. WHANGAREI HBR POP	ECOLOGICAL VALUE <sup>5</sup>	MAGNITUDE OF EFFECT <sup>6</sup>	LEVEL OF EFFECT <sup>7</sup>
Banded dotterel	~700 birds	High	Negligible	Very Low
Bar-tailed godwit	~2,800 birds	High	Negligible	Very Low
Black shag	>10 birds	Moderate	Negligible	Very Low
Caspian tern	50-100 pairs	Very High	Negligible	Low
Lesser knot	~800 birds	High	Negligible	Very Low
Little shag	>10 birds	Moderate	Negligible	Very Low
NZ dotterel	~80 birds	Very High	Negligible	Low
Pied shag	>50 birds	Moderate	Negligible	Very Low
Pied stilt	~800 birds	Low	Negligible	Very Low
Red-billed gull	>1,190 pairs	High	Negligible	Very Low
Reef heron	>10 pairs?	Very High	Negligible	Low
Royal spoonbill	~40 birds	Moderate	Negligible	Very Low
SBBG	Abundant	Low	Negligible	Very Low
SIPO	~2,500 birds	High	Negligible	Very Low
VOC	~350 birds	Moderate	Negligible	Very Low
White-faced heron	~100 birds	Low	Negligible	Very Low
White-fronted tern	>100 birds	High	Negligible	Very Low
Wrybill	~150 birds	Very High	Negligible	Low
Kororā	>100 birds	High	Negligible	Very Low
Grey-faced petrel	<100 pairs	Low	Negligible	Very Low

<sup>15</sup> Refer the evidence of Mr Blackburn for an assessment of stormwater treatment and disposal.

## **Recreation of high tide roost habitat**

70. As identified above (Paragraphs 41-43 and 52-53), the re-creation and ongoing maintenance of the sandbank on the western side of Northport prior to construction is proposed to address the potential effects of permanent loss of high tide habitat and disturbance to roosting birds associated with the construction of the eastern reclamation. While this measure will address those effects identified, it was also necessary to assess the potential effects that may result from the implementation of this measure.
71. The location of proposed high tide roost is within the intertidal area of the SEA described in paragraph 28 above, and will result in the removal of an area of foraging habitat. In order to determine the level of this effect, the footprint of the proposed high tide roost was overlaid on the coastal avifauna and benthic macro-invertebrate maps for wading and shorebird species to determine what species that have been recorded within that footprint, and proportion of their local population that constituted. The species recorded within the footprint were northern NZ dotterel (Map 9), bar-tailed godwit (Map 10), lesser knot (Map 11), pied stilt (Map 12), southern black-backed gull (Map 13), white-faced heron (Map 14) and Caspian tern (Table 11).
72. Despite more than 1% of the estimated Whangarei Harbour populations of Caspian tern, NZ dotterel and lesser knot being recorded within the footprint of the proposed high tide roost (refer to Table 11 below), I consider the magnitude of effect in relation to the loss of foraging habitat on those species will in fact be Negligible (rather than Low). This determination was formed on the basis of the benthic macroinvertebrate data that were collected, and which identified a more diverse and abundance prey source further to the west of the proposed high tide roost. Also, with respect to Caspian tern, this species primarily feeds on small surface-swimming fish, and forages much less frequently in the soft mud and shallow water. Consequently, I do not consider that the loss of the intertidal habitat associated with the re-creation of a high tide roost at the proposed location will detrimentally impact the foraging ability and food supply of the New Zealand dotterel, lesser knot or Caspian tern.
73. As such, I determined the potential effects of the re-creation of the high tide roost to the west of Northport on local (wider Whangarei Harbour) coastal avifauna species will be Low to Very Low (Table 11).

**Table 11: Assessment of potential effects of construction and loss of foraging habitat associated with the re-creation of a sandbank on local populations of coastal avifauna**

SPECIES	EST. WHANGAREI HBR POP	MAX No. BIRDS WITHIN FOOTPRINT	PROPORTION OF POP.	ECOLOGICAL VALUE <sup>5</sup>	MAGNITUDE OF EFFECT <sup>6</sup>	LEVEL OF EFFECT <sup>7</sup>
Banded dotterel	~700 birds	-	-	High	-	-
Bar-tailed godwit	~2,800 birds	1	0.04%	High	Negligible	Very Low
Black shag	>10 birds	-	-	Moderate	-	-
Caspian tern	50-100 pairs	1	1% <sup>16</sup>	Very High	Negligible	Low
Lesser knot	~800 birds	50	6%	High	Negligible	Low
Little shag	>10 birds	-	-	Moderate	-	-
NZ dotterel	~80 birds	2	2.5%	Very High	Negligible	Low
Pied shag	>50 birds	-	-	Moderate	-	-
Pied stilt	~800 birds	1	0.1%	Low	Negligible	Very Low
Red-billed gull	>1,190 pairs	-	-	High	-	-
Reef heron	>10 pairs?	-	-	Very High	-	-
Royal spoonbill	~40 birds	-	-	Moderate	-	-
SBBG	Abundant	11	>1%	Low	Negligible	Very Low
SIPO	~2,500 birds	-	-	High	-	-
VOC	~350 birds	-	-	Moderate	-	-
White-faced heron	~100 birds	1	1%	Low	Negligible	Very Low
White-fronted tern	>100 birds	-	-	High	-	-
Wrybill	~150 birds	-	-	Very High	-	-
Kororā	>100 birds	-	-	High	-	-
Grey-faced petrel	<100 pairs	-	-	Low	-	-

## Summary of potential effects

74. A summary of the potential levels of effects on the Whangarei Harbour local populations of coastal avifauna, based on the implementation of the management and mitigation measures identified, is provided in Appendix 2, Table 18.
75. Overall, the potential effects were determined to be Low to Very Low, on the basis that the following measures are implemented:
- (a) The provision and ongoing maintenance of additional high tide roosting habitat for the term of the consent, such as the re-creation of a historic sandbank to function as a high tide roost on the western side of Northport prior to construction commencing.

<sup>16</sup> Based on a conservative approach of assuming 50 pairs (i.e. the lower range of the estimated Whangarei Harbour population).



- (b) The preparation and implementation of an Avifauna section within the project's CEMP to avoid direct impacts and manage kororā and nesting variable oystercatcher; and
- (c) Some form of underwater noise mitigation for all piling activities using hydraulic impact hammer such that a safe underwater passage is maintained for kororā traversing in and out of the harbour.

### Cumulative effects

76. Cumulative effects are concerned with things that will occur, and include two components:
- (a) Effects arising / building up over time; and
  - (b) Effects arising in combination with other effects.
77. On that basis, the effects on coastal avifauna associated with the Berth 4 expansion, CINZ's channel optimisation, Port Nikau marina and Whangarei marina were considered as part of the cumulative effects assessment (Section 7.0 of Boffa Miskell (2022a) and Table 12 below).

**Table 12: Coastal avifauna effects from each of the coastal developments within Whangarei Harbour for which cumulative effects have been considered (using the assessment undertaken by independent experts engaged by the applicant in each case)**

PROJECT	SPECIES AFFECTED	EFFECT	LEVEL OF EFFECT
Northport Berth 4 expansion	Not identified	Effects on coastal avifauna related to discharges to the marine environment and increased lighting	Not identified
CINZ channel optimisation	Shorebirds	Project-generated effects on shorebird habitats	High at Mair Bank and low-moderate at Reotahi Bay
	Kororā	Disruption to passage between shoreline nesting areas due to increased water turbidity	Less than minor
Port Nikau marina	Not identified	Disturbance to foraging wading birds	Not identified
Whangarei marina	Banded rail	Permanent habitat loss	Less than minor
Eastern expansion	Variable oystercatcher	Permanent habitat loss as well as construction related disturbance / displacement	Low
	Northern dotterel NZ	Permanent habitat loss as well as construction related disturbance / displacement	Low

78. Based on the above affects identified by those various projects (Table 12), I determined that there would be no cumulative effects on coastal avifauna in relation to discharges into the marine environment or increase in lighting on the coastal margin. As such, these effects would remain the same as identified, that being Low to Very Low for all coastal avifauna.

79. None of the above listed projects identified the permanent loss of habitat for variable oystercatcher or Northern NZ dotterel. As such, there will be no cumulative effects on coastal avifauna in relation to permanent habitat loss, and the effects would remain the same as identified in Table 18 (Appendix 2).
80. While the Port Nikau marina assessment noted the potential for disturbance to foraging wading birds, the species and level of effect was not identified. Thus, based on the information provided in the Port Nikau marina assessment, and noting the approximately 15 km distance from Port Nikau to Marsden Point, I determined there will be no cumulative effects on coastal avifauna in relation to construction related disturbance associated with the eastern reclamation. As such, these effects would remain the same as identified in Table 18 (Appendix 2) for all coastal avifauna.
81. In summary, the cumulative (overall) effects of the projects listed in Table 12 will be:
- (a) Low to Very Low for all coastal avifauna species in relation to discharges into the marine environment;
  - (b) Low to Very Low for all coastal avifauna species in relation to lighting on the coastal margin;
  - (c) Low for northern NZ dotterel and variable oystercatcher in relation to permanent habitat loss.
  - (d) Low for northern NZ dotterel and variable oystercatcher in relation to construction disturbance / displacement.

## **NATIONAL POLICY STATEMENT FOR INDIGENOUS BIODIVERSITY**

82. The NPS-IB came into effect on 4 August 2023, and therefore did not form part of the coastal avifauna assessment for the proposal. As such, an assessment of Northport's application against the NPS-IB with respect to coastal avifauna is provided here.
83. The following broad points guide an assessment under the NPS-IB:
- (a) The NPS-IB only applies in the terrestrial environment, with few exceptions; and
  - (b) The NPS-IB contains specific requirements relating to indigenous biodiversity within and outside of Significant Natural Areas (SNAs).

## Coastal avifauna species recorded in the terrestrial environment

84. Given the NPS-IB only applies in the terrestrial environment, an analysis of the coastal avifauna data was undertaken to determine which species were recorded above MHWS in areas to be directly affected by the proposal. A total of six species were recorded (Table 13 below).

*Table 13: Total counts for species recorded above MHWS within the project footprint*

LOCATION	SPECIES	TOTAL COUNTS
Northport	Pied shag	21
	Red-bill gull	44
	Variable oystercatcher	13
HW East 1	Caspian tern	1
	Red-bill gull	1
	South Island pied oystercatcher	5
	Variable oystercatcher	113
HW East 2	Bar-tailed godwit	70

## No Significant Natural Areas affected

85. As outlined in the vegetation assessment and evidence of Dr Sarah Flynn, there are no terrestrial SNAs affected by the Northport application.

## Assessment against NPS-IB

86. Consequently, it is clause 3.16 (Indigenous biodiversity outside SNAs) that is of primary relevance to the current proposal, whereby:
- (a) any significant adverse effects must be managed by applying the effects management hierarchy; and
  - (b) any other effects must be managed to give effect to the objective and policies of the NPS-IB.
87. With regards to significant adverse effects, the preceding sections of my evidence (summarised in paragraphs 74- 75 and 81, as well as Table 18) identified the level of effects on those six species recorded above MHWS (listed in Table 13) as a result of the proposal were considered Very Low to Low, and not significantly adverse.
88. Therefore, the NPS-IB requires that effects which are not considered to be significantly adverse must be managed to give effect to the objective and policies of the NPS-IB.

89. Policy 4 of the NPS-IB specifies that '*Indigenous biodiversity is managed to promote resilience to the effects of climate change*'. Existing coastal high tide roosts are vulnerable to rising sea levels associated with climate change. Therefore, the recreation of the proposed high tide roost to a level that accommodates the rising sea levels is consistent with NPS-IB Policy 4.
90. Policy 15 of the NPS-IB specifies that "*Areas outside SNAs that support specified highly mobile fauna are identified and managed to maintain their populations across their natural range, and information and awareness of highly mobile fauna is improved*". All six species listed in Table 13 above are listed as highly mobile fauna in Appendix 2 of the NPS-IB.
91. These species will utilise the proposed high tide roost and this measure is consistent with providing a function that will assist with maintaining their populations.
92. High tide roosts provide an important function to waders and shorebirds which are forced from their low-water feeding during high tide. Other species that forage in coastal waters and roost at high tide include shags, terns and gulls. Lack of, or inappropriate, roost sites can increase predation risk and disturbance rates, as well as energetic costs of remaining thermoneutral at the roost, and flying to the roost from feeding. In practice it may be difficult for some birds to find suitable roost points, with instances of birds forced to spend the entire high tide on the wing.<sup>17,18</sup>
93. For the various reasons stated above, I consider that the proposal appropriately manages adverse effects on indigenous biodiversity (specifically coastal avifauna) in a manner that gives effect to the objective and policies of the NPS-IB.

## RESPONSE TO THE SECTION 42A REPORT

94. In her technical memo<sup>19</sup> pertaining to the coastal avifauna assessment to inform the s42A report, Ms Webb raised the following two matters:
- (a) The need for the assessment of cumulative effects should be expanded to consider other contributing activities or developments in the wider Harbour that could affect foraging and roosting of coastal avifauna species; and

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<sup>17</sup> Buehler, D. M. (2002). Shorebird counts in Panama during 2002 emphasize the need to monitor and protect the Upper Panama Bay. Wader Study Group Bulletin, 99, 41–44.

<sup>18</sup> Hötter, H. (2000). When do dunlins spend high tide in flight? Waterbirds, 23(3), 482–485.

<sup>19</sup> Technical memo dated 27 July 2023, being Appendix C4 to the s42A report.

- (b) Concerns around the longevity of the proposed recreated high-tide roost and therefore the requirement for further consideration of alternative mitigation, which could include the identification and enhancement of alternative roost areas that may be used by displaced avifauna.

95. Each of these matters are addressed below.

#### *Cumulative effects*

96. As explained previously, the existing environment is the basis against which I have conducted my effects assessment, which includes consideration of cumulative effects. The existing environment represents the environment ‘as it currently exists’, including all those activities listed in Table 14 below.

**Table 14: Coastal developments within Whangarei Harbour considered as part of the existing environment for the purposes of this assessment.**

EXISTING BUILT DEVELOPMENT	EXTANT RESOURCE CONSENTS
<ul style="list-style-type: none"> <li>• NorthPort site</li> <li>• CINZ site and wharves</li> <li>• Marsden Cove residential / marina development</li> <li>• Portland Cement</li> <li>• Port Nikau and Whangarei town basin</li> <li>• Parua Bay boat ramp and mooring</li> <li>• Parua Bay oyster farm</li> </ul>	<ul style="list-style-type: none"> <li>• NorthPort’s Berth 4 expansion</li> <li>• CINZ channel optimisation project</li> <li>• Port Nikau marina expansion</li> <li>• Whangarei Marina Management Trust’s new marina</li> </ul>

97. In terms of cumulative effects, they include two components:

- (a) Effects arising / building up over time; and
- (b) Effects arising in combination with other effects.

98. In regard to Ms Webb’s request to identify other contributing activities or developments in the wider Harbour that could affect foraging and roosting of coastal avifauna species, I am unclear what specific activities or developments she is referring to. As noted in the assessment (Section 1.1), there are a number of historic projects that may have impacted coastal avifauna, however these now form part of the existing environment (refer to Table 14 above).

99. In her technical memo, Ms Webb writes that:

*The cumulative effects assessment requires a broader review of past and existing activities (in addition to coastal development consents) that influence shorebird populations and meet industry practices. The review could include:*

1. *Identification of key issues causing population decline in the Whangarei Harbour (ZOI).*
  2. *Identification of activities and related ecological effects that contribute to the key avifauna issues in ZOI.*
  3. *Identify Northport eastern reclamation construction and operations activities that contribute to these effects (if any).*
  4. *Assess the level of cumulative effect arising from the eastern reclamation.*
100. Ms Webb also writes “*These attributes would provide ecological context and help better identify the key cumulative effects, at the Harbour scale.*”
101. It is my opinion that matters 1 and 2 suggested by Ms Webb go beyond what is required for an assessment of cumulative effects as they relate to the Northport application. Rather, I have undertaken a thorough and comprehensive assessment of the actual and potential effects on coastal avifauna associated with the Northport proposal, including cumulative effects, and have characterised those effects against the existing environment and taking into account the management measures proposed by Northport.
102. Thus, on the basis of the existing environment, and the factors that I understand should be considered as part of a cumulative effects assessment, my conclusions on these have not change from those outlined in both my coastal avifauna assessment report and evidence above (paragraphs 76 to 81(d)).

#### *Recreation of high tide roost*

103. The matter pertaining to the longevity of the recreated high tide roost is outside my area of expertise and is thus addressed by Dr Reinen-Hamill. To be clear however, I support the inclusion of a condition of consent, as proffered by Northport, requiring that the high tide roost is maintained for the duration of the consents.
104. In her technical report, Ms Webb writes: “*Although, the creation of high-tide roost area in proximity to the impact site is an appropriate offset in principle, it may not result in the long-term benefits to shorebirds and the enhancement of roost sites elsewhere in the should be explored by the applicant*”.
105. I am not clear why Ms Webb considers that the recreation of the high tide roost at the proposed location may not result in the long-term benefits to shorebirds. While the proposed high tide roost is not an offset, rather a measure to avoid effects, as noted by Ms Webb, biodiversity offsetting principles state that such measures should be implemented as close to the impact site as possible.

106. Particularly given the presence of abundant food sources in the area, and the proposed consent condition requiring the ongoing maintenance of the high tide roost for the duration of the consent, I am of the opinion that the recreation of the sand bank feature at the proposed location will result in the long-term benefits to shorebirds.<sup>20</sup>

## RESPONSE TO SUBMISSIONS RAISED

### *Margaret Hicks*

107. In her covering letter for her submission, Margaret Hicks writes “*If successful its proposal will evict both the general public and birdlife*”. However, in the submission itself, no further details are given in regard to avifauna.
108. Thus, my assessment and conclusions have not changed following my reading and consideration of the submission of Margaret Hicks.

### *Dr Mere Kepa*

109. In paragraph 3(d) of her submission, Dr Kepa writes that the proposal will permanently remove a significant area of habitat for the small flocks of Torea-Pango and Taraapunga, east of the Port.
110. As shown in Table 2 (page 12) of my evidence, approximately 5.8% of the Whangarei Harbour population of taraapunga (red-bill gull) will be impacted by Northport’s eastern expansion. This equates to a low magnitude of effect on the local population. Furthermore, as shown in the results of the marine ecology assessment, the benthic macroinvertebrate data identified a more diverse and abundant prey source on the western side of Northport compared to the eastern side.
111. With respect to the loss of habitat for tōrea pango (variable oystercatcher), the coastal avifauna assessment identified that the approximately 14.8% of the Whangarei Harbour population utilise the area of high tide habitat that will be lost under Northport’s eastern expansion (refer to Table 2 on page 12). As such, the creation of high tide roost habitat has been proposed to address this loss.
112. Thus, my assessment and conclusions have not changed following my reading and consideration of Dr Kepa’s submission.

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<sup>20</sup> Refer also my comments below on the proposed high tide roost in response to the submissions by the Royal Forest & Bird Protection Society, the Department of Conservation, the Patuharakeke Te Iwi Trust Board, and Marsden Cove Ltd/Marsden Cove Canals Management Ltd.

113. At paragraph 11 of the submission, it notes that *“although Forest & Bird supports the creation of roosting habitat it does not support the construction of roosting habitat if it means the loss of nearly 5,000 square meters of significant ecological areas for foraging seabirds and benthic species such as cockles and pipi.”*
114. In response, I note that NRC’s delineation and description of the ecological values of SEA Area C are very broad-brush (refer to Paragraph 28 of my evidence for the description provided in NRC’s Significant Ecological Marine Area Assessment Sheet<sup>3</sup>). No attempt was made to provide a more detail or refined description or delineation of the specific values.
115. In comparison, the site-specific data that has been collected for the current project with respect to the distribution and abundance of coastal avifauna and benthic macroinvertebrates provides a much more detailed understanding of these values between One Tree Point and Northport (as shown in Maps 2 to 14 that accompany my evidence).
116. While the high tide roost is proposed to be located within the SEA, this is considered the most appropriate location for the following reasons:
- (a) It is in close proximity to the point of impact;
  - (b) It is at the site of a historic high tide roost;
  - (c) It is in an area of lower benthic macroinvertebrate and avifauna abundance relative to other areas of the SEA (refer to Maps 9-14);
  - (d) It is independent from the existing shoreline during high tide to provide separation from human and dog disturbance;
  - (e) The assessment of effects determined that the local populations of birds recorded within the proposed high tide roost footprint would not be adversely affected based on the proportion of those populations recorded utilising that area (refer to Table 11 on page 23 of my evidence).
117. Paragraph 12 of F&B’s submission raise concerns in regard to the temporary effects of disturbance to foraging birds during the construction phase. The submission states *“The Assessment noted that creation of the sandbank island would go some way towards addressing the distances displaced seabirds would have to travel for roosting purposes.*



*However, it is difficult to see how this would supplant lost foraging habitat when the purpose of the sandbank island is to create roosting habitat.”*

118. At no point in my assessment or evidence has it been claimed that the creation of the sandbank would supplant lost foraging habitat. Rather, as shown in the results of the marine ecology assessment, the benthic macroinvertebrate data identified a more diverse and abundant prey source on the western side of Northport compared to the eastern side. As such, based on that data, I do not consider that there will be a shortage of food supply in the immediate vicinity for any foraging birds that are temporarily disturbed during the construction of Northport’s eastern expansion.
119. In paragraph 13 of the submission, F&B *“is also not convinced that mitigation measures to address sediment plumage during dredging and deposition will result in negligible to low effects on seabird food supply and foraging activity.”*
120. No other details are provided in the submission around this point, and it is not my role to convince submitters. Rather, the results of my assessment in this regard are based on the results of the MetOcean modelling, the marine ecology assessment of those results on the benthic fauna and water quality, and distribution of foraging seabirds in the zone of influence.
121. Based on my responses to the above points raised in F&B’s submission on coastal avifauna, I remain of the opinion that the conclusions of my assessment are still valid and remain unchanged.

#### *Department of Conservation*

122. The following points were raised in the Department’s submission:
- (a) Lack of consideration of the way that avifauna use the eastern shoreline and harbour entrance (paragraph 14).
  - (b) Concern that variable oystercatcher will only move to the area between the port and the CINZ jetty bringing them into conflict with other beach users, particularly if they have dogs with them (paragraph 15).
  - (c) The location of the proposed high tide roost in relation to the future western extension (paragraph 16).
  - (d) The assertion that there has been no assessment of the impact on the northern NZ dotterel from the refinery and the loss of immediate foraging area (paragraph 17).

- (e) The assertion that the bird population figures used in the assessment are incorrect, in some cases by orders of magnitude (paragraph 18).
- (f) Concerns in relation to the roost location, roost size, and the impacts on other species from the roost location chosen (paragraph 19).
- (g) The need for further consideration and better compensation for loss of avifauna habitat that takes into account cumulative effects from the likely future applications to expand Northport (paragraph 20).

123. In the following paragraphs I respond to each of these points.
124. I disagree with the assertion that a “*lack of consideration*” for the way avifauna use other areas in the wider harbour. Information was provided in the assessment around the wider harbour and how species have been recorded utilising the various habitat features (e.g. Section 3.3.4 of the coastal avifauna assessment).
125. In terms of the concern raised that variable oystercatcher will “*only move to the area between the port and the CINZ jetty*”, it is my opinion that this will not be the case. While the majority of variable oystercatcher records were from the eastern side of Northport (refer to Map 4), there were records from the western side. As such, I think it is likely that some birds will move to the western side of Northport during and following the construction of the eastern expansion, including using the proposed high tide roost. As such, I do not believe that there is evidence that birds will only move to the area between the port and the CINZ jetty.
126. Several concerns were raised in regard to the proposed high tide roost, including in relation to its location to a potential future western extension of Northport, it’s proposed size and the impacts on other species from the roost location chosen.
127. With respect to concerns related to a potential future western expansion of Northport, such a potential project does not form part of the existing environment (refer to Section 1.1 of the coastal avifauna assessment) and as such could not be considered as part of this assessment. Rather, other more appropriate factors that were used to inform the location of the proposed high tide roost, including:
- (a) Being reasonably close to the area reclaimed;
  - (b) Being independent from the existing shoreline during high tide to provide separation from human and dog disturbance; and

(c) The avoidance of a cockle bed.

128. In terms of the proposed size, an area of 1,220 m<sup>2</sup> of unvegetated high tide roost habitat will be lost under the eastern expansion footprint. In comparison, approximately 2,703 m<sup>2</sup> area above MHWS will be created by the proposed high tide roost; this is more than double the area of high tide roost habitat that will be lost. As such, I consider the proposed size of the high tide roost to be appropriate.
129. In regard to the impacts on other species from the proposed roost location, this was assessed (refer to Section 6.7 of the coastal avifauna assessment).
130. Lastly, in response to the Department's criticism in relation to the bird population figures that have been used in the assessment, I note that the limitations of the population data were clearly identified in my assessment (Section 2.3 Data Constraints), with a number of data sources used to try to obtain the most current publicly available estimates. This specific issue was not raised by the Department in their earlier review of the draft coastal avifauna assessment, nor was the Department forthcoming in identify any additional data sources that should have been used.
131. Based on my responses to the above points raised in the Director General's submission on coastal avifauna, I remain of the opinion that the conclusions of my assessment are still valid and remain unchanged.

*Patuharakeke Te Iwi Trust Board (PTB)*

132. The PTB raises concerns that the area of proposed high tide roost to be created is adequate, stating "*How can an area of about two thousand square metres come close to mitigating the loss of 20,800m<sup>2</sup>?*". As noted in the submission itself, the figure of 20,800m<sup>2</sup> was taken from the coastal processes assessment in relation to the high tide beach lost due to the eastern reclamation. However, it is important to understand that not all area of beach above mean high water spring (MHWS) is suitable for roosting habitat. As explained above in paragraph 129, some of the dune area is covered in vegetation; such areas will not be used by roosting birds. The actual area of useable (unvegetated) roosting habitat above high tide that will be lost under the eastern expansion footprint is 1,220 m<sup>2</sup> (0.122 ha). Therefore, the 2,703 m<sup>2</sup> area above MHWS that will be created for the proposed high tide roost is more than double the area of high tide roost habitat that will be lost.
133. In terms of the concern that no mitigation has been proposed for the loss of foraging habitat for *Threatened* and *At Risk* species, as previously identified, the nearby intertidal

habitat to the west of Northport has been extensively sampled and provides more diverse and abundant prey source than that which will be lost under the eastern expansion.

134. Thus, based on my responses to the above points raised in PTB's submission on coastal avifauna, I remain of the opinion that the conclusions of my assessment are still valid and remain unchanged.

*R Twyman*

135. In his submission, Mr Twyman raises concerns regarding the potential impact of noise (both underwater and airborne) on wildlife, include seabirds.
136. The potential effect of noise and vibration on coastal avifauna was extensively and carefully considered in Section 6.3 (Disturbance and Displacement) of my assessment, and summarised above in paragraphs 48-54 and Table 5 (page 15). The Moderate level of terrestrial noise effects identified will be addressed through the creation of the re-creation of high tide roosting habitat on the western side of Northport prior to the construction of the eastern reclamation.
137. With respect to underwater noise, when a hydraulic impact hammer is used for piling, it is recommended that some form of underwater noise mitigation may be implemented to ensure a safe underwater passage route (i.e. beyond a likely underwater noise level effects threshold for kororā) for birds traveling past the piling works. Details of the noise mitigation measures for the purpose of kororā management will be provided in the Avifauna section of the project's Construction Environmental Management Plan.
138. Thus, based on my responses to the above points raised in Mr Tyman's submission on coastal avifauna, I remain of the opinion that the conclusions of my assessment are still valid and remain unchanged.

*S Tyson*

139. In paragraph 7 of his submission, Mr Tyson raises concerns in regard to the effects on northern NZ dotterel and red-billed gulls that breed on CINZ land and use the stretch of beach to the east of Northport.
140. The potential effects on all coastal avifauna species using the stretch of beach to the east of Northport were considered in my assessment, including northern NZ dotterel or red-billed gulls. As such, the point raised in the submission of Mr Tyson in no way alters my conclusions regarding the level of effects identified.

*SD Steedman*

141. In their submission, SD Steedman states *“The ecosystem currently supports a number of endangered, declining and at risk native and endemic bird species. The fact that the land is being reclaimed to facilitate this development means that their habitat and food supply will be impacted.”*
142. The actual and potential effects on all coastal avifauna species (including those classified as *At Risk* and *Threatened*) were considered in my assessment, including in relation to habitat and food supply. As such, the statements made in SD Steedman’s submission do not alter my conclusions regarding the level of effects identified on those species.

*Marsden Cove Ltd (MCL) and Marsden Cove Canals Management Ltd (MCCML)*

143. The issues raised by both of these submissions in regard to the proposed creation of high tide roost habitat primarily relate to matters pertaining to coastal processes and marine ecology. As such, these are addressed in the evidence of Drs Richard Reinen-Hamill and Shane Kelly respectively.
144. The only matter raised of specific relevance to avifauna is in relation to the statement: *“the location, size and shape of the new bird roost does not appear to specifically address what habitat would be lost. The ideal location would be in an area that does not have large numbers of pipis or other shellfish and / or high abundance of wading bird prey”*.
145. In response, as outlined in paragraphs 71 to 75 of my evidence (and accompanying Map 9–14) and Section 6.7.1 of the coastal avifauna assessment, due consideration was given to the appropriate siting of the proposed high tide roost. The proposed location was informed by the:
- (a) The results of the distribution and abundance of macro-invertebrate benthic data;
  - (b) The results of the distribution and abundance of coastal avifauna data; and
  - (c) A combined site visit by myself, Dr Reinen-Hamill and Dr Kelly to identify any constraining factors and to micro-site the high tide roost.
146. As such, it is my informed and considered opinion that the proposed location is appropriate from a coastal avifauna perspective.

## **COMMENT ON DRAFT PROPOSED CONDITIONS ADVANCED BY NORTHPORT**

147. The proposed consent conditions require the creation of the sand bank renourishment area, as well as monitoring and renourishment of the sandbank. The objectives of these proposed consent conditions pertaining to the sand bank are to:
- (a) Avoid effects of displacement / disturbance on roosting birds through the implementation of the sandbank prior to construction of the eastern reclamation; and
  - (b) Ensure that the sandbank structure retains the function of a high tide roost for the duration of the consents.
148. The proposed conditions include measures and management to avoid direct impacts of construction on kororā and VOC. Furthermore, there is a proposed condition requiring that the Avifauna section of the CEMP include detailed descriptions and methodologies setting out how adverse effects on kororā and VOC will be managed. Notably for kororā, these measures should include methods to manage effects associated with proposal both in the terrestrial and marine environments.
149. The proposed conditions also requires that the Avifauna section of the CEMP include measures to minimise the effects of artificial construction lighting on avifauna.
150. With regards to underwater noise, I note that while identified as a proposed condition for marine mammals, the piling methods listed to reduce noise levels at source impact, will also benefit diving birds such as kororā and shag.
151. As such, the proposed conditions are appropriate for avoiding and managing effects on coastal avifauna associated with the construction and operation of Northport's eastern reclamation, as identified in paragraph 75 of my evidence.

**Leigh Sandra Bull**  
BlueGreen Ecology Ltd

24 August 2023

## APPENDIX 1 – EIANZ impact assessment tables

Table 15: Criteria for describing the level of effect

LEVEL OF EFFECT		ECOLOGICAL AND / OR CONSERVATION VALUE				
		Very High	High	Moderate	Low	Negligible
MAGNITUDE	Very High	Very High	Very High	High	Moderate	Low
	High	Very High	Very High	Moderate	Low	Very Low
	Moderate	High	High	Moderate	Low	Very Low
	Low	Moderate	Low	Low	Very Low	Very Low
	Negligible	Low	Very Low	Very Low	Very Low	Very Low
	Positive	Net gain	Net gain	Net gain	Net gain	Net gain

Table 16: Criteria for assigning ecological value to species

ECOLOGICAL VALUE	SPECIES CLASSIFICATION
Very High	<i>Nationally Threatened</i> (Nationally Critical, Nationally Endangered, Nationally Vulnerable, Nationally Increasing <sup>1</sup> ) species found in the ZOI <sup>2</sup> either permanently or seasonally.
High	Species listed as <i>At Risk – Declining</i> found in the ZOI either permanently or seasonally.
Moderate	Species listed as any other category of <i>At Risk</i> (Recovering, Relict, Naturally Uncommon) found in the ZOI either permanently or seasonally; or Locally (ED) uncommon or distinctive species.
Low	Nationally and locally common indigenous species.
Negligible	Exotic species, including pests, species having recreational value.

Table 17: Criteria for describing magnitude of effect

MAGNITUDE	DESCRIPTION
Very High	Total loss of, or very major alteration, to key elements/ features of the baseline conditions such that the post development character/ composition/ attributes will be fundamentally changed and may be lost from the site altogether; AND/OR <b>Loss<sup>3</sup> of a very high proportion of the known population</b> or range of the element / feature.
High	Major loss or major alteration to key elements/ features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR <b>Loss<sup>23</sup> of a high proportion of the known population</b> or range of the element / feature.
Moderate	Loss or alteration to one or more key elements/features of the existing baseline conditions, such that post-development character, composition and/or attributes will be partially changed; AND/OR

<sup>1</sup> Nationally Increasing is category that was devised by DOC (Michel, 2021) in 2021 to resolve a problem that would arise if the population of a taxon assessed as At Risk Recovering A should stabilise. Threatened – Nationally Increasing is assigned to “Small population that have experienced a previous decline (or for which it is uncertain whether it has experienced a previous decline) and that is forecast to increase >10% over the next 10 years or 3 generations, whichever is longer” (Rolfe et al. 2021). Thus, while such a threat category is not identified in Roper-Lindsay et al. (2018), we have included it along with all other *Threatened* classifications in to the Very High ecological value category.

<sup>2</sup> Roper-Lindsay et al. (2018) define the Zone of Influence (ZOI) as “the areas/resources that may be affected by the biophysical changes caused by the proposed project and associated activities.”

<sup>3</sup> In the context of mobile fauna, the term “loss” can include displacement from an area.

MAGNITUDE	DESCRIPTION
	<b><i>Loss of a moderate proportion of the known population</i></b> or range of the element / feature.
<b>Low</b>	Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances/patterns; AND/OR <b><i>Having a minor effect on the known population</i></b> or range of the element / feature.
<b>Negligible</b>	Very slight change from existing baseline condition. Change barely distinguishable, approximating to the "no change" situation; AND/OR <b><i>Having a negligible effect on the known population</i></b> or range of the element / feature.



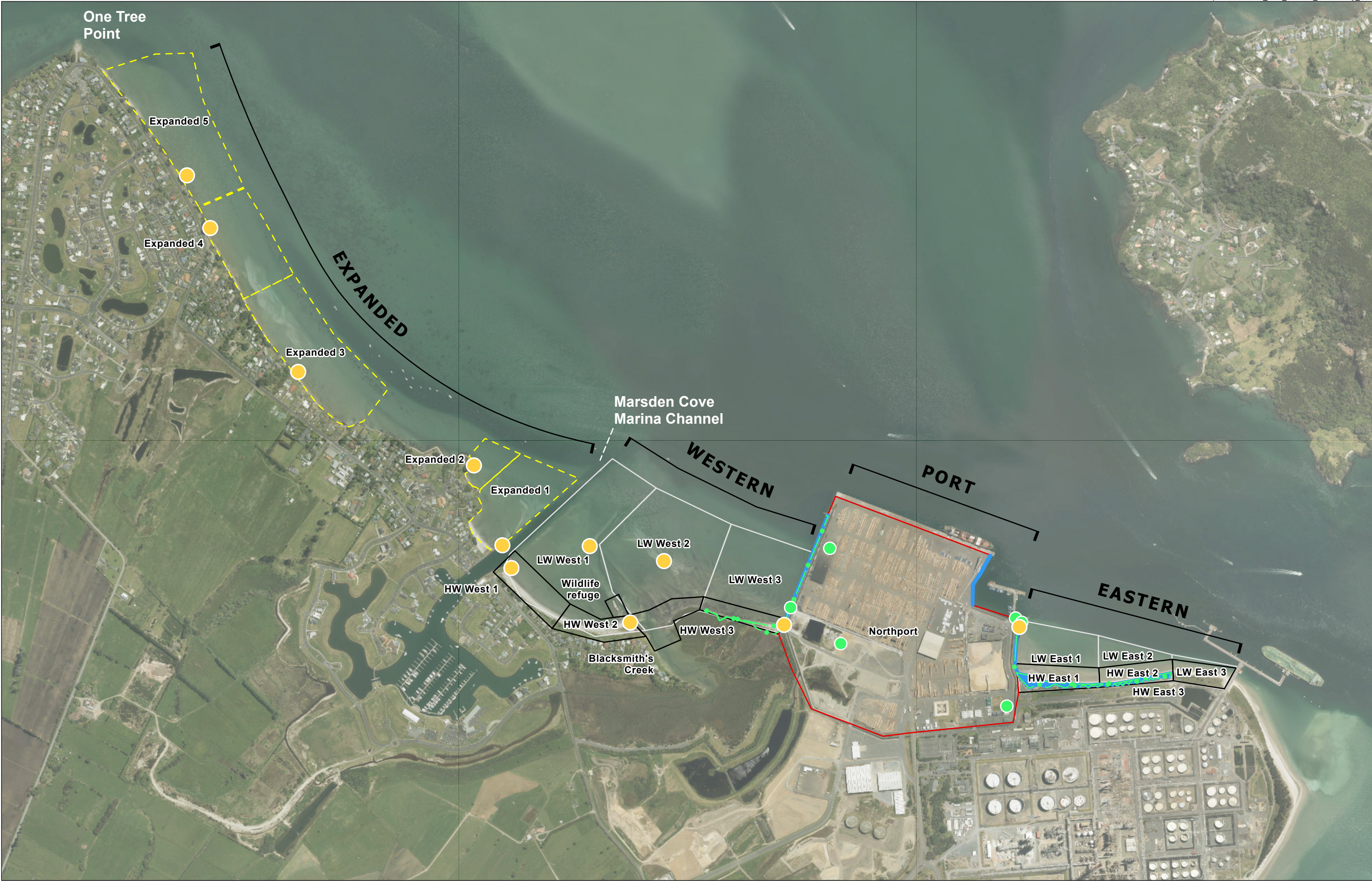
## APPENDIX 2 – Table summarising potential effects on coastal avifauna

**Table 18: Summary of potential effects associated with the construction (Con.) and operation (Op.) of the proposed eastern reclamation with the implementation of management and mitigation measures**

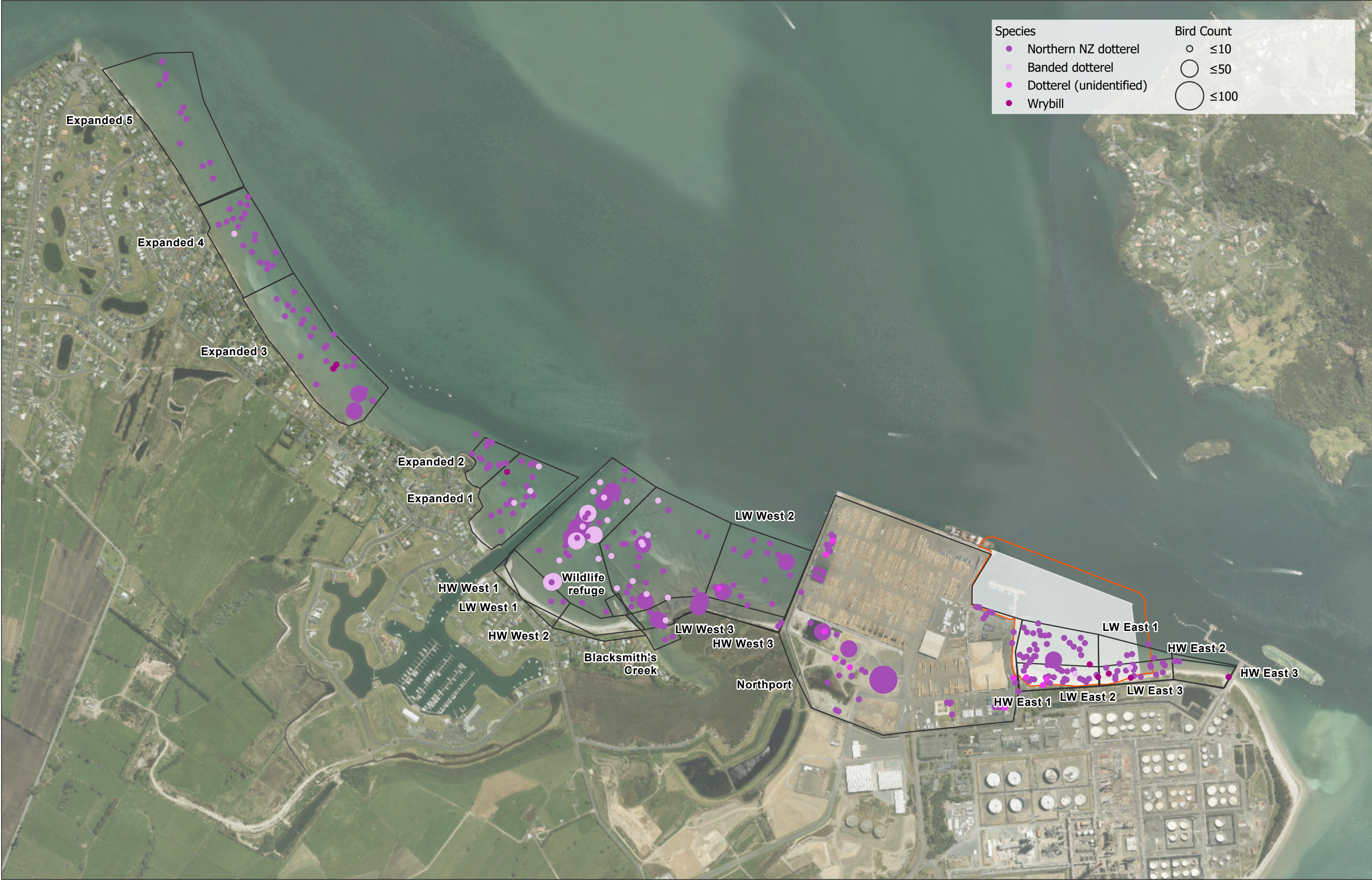
SPECIES	PERMANENT HABITAT LOSS		MORTALITIES		DISTURBANCE & DISPLACEMENT		FOOD SUPPLY & FORAGING ABILITY		ARTIFICIAL LIGHTING		POLLUTION		ROOST RE-CREATION	OVERALL PROJECT EFFECT
	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.	Con.	Op.		
Banded dotterel	Very Low	-	-	-	Very Low	-	Very Low	-	-	Very Low	Very Low	Very Low	-	VERY LOW
Bar-tailed godwit	Very Low	-	-	-	Very Low	-	Very Low	-	-	Very Low	Very Low	Very Low	-	VERY LOW
Black shag	-	-	-	-	-	-	Very Low	-	-	Very Low	Very Low	Very Low	-	VERY LOW
Caspian tern	Low	-	-	-	Low	Low	Low	-	-	Low	Low	Low	Low	LOW
Lesser knot	-	-	-	-	-	-	Very Low	-	-	Very Low	Very Low	Very Low	Low	LOW
Little shag	Very Low	-	-	-	Very Low	-	Very Low	-	-	Very Low	Very Low	Very Low	-	VERY LOW
NZ dotterel	Low	-	-	Low	Low	Low	Low	-	-	Low	Low	Low	Low	LOW
Pied shag	Very Low	-	-	-	Very Low	Very Low	Very Low	-	-	Very Low	Very Low	Very Low	-	VERY LOW
Pied stilt	Very Low	-	-	Very Low	Very Low	-	Very Low	-	-	Very Low	Very Low	Very Low	Very Low	VERY LOW
Red-billed gull	Low	-	-	-	Low	Very Low	Very Low	-	-	Very Low	Very Low	Very Low	-	LOW
Reef heron	Low	-	-	-	Low	-	Low	-	-	Low	Low	Low	-	LOW
Royal spoonbill	-	-	-	-	-	-	Very Low	-	-	Very Low	Very Low	Very Low	-	VERY LOW
SBBG	Very Low	-	-	-	Very Low	Very Low	Very Low	-	-	Very Low	Very Low	Very Low	Very Low	VERY LOW
SIPO	Low	-	-	-	Low	-	Very Low	-	-	Very Low	Very Low	Very Low	-	LOW
VOC	Low	-	Very Low	Very Low	Low	Very Low	Very Low	-	-	Very Low	Very Low	Very Low	-	LOW
White-faced heron	Very Low	-	-	-	Very Low	-	Very Low	-	-	Very Low	Very Low	Very Low	Very Low	VERY LOW
White-fronted tern	Low	-	-	-	Low	-	Very Low	-	-	Very Low	Very Low	Very Low	-	LOW
Wrybill	Low	-	-	-	Low	Low	Low	-	-	Low	Low	Low	-	LOW
Kororā	-	-	Very Low	-	Low	-	-	-	-	-	Very Low	Very Low	-	LOW
Grey-faced petrel	-	-	-	-	-	-	-	-	-	Very Low	Very Low	Very Low	-	VERY LOW







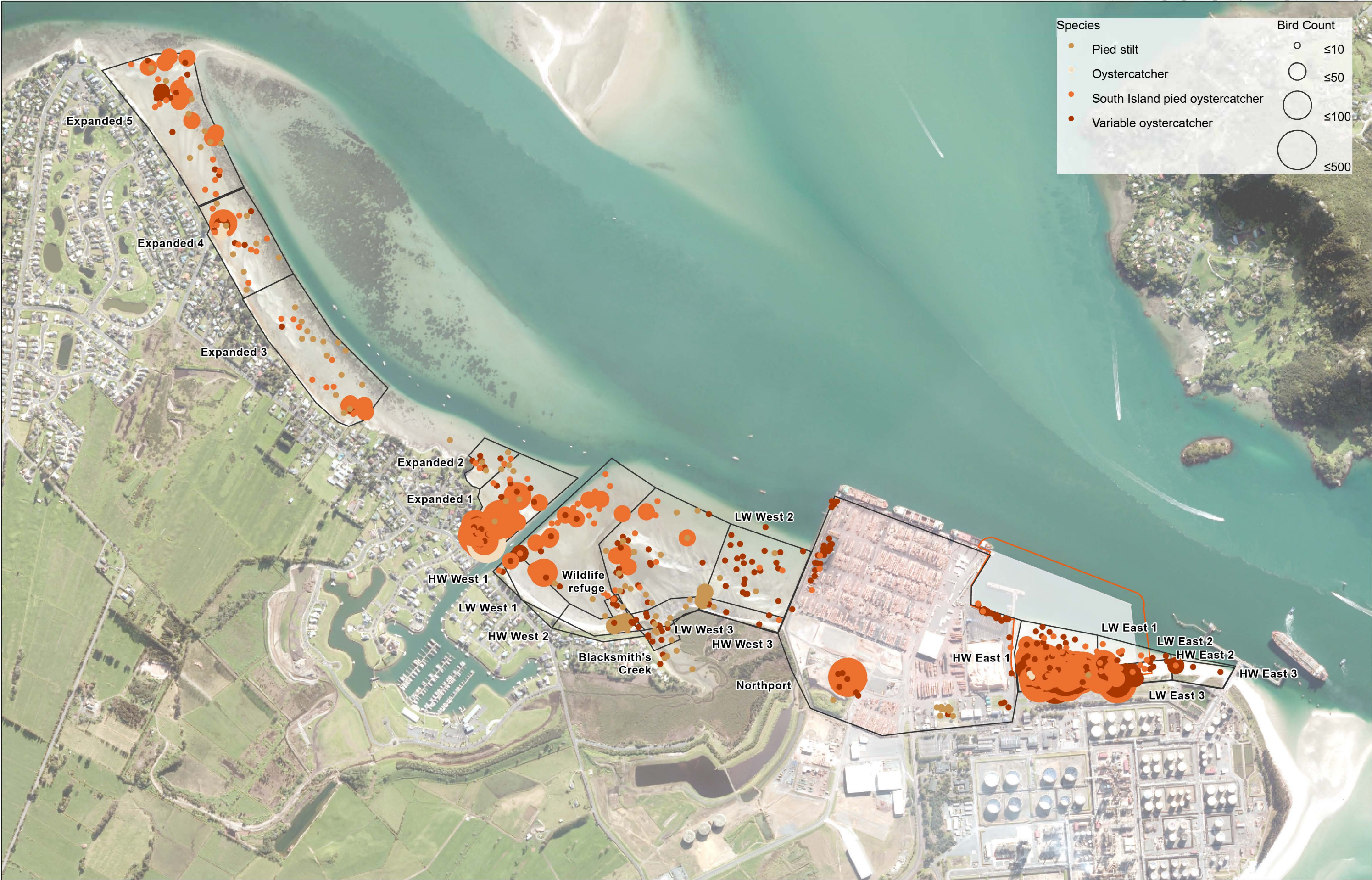




















Species	Bird Count
● Heron	○ ≤10
● Reef heron	○ ≤50
● White-faced heron	
● Royal spoonbill	



















