Boffa Miskell

Northport Eastern Expansion

Additional Winter 2022 Avifauna Data Analysis

Prepared for Northport Ltd

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Executive Summary

- Northport Ltd (NPL) recently submitted a resources consent application for its proposed eastern expansion of its facilities in Whangarei Harbour to increase its freight storage and handling capacity to support the future freight needs of the upper North Island.
- A coastal avifauna assessment (Boffa Miskell Ltd, 2022) was prepared and accompanied that application, and which was largely based on wading bird survey data that had been collected around Northport during spring / summer 2017/18 and 2019/20, and winter 2021. However due to timing, that assessment did not include the analysis from an additional round of wading bird surveys that were undertaken during winter 2022.
- This current report presents an updated analysis of all the wading bird survey data that has been collected for the Northport eastern expansion project, as well as updated assessment of effects based on that inclusion of the winter 2022 data.
- Data collected during the winter 2022 surveys had the potential to change the level of effects determined in the original coastal avifauna assessment through:
    - The detection of new species (including *Threatened* or *At Risk*) not previously recorded; and / or
    - An increase in the proportion of a species that may be affected, thereby increasing the magnitude and overall level of effect of the project on the local populations of those species.
- Overall, the main findings from the inclusion of the winter 2022 data into the analysis of the wading bird survey data were as follows:
    - Three new species not previously recorded were detected. A single Asiatic whimbrel in survey area Expanded 3 (Map 4), a single black-fronted tern in survey area Expanded 4 (Map 6), and 15 black-billed gull (all to the west of Northport). All these observations were well away from the eastern expansion.
    - The same patterns of high tide and low tide activity that had been reported previously (Boffa Miskell Ltd, 2022) were observed, with no meaningful changes in patterns, distribution or species numbers.
- The updated assessment based on these results determined that the level of effects identified by Boffa Miskell (2022) are unchanged. The results of the winter 2022 data have not resulted in the requirement of any additional measures. As such the measures outlined in the original assessment to address the effects of the project remain the same and must be implemented.

CONTENTS

Appendices

1.0 Introduction

Northport Ltd (NPL) recently submitted a resources consent application for its proposed expansion of its facilities in Whangarei Harbour (see Map 1) to increase its freight storage and handling capacity to support the future freight needs of the upper North Island. The proposed development comprises:

- Expanding Northport's footprint to the immediate east of its existing facility by approximately 13.7 ha (comprising 11.7 ha of reclamation within the CMA and 2ha of earthworks outside the CMA).
- Capital and associated maintenance dredging to enlarge and deepen the existing swing basin and to enable construction of the new wharf.
- A 520 m long wharf (including the consented but not yet constructed 270 m long Berth 4) constructed on the northern (seaward) face of the proposed reclamation.
- Construction of a new tug berthing facility.

A coastal avifauna assessment (Boffa Miskell Ltd, 2022) formed part of the resource consent application. That assessment was in part based on wading bird data that had been collected in the spring / summer of 2017/18 and 2019/20, and winter 2021. A subsequent round of winter monitoring was conducted in 2022, however the data collected from that monitoring could not be analysed in time to include in the coastal avifauna assessment (Boffa Miskell Ltd, 2022) that was lodged as part of the resource consent application. As such, this report presents :

- An outline of the methods for survey wading birds for the Northport project and assessing effects (Section 2.0);
- The results of the analysis of all the wading bird data that have been collected for the Northport eastern expansion project (i.e. spring / summer of 2017/18 and 2019/20, and winter of 2021 and 2022) (Section 3.0); and
- An updated assessment of potential effects on coastal avifauna that identifies any differences resulting from the inclusion of the results from the winter 2022 wading bird data (Section 4.0).

2.0 Methods

2.1 Survey sites

The surveys were conducted over the following three sites, as shown on Map 2:

1) Eastern zone – comprised the beach from the eastern boundary of the Northport facility to the CINZ jetty (bound by the landward extent of the sand dunes and the MLWS mark).
2) Western zone – included the section of Marsden Bay from the western boundary of the Northport facility to the Marsden Cove Marina channel.

3) Expanded zone – an additional survey area added in December 2020 which included the coastline from the Marsden Cove Marina channel on the west side of the marina channel to the Marsden Yacht Club at One Tree Point.

In the case of the Eastern and Western sites, each survey site was further broken into three compartments (East 1–3 and West 1–3), each of which was further divided into 'high water' and 'mid/low water' sub-compartments (refer to Map 2). The following discrete high-tide compartments were also identified, as shown on Map 2:

- Wildlife Refuge;
- Blacksmith's Creek - an area of mangrove edge and high shore zone at the outlet from the Blacksmiths Creek to Marsden Bay;
- Port – Areas within the Northport facility itself was also surveyed.

2.2 Survey effort

All wading bird surveys were undertaken by 4Sight Consulting Ltd, and were conducted over the following seasons and dates:

- Spring / summer - between 23 August 2017 to 12 March 2018 and between 25 September 2019 to 17 February 2020.
- Winter – between 4 June and 26 July 2021 and between 15 June and 15 August 2022.

Details regarding survey effort and dates for the spring / summer surveys, and the winter 2021 survey are provided in Boffa Miskell (2022). Details regarding survey effort and dates for the winter 2022 survey are provided in Appendix 1 of this report.

Surveys were conducted according to the 'five minute bird count' specification of Hartley & Greene (2012). At each observation point the observer recorded weather conditions and human activity. The observer then counted all birds in the sub compartment being surveyed, keeping each count to approximately five minutes.

2.3 Assessment Methodology

As outlined in Section 2.5 of Boffa Miskell (2022), the methodology used to undertake this assessment is consistent with the EIANZ guidelines for undertaking ecological impact assessments (Roper-Lindsay et al., 2018), whereby ecological values are assigned (Table 1) and the magnitude of effects identified (Table 2) in order to determine the overall level of effect of the proposal (Table 3).

Table 2 lists the criteria and descriptions for determining the magnitude of effect as described in the EIANZ guidelines (Roper-Lindsay et al., 2018). For the purpose of this assessment, we have taken a species rather than habitat focus, and as such the population criteria (text italicised and bolded in Table 2) has been applied for the assessment of effects. The population proportion thresholds that have been applied to each magnitude level are as follows:

- Very High: >50% of the population affected;
- High: 20-50% of the population affected;
- Moderate: 10-20% of the population affected;

- Low: 1-10% of the population affected;
- Negligible: <1% of the population affected.

Thus, data collected during the winter 2022 surveys has the potential to change the level of effects determined in the original coastal avifauna assessment through:

- The detection of new species (including *Threatened* or *At Risk*) not previously recorded; and
- An increase in the proportion of a species that may be affected, thereby increasing the magnitude and overall level of effect of the project on the local populations of those species.

Table 1: Criteria for assigning ecological value to species (Roper-Lindsay et al., 2018).

ECOLOGICAL VALUE	SPECIES CLASSIFICATION
Very High	*Nationally Threatened* (Nationally Critical, Nationally Endangered, Nationally Vulnerable, Nationally Increasing[1]) species found in the ZOI[2] either permanently or seasonally.
High	Species listed as *At Risk – Declining* found in the ZOI either permanently or seasonally.
Moderate	Species listed as any other category of *At Risk* (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 2: Criteria for describing magnitude of effect (Roper-Lindsay et al., 2018)

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 ***Loss***[3] ***of a very high proportion of the known population*** 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 ***Loss***[3] ***of a high proportion of the known population*** or range of the element / feature.

[1] 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.

[2] 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."*

[3] In the context of mobile fauna, the term "loss" can include displacement from an area.

MAGNITUDE	DESCRIPTION
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 ***Loss of a moderate proportion of the known population*** or range of the element / feature.
Low	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 ***Having a minor effect on the known population*** or range of the element / feature.
Negligible	Very slight change from existing baseline condition. Change barely distinguishable, approximating to the "no change" situation; AND/OR ***Having a negligible effect on the known population*** or range of the element / feature.

Table 3: Criteria for describing the level of effect (Roper-Lindsay et al., 2018)

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

3.0 Results

3.1 New Species

Additional species observed during the winter 2022 surveys that had not been recorded in previous wading bird surveys included the Asiatic whimbrel (*Numenius phaeopus variegatus*), an international migrant, as well as two national migrants, being black-billed gull (*Larus bulleri*) and black-fronted tern (*Chlidonias albostriatus*). Single observations were made for the whimbrel (Expanded 3 survey area on 14/6/22) and black-fronted (Expanded 4 survey area on 18/7/22), and a total of 15 black-billed gull were observed on three occasions (17/4/22, 31/7/22), all to the west of Northport.

3.2 Habitat Use

Table 4 lists the native wading bird species recorded through the course of the four wading bird survey sessions (refer to Section 2.2) that are included in this analysis. Four species (Asiatic whimbrel, eastern curlew, black-fronted tern and black-billed gull) were all observed in very low

numbers over the course of the four survey periods, and all to the west of Northport; as such, they have not been included in any further data analysis.

Table 4: Native species recorded during 4Sight wading birds (spring / summer 2017/18 and 2019/20, and winter 2021 and 2022)

SPECIES		SPECIES CODE	THREAT CLASSIFICATION[4]	VALUE[5]
Reef heron	*Egretta sacra sacra*	RF	*Threatened - Nationally Endangered*	Very High
Caspian tern	*Hydroprogne caspia*	CTe	*Threatened - Nationally Vulnerable*	Very High
Northern NZ dotterel	*Charadrius obscurus aquilonius*	NZD	*Threatened - Nationally Increasing*	Very High
Wrybill	*Anarhynchus frontalis*	Wry	*Threatened - Nationally Increasing*	Very High
Banded dotterel	*Charadrius bicinctus bicinctus*	BDo	*At Risk - Declining*	High
Bar-tailed godwit	*Limosa lapponica baueri*	BtG	*At Risk - Declining*	High
Lesser knot	*Calidris canutus rogersi*	Lkn	*At Risk - Declining*	High
Red-billed gull	*Larus novaehollandiae scopulinus*	RbG	*At Risk - Declining*	High
South Island pied oystercatcher	*Haematopus finschi*	SIPO	*At Risk - Declining*	High
White-fronted tern	*Sterna s. striata*	WfT	*At Risk - Declining*	High
Pied shag	*Phalacrocorax v. varius*	Psh	*At Risk - Recovering*	Moderate
Variable oystercatcher	*Haematopus unicolor*	VOC	*At Risk - Recovering*	Moderate
Black shag	*Phalacrocorax carbo novaehollandiae*	BSh	*At Risk - Relict*	Moderate
Little shag	*Phalacrocorax melanoleucos brevirostris*	LSh	*At Risk - Relict*	Moderate
Royal spoonbill	*Platalea regia*	RSp	*At Risk - Naturally Uncommon*	Moderate
Pied stilt	*Himantopus h. leucocephalus*	PSt	*Not Threatened*	Low
Southern black-backed gull	*Larus d. dominicanus*	SBBG	*Not Threatened*	Low
White-faced heron	*Egretta novaehollandiae*	WfH	*Not Threatened*	Low
Black-fronted tern	*Chlidonias albostriatus*		*Threatened – Nationally Endangered*	Very High
Black-backed gull	*Larus bulleri*		*At Risk – Declining*	High
Asiatic whimbrel	*Numenius phaeopus variegatus*		*Migrant*	

[4] Robertson et al. (2021)

[5] Refer to Table 1, page 7

SPECIES		SPECIES CODE	THREAT CLASSIFICATION[4]	VALUE[5]
Eastern curlew	*Numenius madagascariensis*		*Vagrant*	

Maps 3 to 8 provide a graphical presentation of the distribution and abundance of the major shorebird groups recorded during the 4Sight wading bird surveys. The additional winter data has not changed the general patterns of use, which are as follows

- Dotterels were recorded along much of the coastal margin from One Tree Point to CINZ, as well as the Northport site (Map 3).
- 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. The single eastern curlew and Asiatic whimbrel were both recorded at the northern ends of the bay, in survey areas Expanded 5 and 3 respectively (Map 4).
- 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 5).
- Gulls and terns were recorded dispersed along the coast, with large concentrations of red-billed gull to the east of Northport (Map 6).
- Heron and spoonbill were recorded in relatively low numbers along the coast, primarily to the west of Northport (Map 7).
- 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 8).

To further investigate the distribution of intertidal foraging species relative to available food supply, species count data was overlaid on to the macroinvertebrate abundance heat maps (refer to Maps 9 to 22).

The following sections of this report investigate in greater detail the spatial patterns of use recorded during the 4Sight wading bird surveys to the east (Section 3.2.1) and west (Section 3.2.3), as well on the Northport site itself (Section 3.2.2) based on the inclusion of the winter 2022 data.

3.2.1 East of Northport

3.2.1.1 High tide activity

The additional winter data did not change the overall patterns of high tide activity on the eastern side of Northport. However the following provides an update in regards to the metrics that were presented in the original coastal avifauna assessment (Boffa Miskell Ltd, 2022).

High numbers of shorebirds were recorded within compartments East 1 and East 2 (refer to Map 23 and Table 5), and the diversity of species recorded on the Eastern sites remained lower than that recorded at the Western sites (refer to Table 9). Similar levels of densities of birds were recorded in East 1 and East 2 (refer Table 5 and Figure 1).

Table 5: Number of coastal bird species recorded during all high tide eastern wading bird surveys

SURVEY LOCATION		No. SPECIES	TOTAL ABUNDANCE	MEAN BIRD DENSITY (PER Ha)	SURVEY PERIOD
Northport ↓ CINZ jetty	HW East 1	11	6457	58.5	• Spring / summer 2017/18 • Spring / summer 2019/20 • Winter 2021 • Winter 2022
	HW East 2	9	4443	53.8	• Spring / summer 2017/18 • Spring / summer 2019/20 • Winter 2021 • Winter 2022
	HW East 3	5	493	8.2	• Spring / summer 2017/18 • Spring / summer 2019/20 • Winter 2021 • Winter 2022

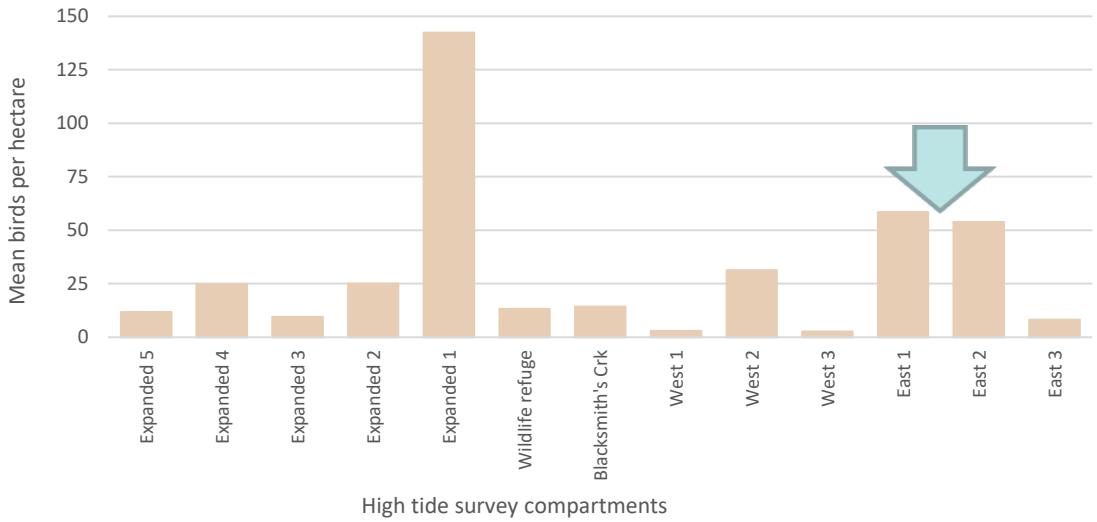

Figure 1: Mean density of birds recorded during all high tide surveys periods. (Green arrow denotes the survey compartments in which the proposed reclamation is located)

The species for which the highest mean abundance and densities were recorded in East 1 were SIPO (mean = 77 birds per count, Table 6; 33 birds per hectare; Figure 2) and variable oystercatcher (mean = 40 birds per count, Table 6; 17 birds per hectare, Figure 2). Red-billed gull recorded the highest mean abundance and densities in East 2 (mean = 76 birds per count, Table 6; 43 birds per hectare, Figure 2).

Table 6: Mean number of birds recorded per survey session during the high tide wading bird surveys. (Shaded column indicates the location of the proposed eastern reclamation)

SPECIES	MEAN No. BIRDS RECORDED PER SURVEY SESSION												
	Exp 5	Exp 4	Exp 3	Exp 2	Exp 1	W/life refuge	B/smith Creek	West 1	West 2	West 3	East 1	East 2	East 3
Banded dotterel	0	0	0	0	0.0	0	0	0	0	0	0	0	0
Bar-tailed godwit	0	0	0	0	6.5	0	16.4	1.6	52.5	0.7	0.0	1.5	0
Black shag	0	0	0	0	0	0	0	0	0	0	0	0	0
Caspian tern	0	0	0	0	0.1	0	0.2	0	0.1	0	0.4	0	0
Lesser knot	0.1	0.1	0.1	0.1	0.1	0	8.0	0	14.0	0.5	0	0	0
Little shag	0	0	0	0.1	0	0.2	0	0	0	0	0	0	0
NZ dotterel	0	1.4	1.9	0.5	0.3	0.0	0.1	0	0	0	0.9	0.4	0
Pied shag	0.2	0.5	0.1	0.1	0.1	0.0	0.1	0	0	0	0	0	0
Pied stilt	0	0	0.2	0	0.2	0.0	0.9	0	1.6	1.0	0	0	0
Red-billed gull	17.4	20.3	12.8	7.0	22.6	0.5	3.9	5.8	1.2	0.7	18.1	76.3	12.0
Reef heron	0	0	0	0	0	0.3	0	0	0	0	0	0	0
Royal spoonbill	0.4	0.2	0.2	0.1	0	0	0.1	0	0	0	0	0	0
SBBG	0.3	0.1	0.1	0	0.6	0.9	1.8	0	0.3	0.2	0.3	0.2	0.1
SIPO	2.1	0.2	2.7	0	82.5	0	0	0.5	0	0	77.4	8.0	0
VOC	1.9	0	0.3	0.1	6.4	1.1	1.0	0.5	0.1	0.6	40.2	9.8	0.1
White-faced heron	0.2	0.1	0.6	0.1	0.1	1.9	0.8	0	0	0.2	0	0	0
White-fronted tern	0	0	0	0	0	0	0	0	0	0	0	0.1	0
Wrybill	0	0	0	0	0	0	0	0	0	0	0	0	0

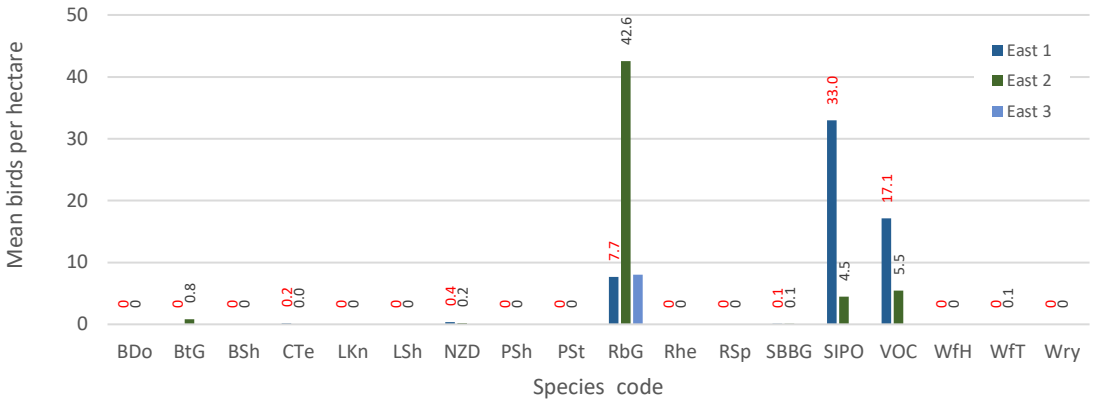

Figure 2: Mean birds recorded per hectare during high tide surveys at the eastern sites over all survey periods, with data labels provided for compartments East 1 (red) and East 2 (black). (Refer to Table 4 for species codes)

3.2.1.2 Low – mid tide activity

The additional winter data did not change the overall patterns of low tide activity on the eastern side of Northport.

Of the three compartments, the highest number (n=8841) and mean density (34.1 birds per hectare) of birds was recorded in East 2 during the low-mid tide surveys (refer to Map 24, Table 7 and Figure 3). The highest species richness (n=13) at East 2. The lowest species richness (n=7) was recorded in East 3 (refer to Map 24 and Table 7).

Table 7: Number of coastal bird species recorded during the low and mid tide eastern wading bird surveys

SURVEY LOCATION		No. SPECIES	TOTAL ABUNDANCE	MEAN BIRD DENSITY (PER Ha)	SURVEY PERIOD
Northport ↓ CINZ jetty	LW East 1	13	7293	16.0	• Spring / summer 2017/18 • Spring / summer 2019/20 • Winter 2021 • Winter 2022
	LW East 2	12	8814	34.1	• Spring / summer 2017/18 • Spring / summer 2019/20 • Winter 2021 • Winter 2022
	LW East 3	7	1861	14.1	• Spring / summer 2017/18 • Spring / summer 2019/20 • Winter 2021 • Winter 2022

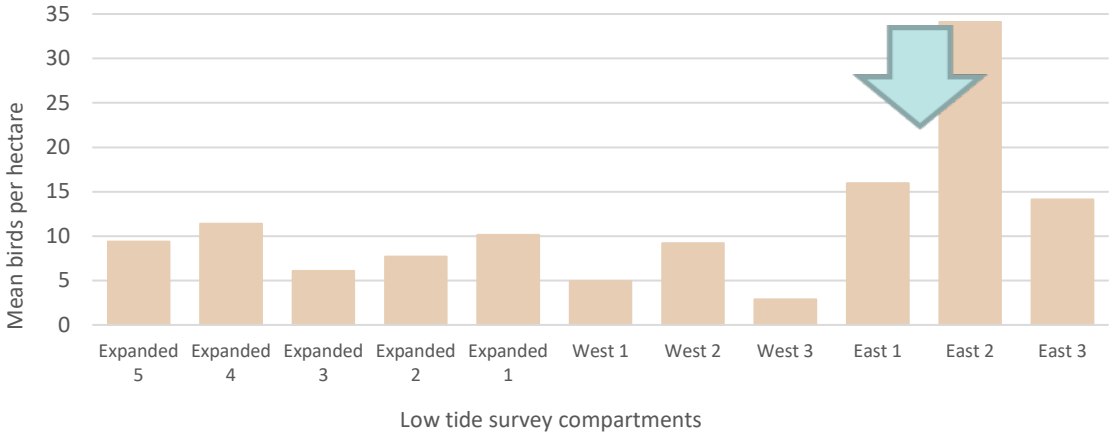

Figure 3: Mean density of birds recorded during low/mid tide surveys over all the survey periods. (Green arrow denotes the survey compartments in which the proposed reclamation is located)

The most abundant species recorded in East 1 were SIPO (mean = 36 birds per count; Table 8), followed by red-billed gull (mean = 34 birds per count; Table 8) and variable oystercatcher (mean = 20 birds per count; Table 8). Red-billed gull was the most abundant species recorded in East 2 (mean = 104 birds per count) (refer to Map 24 and Table 8). The same patterns were observed in the density of these species recorded at those sites (refer to Figure 4).

Table 8: Mean number of birds recorded per survey session during the low-mid tide wading bird surveys. Shaded column indicates the location of the proposed eastern reclamation)

SPECIES	MEAN No. BIRDS RECORDED PER SURVEY SESSION										
	Exp 5	Exp 4	Exp 3	Exp 2	Exp 1	West 1	West 2	West 3	East 1	East 2	East 3
Banded dotterel	0.0	0.08	0	0	0.19	2.00	0.71	0	0.03	0.01	0.00
Bar-tailed godwit	7.89	2.27	8.11	0.41	7.52	19.27	30.97	3.00	0	0.03	0.00
Black shag	0.07	0	0	0	0	0.01	0	0	0	0	0
Caspian tern	0.78	0.08	0	0.03	0.04	0.14	0.38	0.15	0.22	0.13	0.01
Lesser knot	0.11	0.15	0.19	0.10	0.04	22.22	44.38	6.42	0	0	0
Little shag	1.04	0.08	0.19	0.14	0	0	0.18	0	0	0	0
NZ dotterel	0.93	1.42	3.04	1.21	2.20	4.43	6.38	2.28	2.26	0.59	0.04
Pied shag	1.00	0.23	0.41	0.24	0.19	0.09	0.15	0.03	0.01	0.04	0.03
Pied stilt	2.26	1.73	2.26	0.38	0.26	0.68	1.58	0.97	0.09	0	0
Red-billed gull	57.74	41.69	35.37	7.10	9.30	16.81	28.68	10.04	34.08	103.61	23.61
Reef heron	0.04	0.04	0.07	0.10	0	0.09	0.11	0.06	0.04	0	0
Royal spoonbill	0.93	0.65	0.63	0.59	0.07	0.04	0.32	0.16	0	0	0
SBBG	14.00	8.81	4.07	0.14	1.48	1.84	6.04	0.42	0.83	0.80	0.37
SIPO	17.30	10.88	7.93	1.28	42.96	8.85	3.89	0.13	36.03	4.61	0.04
VOC	2.00	4.88	1.93	0.38	3.41	1.65	2.77	1.54	19.73	6.09	0.39
White-faced heron	3.81	1.54	3.41	0.86	0.78	0.56	2.06	0.72	0.09	0.04	0
White-fronted tern	0.48	0	0	0	0	0.06	2.18	0.01	1.30	0.01	0
Wrybill	0.04	0	0.26	0	0.04	0	0	0	0.01	0.01	0

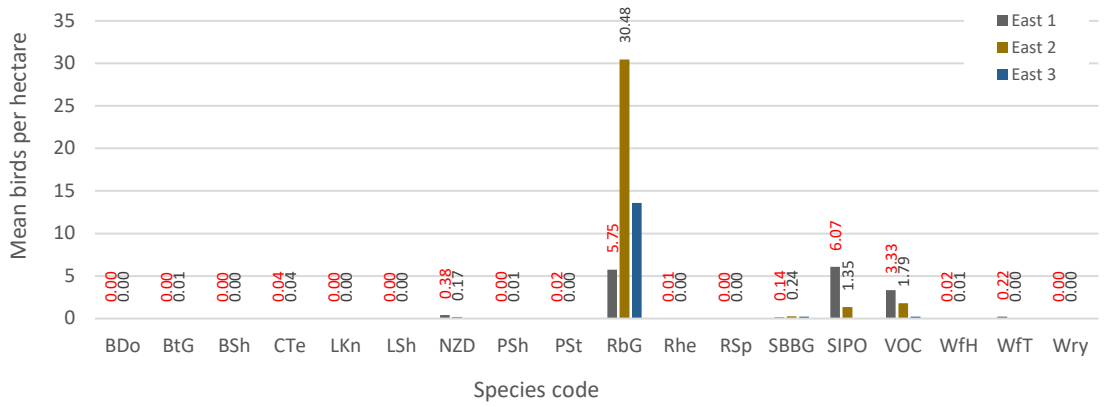

Figure 4: Mean birds recorded per hectare during low and mid tide surveys at the eastern sites over all the survey periods, with data labels provided for compartments East 1 (red) and East 2 (black). (Refer to Table 4 for species codes)

3.2.2 Northport

The additional winter data did not change the overall patterns of bird high tide activity recorded on the Northport site.

Ten species were recorded on the Northport site during high tide counts (refer to Map 23 and Figure 5), of which red-billed gull (mean = 19 birds per count) were the most abundant, followed by northern NZ dotterel (mean = 7 birds per count) and variable oystercatcher (mean = 4 birds per count).

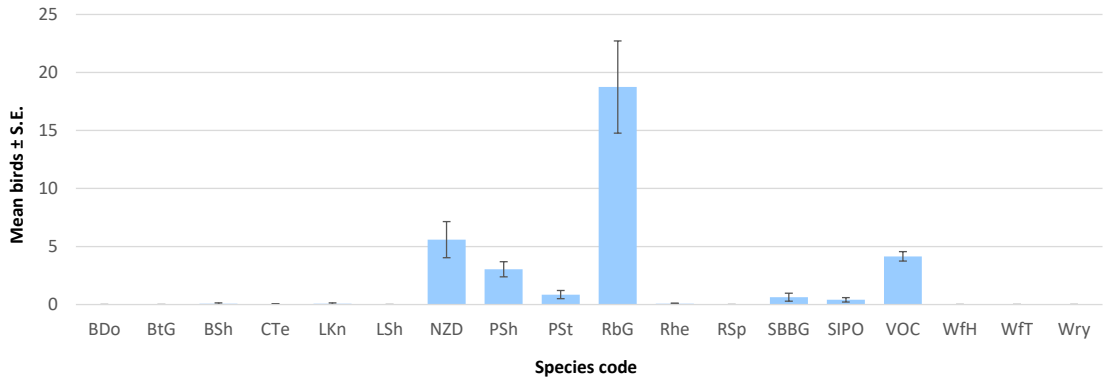

Figure 5: Mean (± S.E.) birds recorded during high tide surveys at Northport survey sites during all the survey periods. (Refer to Table 4 for species codes)

3.2.3 West of Northport

3.2.3.1 High tide activity

The additional winter data did not change the overall patterns of high tide activity on the western side of Northport.

For the five high tide survey compartments (West 1-3, Blacksmith's Creek and Wildlife Refuge) for which wading bird data was collected over four seasons (summer 2017/18 and 2019/20, and winter 2021 and 2022), Blacksmith's Creek high tide roost recorded the highest species richness (n=14) (refer to Table 9 and Map 23). In terms of overall bird abundance, West 2 recorded the greatest number of birds (n=2999) and highest mean density (31.4 birds per ha; Figure 6) during high tide counts over the four seasons (Table 9).

However, when the data collected from the Expanded survey areas over three seasons (summer 2019/20, and winter 2021 and 2022) are included, the highest mean density of birds (142 birds per ha) overall was recorded at Expanded 1 site (refer to Table 9 and Figure 6).

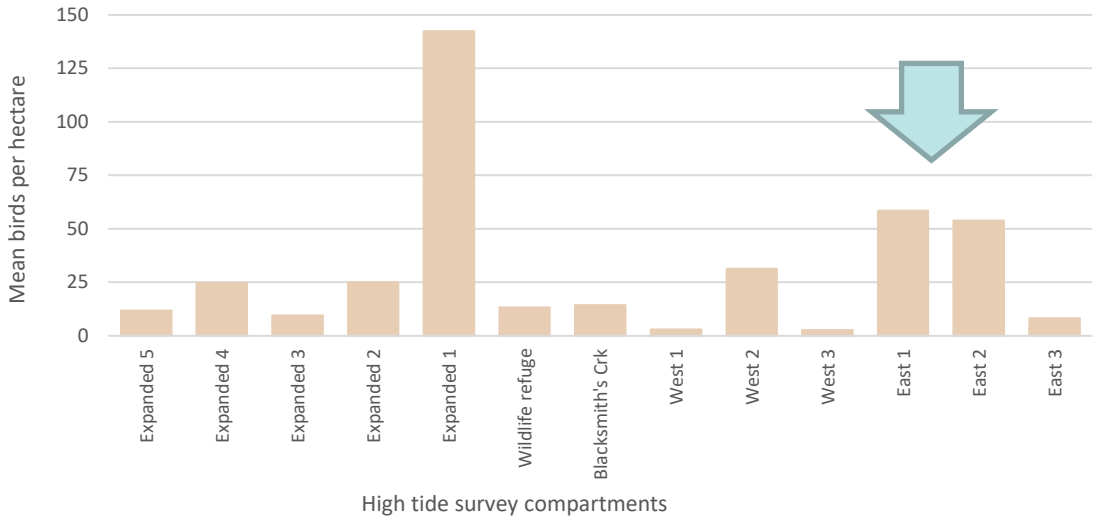

Figure 6: Mean density of birds recorded per hectare during high tide surveys (One Tree Point to Northport) over the 2017/18, 2019/20 and 2021 survey period. (Green arrow denotes the survey compartments in which the proposed reclamation is located)

Table 9: Number of coastal bird species recorded during the high tide western (and expanded) wading bird surveys

SURVEY LOCATION		No. SPECIES	TOTAL ABUNDANCE	MEAN BIRD DENSITY (PER Ha)	SURVEY PERIOD
One tree Point	Expanded 5	8	363	11.8	• Summer 2019/20 • Winter 2021 • Winter 2022
	Expanded 4	8	387	24.7	• Summer 2019/20 • Winter 2021 • Winter 2022
	Expanded 3	10	322	9.6	• Summer 2019/20 • Winter 2021 • Winter 2022
	Expanded 2	8	15	25	• Summer 2019/20 • Winter 2021 • Winter 2022
	Expanded 1	11	2033	142.4	• Summer 2019/20 • Winter 2021 • Winter 2022
	Wildlife refuge	9	218	13.3	• Spring / summer 2017/18 • Spring / summer 2019/20 • Winter 2021 • Winter 2022
	Blacksmith's Creek	14	1570	14.3	• Spring / summer 2017/18 • Spring / summer 2019/20 • Winter 2021 • Winter 2022
	HW West 1	5	377	2.9	• Spring / summer 2017/18 • Spring / summer 2019/20 • Winter 2021 • Winter 2022
	HW West 2	10	2999	31.4	• Spring / summer 2017/18 • Spring / summer 2019/20 • Winter 2021 • Winter 2022
Northport	HW West 3	11	176	2.7	• Spring / summer 2017/18 • Spring / summer 2019/20 • Winter 2021 • Winter 2022

Map 23 provides an overall (cumulative) picture of high tide activity based on all data collected during high tide counts, while the mean number of birds recorded during each high tide survey session is provided in Table 6. Notably, bar-tailed godwit and lesser knot were the most abundant species recorded in the high tide roosting flocks at compartment West 2 and Blacksmith's Creek (refer to Map 23, Table 6 and Figure 7).

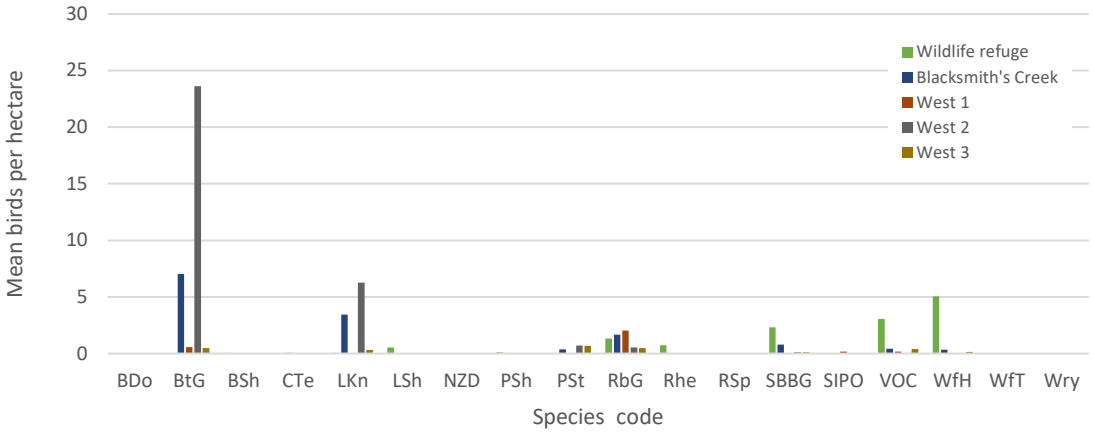

Figure 7: Mean birds per hectare recorded during high tide surveys at the western sites over the 2017/18, 2019/20 and 2021 survey periods. (Refer to Table 4 for species codes)

Map 25 presents the high tide data that were collected during the spring / summer 2019/20 and winter 2021 and 2022, as these were the time periods over which data were also collected for the Expanded area. SIPO were the most abundant species recorded during the high tide counts, with the majority recorded within compartment Expanded 1 (refer to Table 6 and Figure 8), adjacent to the Marsden Cove Marina Channel; notably, this high tide roost is in close proximity to Snake Bank which has been identified as an important foraging site for SIPO (Bioresearches, 2017).

With the exception of low numbers of red-billed gull, very few birds were recorded roosting in the remaining Expanded survey areas (refer to Map 25 and Figure 8).

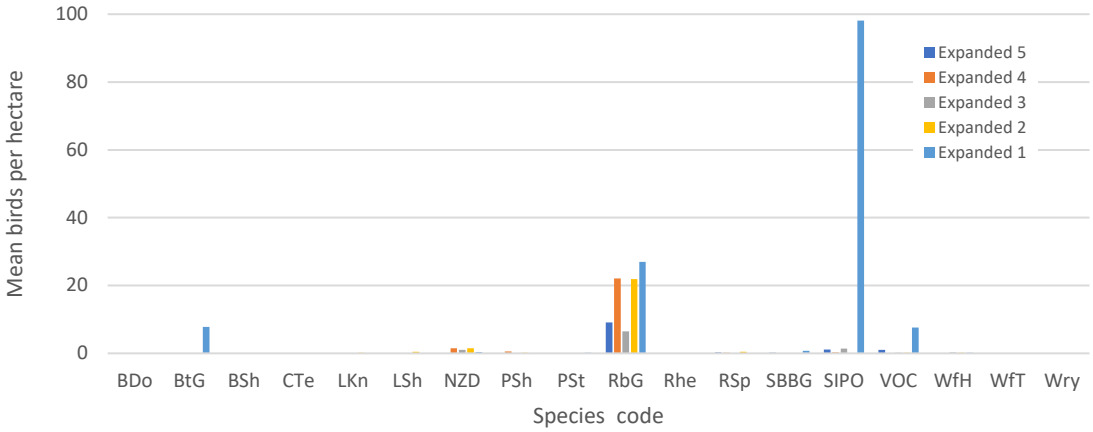

Figure 8: Mean birds per hectare recorded during high tide surveys at the expanded sites during summer 2019/20 and winter 2021 and 2022 survey periods. (Refer to Table 4 for species codes)

3.2.3.2 Low – mid tide activity

The additional winter data did not change the overall patterns of low tide activity on the western side of Northport.

For the three compartments (West 1-3) for which wading bird data was collected during the low and mid-tide phases over four seasons (spring / summer 2017/18 and 2019/20, and winter 2021 and 2022), highest species richness (n=16) and total bird abundance (n=10,332) were recorded at

West 2 (Table 10). Over the same period, the least number of birds (n=2049) were recorded in West 3, the survey compartment immediately adjacent to the port (Table 10).

Table 10: Number of coastal bird species recorded during the low and mid tide western (and expanded) wading bird surveys

SURVEY LOCATION		No. SPECIES	TOTAL ABUNDANCE	MEAN BIRD DENSITY (PER Ha)	SURVEY PERIOD
One Tree Point	Expanded 5	17	2981	9.4	• Summer 2019/20 • Winter 2021 • Winter 2022
	Expanded 4	15	1938	11.4	• Summer 2019/20 • Winter 2021 • Winter 2022
	Expanded 3	14	1832	6.1	• Summer 2019/20 • Winter 2021 • Winter 2022
	Expanded 2	14	376	7.7	• Summer 2019/20 • Winter 2021 • Winter 2022
	Expanded 1	15	1712	10.1	• Summer 2019/20 • Winter 2021 • Winter 2022
	LW West 1	16	6219	4.9	• Spring / summer 2017/18 • Spring / summer 2019/20 • Winter 2021 • Winter 2022
	LW West 2	16	10,332	9.2	• Spring / summer 2017/18 • Spring / summer 2019/20 • Winter 2021 • Winter 2022
Northport	LW West 3	14	2049	2.9	• Spring / summer 2017/18 • Spring / summer 2019/20 • Winter 2021 • Winter 2022

Figure 3(page 10) shows the mean number of birds recorded per hectare at each of the sites during low-mid tide surveys. Thus, even when accounting for differences in the size of the various compartments, the lowest density of birds was recorded within West 3, immediately adjacent to Northport. Of the western sites, the greatest density of birds was recorded in compartment Expanded 4 (Table 10 and Figure 3).

Map 24 provides an overall picture of activity based on all data collected over the low and mid-tide counts. Lesser knot were the most abundant species recorded, and while observed utilising all three western compartments, their average numbers (mean = 44 birds; Table 8) and densities (3.1 birds per hectare; Figure 9) were highest in West 2. Bar-tailed godwit were also prevalent in compartments West 1 and West 2 (refer to Table 8 and Figure 9). Northern NZ dotterel were recorded in all western compartments, but in relatively low numbers (refer to Table 8 and Figure 9).

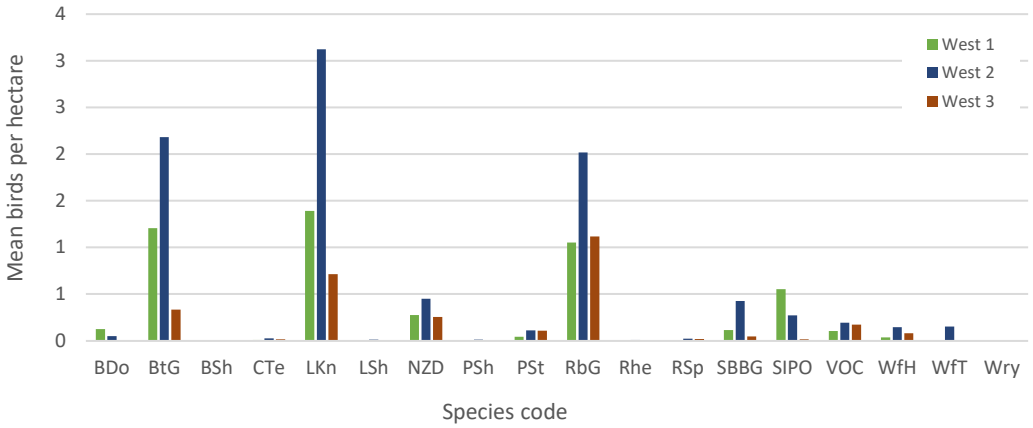

Figure 9: Mean birds recorded per hectare during low and mid tide surveys at the west (1-3) sites over all survey periods. (Refer to Table 4 for species codes)

Map 26 presents the low and mid-tide data that was collected during the spring / summer 2019/20 and winter 2021 and 2022 surveys, as these were the time periods over which data were also collected for the Expanded area. All Expanded areas were utilised during these tidal phases, however the mean bird density differed between the compartments; the highest mean bird density was recorded in Expanded 4 (11.4 birds per hectare) and the lowest in Expanded 3 (6.1 birds per hectare; Table 10). Red-billed gull were the predominant species recorded at Expanded Areas 2-5, while SIPO was the predominant species recorded at Expanded Area 1 (refer to Figure 10 and Map 26).

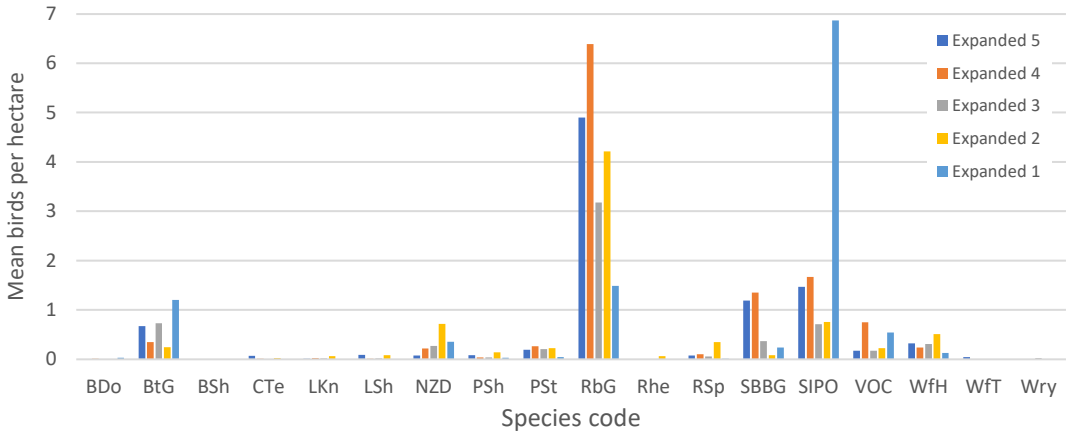

Figure 10: Mean birds recorded per hectare during low and mid tide surveys at the expanded sites during summer 2019/20 and winter 2021 and 2022 survey periods. (Refer to Table 4 for species codes)

3.3 Summary

Overall, the main findings from the inclusion of the winter 2022 data into the analysis of the wading bird survey data were as follows:

- Three new species not previously recorded were detected. A single Asiatic whimbrel in survey area Expanded 3 (Map 4), a single black-fronted tern in survey area Expanded 4

(Map 6), and 15 black-billed gull (all to the west of Northport; Map 6). All these observations were well away from the eastern expansion.

- The same patterns of high tide and low tide activity that had been reported previously (Boffa Miskell Ltd, 2022) were observed, with no meaningful changes in patterns, distribution or species numbers.

4.0 Assessment of Potential Effects

4.1 Direct / permanent loss of habitat

4.1.1 Potential construction effects

Boffa Miskell (2022) calculated 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 (Table 11) and high (Table 12) tides. That information was then used to determine to the magnitude of effect, and therefore the overall level of effect associated with the permanent loss of habitat during the construction phase of the project on those local Whangarei Harbour populations (Table 13). We note that it is likely the same birds that are present on the intertidal flats during low-mid tide may roost in the high tide compartments. As such, rather than taking a cumulative approach to the proportion of the population effected, we have based our assessment on the higher of the two (low-mid or high tide) and identified these in red text in Table 12.

Overall, the inclusion of the winter 2022 data did not result in the magnitude of effect changing, and as such the conclusions reached in the original coastal avifauna assessment (Boffa Miskell Ltd, 2022) regarding the levels of effect remain unchanged, as do the recommendations in regard to the creation of roosting habitat to address these effects.

Table 11: Mean number of birds recorded in compartment East 1 (E1) and / or East 2 (E2) during the low-mid tide wading bird surveys, and that as a proportion of the sum of the means of birds recorded across all survey sites and the Whangarei Harbour populations. (NB: Values that have changed based on the inclusion of the winter 2022 data are shown in strikethrough.)

SPECIES	WHANGAREI HARBOUR POPULATION (birds)	LOW-MID TIDE			
		Mean No. birds in E1 & E2	Sum of means all survey sites	Proportion of birds within E1 & E2	Proportion of Whangarei Hbr pop. within E1 & E2
Banded dotterel	700	0.04	3.0 ~~2.4~~	1.3% ~~1.7%~~	0.01%
Bar-tailed godwit	2800	0.03	79.5 ~~92.8~~	0.03%	0.00%
Black shag	10	0	0.1 ~~0.01~~	0	0.00%
Caspian tern	100	0.35 ~~0.38~~	2.0 ~~2.3~~	18.0% ~~16.6%~~	0.4%
Lesser knot	800	0	73.6 ~~81.3~~	0	0.00%
Little shag	10	0	1.6 ~~1.3~~	0	0.00%

SPECIES	WHANGAREI HARBOUR POPULATION (birds)	LOW-MID TIDE			
		Mean No. birds in E1 & E2	Sum of means all survey sites	Proportion of birds within E1 & E2	Proportion of Whangarei Hbr pop. within E1 & E2
NZ dotterel	80	2.85 ~~2.72~~	24.8 ~~24.06~~	11.5% ~~11.3%~~	3.6% ~~3.4%~~
Pied shag	50	0.05 ~~0.06~~	2.4 ~~1.7~~	2.2% ~~3.3%~~	0.1%
Pied stilt	800	0.09 ~~0.10~~	10.2 ~~10.3~~	0.9% ~~0.95%~~	0.01%
Red-billed gull	2380	137.68 ~~139.41~~	368.0 ~~328.95~~	37.4% ~~42.4%~~	5.8% ~~5.9%~~
Reef heron	20	0.04	0.6	7.0% ~~6.8%~~	0.2%
Royal spoonbill	40	0	3.4 ~~1.6~~	0	0.00%
SBBG	1000	1.63 ~~1.76~~	38.8 ~~47.7~~	4.2% ~~3.7%~~	0.2%
SIPO	2500	40.63 ~~42.76~~	133.9 ~~136.6~~	30.2% ~~31.3%~~	1.6% ~~1.7%~~
VOC	350	25.81 ~~27.51~~	44.8 ~~47.9~~	57.7% ~~57.4%~~	7.4% ~~7.9%~~
White-faced heron	100	0.13 ~~0.11~~	13.9 ~~12.9~~	0.9%	0.1%
White-fronted tern	100	1.31 ~~1.42~~	4.0 ~~4.6~~	32.4% ~~31.3%~~	1.3% ~~1.4%~~
Wrybill	150	0.03	0.4 ~~0.08~~	7.3% ~~35.2%~~	0.02%

Table 12: Mean number of birds recorded in compartment East 1 (E1) and / or East 2 (E2) during the high wading bird surveys, and that as a proportion of the sum of the means of birds recorded across all survey sites and the Whangarei Harbour populations. (NB: Values that have changed based on the inclusion of the winter 2022 data are shown in strikethrough.)

SPECIES	WHANGAREI HARBOUR POPULATION (birds)	HIGH TIDE			
		Mean No. birds in E1 & E2	Sum of means all survey sites	Proportion of birds within E1 & E2	Proportion of Whangarei Hbr pop. within E1 & E2
Banded dotterel	700	0	0	0	0
Bar-tailed godwit	2800	1.52 ~~1.75~~	79.2 ~~88.54~~	1.92% ~~1.98%~~	0.05% ~~0.06%~~
Black shag	10	0	0.02 ~~0.03~~	0	0
Caspian tern	100	0.47 ~~0.53~~	0.84 ~~0.85~~	56.0% ~~61.76%~~	0.47% ~~0.53%~~
Lesser knot	800	0	22.9 ~~24.75~~	0	0
Little shag	10	0.02 ~~0.03~~	0.4	5.01% ~~5.81%~~	0.21% ~~0.25%~~
NZ dotterel	80	1.29 ~~1.15~~	5.6 ~~3.58~~	23.15% ~~32.12%~~	1.6% ~~1.4%~~
Pied shag	50	0.02 ~~0.03~~	1.1 ~~0.66~~	1.98% ~~3.79%~~	0.04% ~~0.05%~~
Pied stilt	800	0.02 ~~0.03~~	3.8 ~~3.48~~	0.56% ~~0.72%~~	0.003%
Red-billed gull	2380	94.43 ~~96.98~~	198.8 ~~151.64~~	47.51% ~~63.95%~~	4.0%
Reef heron	20	0.02 ~~0.03~~	0.4 ~~0.33~~	5.9% ~~7.6%~~	0.11% ~~0.13%~~
Royal spoonbill	40	0	1.0 ~~0.54~~	0	0
SBBG	1000	0.49 ~~0.58~~	4.8 ~~5.66~~	10.2%	0.05% ~~0.06%~~
SIPO	2500	85.47 ~~89.93~~	173.5 ~~165.27~~	49.3% ~~54.4%~~	3.4% ~~3.6%~~
VOC	350	50.06 ~~50.28~~	62.3 ~~61.93~~	80.4% ~~81.2%~~	14.3% ~~14.4%~~

SPECIES	WHANGAREI HARBOUR POPULATION (birds)	HIGH TIDE			
		Mean No. birds in E1 & E2	Sum of means all survey sites	Proportion of birds within E1 & E2	Proportion of Whangarei Hbr pop. within E1 & E2
White-faced heron	100	0	4.0 ~~3.74~~	0	0
White-fronted tern	100	0.11 ~~0.13~~	0.11 ~~0.13~~	100% ~~96.15%~~	0.11% ~~0.14%~~
Wrybill	150	0.04 ~~0.05~~	0.1 ~~0.08~~	63.2% ~~62.5%~~	0.03%

Table 13: Assessment of potential effects of permanent habitat loss on the local coastal avifauna populations without mitigation
(NB: Values that have changed based on the inclusion of the winter 2022 data are shown in strikethrough.)

SPECIES	EST. WHANGAREI HBR POP	PROPORTION WHANG. HBR POP WITHIN E1 &/or E2		VALUE[6]	MAGNITUDE OF EFFECT[7]	LEVEL OF EFFECT[8]
		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% ~~0.06%~~	High	Negligible	Very Low
Black shag	>10 birds	0	0	-	-	-
Caspian tern	50-100 pairs	0.35% ~~0.38%~~	0.47% ~~0.53%~~	Very High	Negligible	Low
Lesser knot	~800 birds	0	0	-	-	-
Little shag	>10 birds	0	0.21% ~~0.25%~~	Moderate	Negligible	Very Low
NZ dotterel	~80 birds	3.6% ~~3.4%~~	1.6% ~~1.4%~~	Very High	Low	Moderate
Pied shag	>50 birds	0.1%	0.04% ~~0.05%~~	Moderate	Negligible	Very Low
Pied stilt	~800 birds	0.01%	0.003%	Low	Negligible	Very Low
Red-billed gull	>1,190 pairs	5.8% ~~5.9%~~	4.075%	High	Low	Low
Reef heron	>10 pairs?	0.2%	0.11% ~~0.13%~~	Very High	Negligible	Low
Royal spoonbill	~40 birds	0	0	-	-	-
SBBG	Abundant	0.16% ~~0.18%~~	0.05% ~~0.06%~~	Low	Negligible	Very Low
SIPO	~2,500 birds	1.6% ~~1.7%~~	3.4% ~~3.6%~~	High	Low	Low
VOC	~350 birds	7.4% ~~7.9%~~	14.3% ~~14.4%~~	Moderate	Moderate	Moderate
White-faced heron	~100 birds	0.1%	0	Low	Negligible	Very Low
White-fronted tern	>100 birds	1.3% ~~1.4%~~	0.11% ~~0.13%~~	High	Low	Low
Wrybill	~150 birds	0.02%	0.03%	Very High	Negligible	Low

4.2 Injuries and / or mortalities

The data collected during the winter 2022 surveys has not changed the overall level of potential effects of injuries and / or mortalities associated with the project. As such, the level of potential effects determined by Boffa Miskell (2022) during the construction (Table 14) and operational

[6] Refer to Table 1, page 7
[7] Refer to Table 2, page 9
[8] Refer to Table 3, page 10

(Table 15) phases remain the same. So too does the recommendation that an Avifauna Management Plan be prepared and implemented by a suitably qualified ornithologist in order to direct impacts and manage kororā and nesting variable oystercatcher.

Table 14: Assessment of potential effects of construction mortalities on the local coastal avifauna populations

SPECIES	EST. WHANGAREI HBR POP	ECOLOGICAL VALUE[5]	MAGNITUDE OF EFFECT[7]	LEVEL OF EFFECT[8]
Kororā	>100 birds	High	Negligible	Very Low
VOC	~350 birds	Moderate	Negligible	Very Low

Table 15: Assessment of potential effects of operational mortalities of nesting birds on local coastal avifauna populations

SPECIES	EST. WHANGAREI HBR POP	ECOLOGICAL VALUE[5]	MAGNITUDE OF EFFECT[7]	LEVEL OF EFFECT[8]	ECOLOGICAL VALUE[5]
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

4.3 Disturbance and displacement

4.3.1 Potential construction effects

Boffa Miskell (2022) calculated 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 (Table 11) and high (Table 12) tides. Given the area of habitat that will be disturbed during construction relative to the wider available area, and the level of foraging and roosting activity by species in compartments East 1 and East 2, we have determined the potential effects of construction disturbance and displacement on the local (Whangarei Harbour) coastal avifauna populations of species utilising that area as outlined in Table 16. We note again that we have based our assessment on the higher of the two counts (low-mid or high tide) and identified these in red text in Table 16. Further, it is important to note that the potential effects of disturbance and displacement will be temporary for the duration of the construction.

While the inclusion of the winter 2022 survey data has resulted in some slight changes (refer to values in Table 16 with strikethrough) in the proportion of local populations that may be impacted, in no instance did these changes result in a change in magnitude based on the population criteria identified in Section 2.3. As such, the level of effects remain the same as determined by Boffa Miskell (2022), and so the measures identified by Boffa Miskell (2022) to address the effects on northern NZ dotterel and variable oystercatcher are still required. As is the need for the implementation of underwater noise mitigation during those piling activities using hydraulic impact hammer 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. The form of noise mitigation to be used will be informed through the results of underwater noise modelling, and details provided in the project's Construction Environmental Management Plan and Avifauna Management Plan.

Table 16: Assessment of potential effects of construction disturbance and displacement on the local coastal avifauna populations without mitigation (NB: Values that have changed based on the inclusion of the winter 2022 data are shown in strikethrough.)

SPECIES	EST. WHANGAREI HBR POP	PROPORTION WHANG. HBR POP WITHIN E1 &/or E2		ECOLOGICAL VALUE[5]	MAGNITUDE OF EFFECT[7]	LEVEL OF EFFECT[8]
		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% ~~0.06%~~	High	Negligible	Very Low
Black shag	>10 birds	0	0	-	-	-
Caspian tern	50-100 pairs	0.35% ~~0.38%~~	0.47% ~~0.53%~~	Very High	Negligible	Low
Lesser knot	~800 birds	0	0	-	-	-
Little shag	>10 birds	0	0.21% ~~0.25%~~	Moderate	Negligible	Very Low
NZ dotterel	~80 birds	3.6% ~~3.4%~~	1.6% ~~1.4%~~	Very High	Low	Moderate
Pied shag	>50 birds	0.1%	0.04% ~~0.05%~~	Moderate	Negligible	Very Low
Pied stilt	~800 birds	0.01%	0.003%	Low	Negligible	Very Low
Red-billed gull	>1,190 pairs	5.8% ~~5.9%~~	4.075%	High	Low	Low
Reef heron	>10 pairs?	0.2%	0.11% ~~0.13%~~	Very High	Negligible	Low
Royal spoonbill	~40 birds	0	0	-	-	-
SBBG	Abundant	0.16% ~~0.18%~~	0.05% ~~0.06%~~	Low	Negligible	Very Low
SIPO	~2,500 birds	1.6% ~~1.7%~~	3.4% ~~3.6%~~	High	Low	Low
VOC	~350 birds	7.4% ~~7.9%~~	14.3% ~~14.4%~~	Moderate	Moderate	Moderate
White-faced heron	~100 birds	0.1%	0	Low	Negligible	Very Low
White-fronted tern	>100 birds	1.3% ~~1.4%~~	0.11% ~~0.13%~~	High	Low	Low
Wrybill	~150 birds	0.02%	0.03%	Very High	Negligible	Low
Kororā	>100 birds	-	-	High	Low	Low

4.3.2 Potential operational effects

Based on a 45 m disturbance zone around the Project footprint, disturbance from the operation of the VFG eastern reclamation could result in an additional effective loss of 3.73 ha of intertidal foraging habitat. In addition, there may also be an effect on those 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.

Boffa Miskell (2022) calculated the proportion of the local Whangarei Harbour population for each species recorded in East 3 (adjacent to the eastern reclamation footprint) during high (Table 17) and low-mid (Table 18) tides. That information was then 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 19). Again we have based our assessment on the higher count of the two (low-mid or high tide) and identified these in red text in Table 19.

Overall, the inclusion of the winter 2022 data did not result in the magnitude of effect changing, and as such the conclusions reached in the original coastal avifauna assessment (Boffa Miskell Ltd, 2022) regarding the levels of effect remain unchanged.

Table 17: Mean number of birds recorded in compartment East 3 (E3) during the high tide wading bird surveys, and that as a proportion of the sum of the means of birds recorded across all survey sites and the Whangarei Harbour populations. (NB: Values that have changed based on the inclusion of the winter 2022 data are shown in strikethrough.)

SPECIES	WHANGAREI HARBOUR POPULATION (birds)	HIGH TIDE			
		Mean No. birds in E3	Sum of means all survey sites	Proportion of birds within E3	% of Whang. Hbr pop. within E3
Banded dotterel	700	0	0	0	0
Bar-tailed godwit	2800	0	79.2 ~~88.54~~	0	0
Black shag	10	0	0.02 ~~0.03~~	0	0
Caspian tern	100	0	0.84 ~~0.85~~	0	0
Lesser knot	800	0	22.9 ~~24.75~~	0	0
Little shag	10	0	0.4	0	0
NZ dotterel	80	0.03 ~~0.02~~	5.6 ~~3.58~~	0.45% ~~0.47%~~	0.03% ~~0.02%~~
Pied shag	50	0	1.1 ~~0.66~~	0	0
Pied stilt	800	0	3.8 ~~3.48~~	0	0
Red-billed gull	2380	12.03 ~~8.05~~	198.8 ~~151.64~~	6.05% ~~5.31%~~	0.51% ~~0.34%~~
Reef heron	20	0	0.4 ~~0.33~~	0	0
Royal spoonbill	40	0	1.0 ~~0.54~~	0	0
SBBG	1000	0.13 ~~0.08~~	4.8 ~~5.66~~	2.59% ~~1.48%~~	0.013% ~~0.008%~~
SIPO	2500	0	173.5 ~~165.27~~	0	0
VOC	350	0.13 ~~0.08~~	62.3 ~~61.93~~	0.2% ~~0.14%~~	0.036% ~~0.024%~~
White-faced heron	100	0	4.0 ~~3.74~~	0	0
White-fronted tern	100	0	0.11 ~~0.13~~	0	0
Wrybill	150	0.03 ~~0.02~~	0.1 ~~0.08~~	36.76% ~~20.91%~~	0.017% ~~0.011%~~

Table 18: Mean number of birds recorded in compartment East 3 (E3) during the low-mid tide wading bird surveys, and that as a proportion of the sum of the means of birds recorded across all survey sites and the Whangarei Harbour populations. (NB: Values that have changed based on the inclusion of the winter 2022 data are shown in strikethrough.)

SPECIES	WHANGAREI HARBOUR POPULATION (birds)	LOW-MID TIDE			
		Mean No. birds in E3	Sum of means all survey sites	Proportion of birds within E3	% of Whang. Hbr pop. within E3
Banded dotterel	700	0	3.0 ~~2.4~~	0	0
Bar-tailed godwit	2800	0	79.5 ~~92.8~~	0	0
Black shag	10	0	0.1 ~~0.01~~	0	0
Caspian tern	100	0.01	2.0 ~~2.3~~	0.67% ~~0.35%~~	0.013% ~~0.008%~~

SPECIES	WHANGAREI HARBOUR POPULATION (birds)	LOW-MID TIDE			
		Mean No. birds in E3	Sum of means all survey sites	Proportion of birds within E3	% of Whang. Hbr pop. within E3
Lesser knot	800	0	73.6 ~~81.3~~	0	0
Little shag	10	0	1.6 ~~1.3~~	0	0
NZ dotterel	80	0.04 ~~0.02~~	24.8 ~~24.06~~	0.16% ~~0.10%~~	0.05% ~~0.03%~~
Pied shag	50	0.03 ~~0.02~~	2.4 ~~1.7~~	1.09% ~~0.95%~~	0.05% ~~0.03%~~
Pied stilt	800	0	10.2 ~~10.3~~	0	0
Red-billed gull	2380	23.61 ~~8.04~~	368.0 ~~328.95~~	6.41% ~~2.44%~~	0.992% ~~0.338%~~
Reef heron	20	0	0.6	0	0
Royal spoonbill	40	0	3.4 ~~1.6~~	0	0
SBBG	1000	0.37 ~~0.23~~	38.8 ~~47.7~~	0.95% ~~0.48%~~	0.037% ~~0.023%~~
SIPO	2500	0.04 ~~0.02~~	133.9 ~~136.6~~	0.03% ~~0.02%~~	0.002% ~~0.001%~~
VOC	350	0.39 ~~0.23~~	44.8 ~~47.9~~	0.88% ~~0.47%~~	0.113% ~~0.065%~~
White-faced heron	100	0	13.9 ~~12.9~~	0	0
White-fronted tern	100	0	4.0 ~~4.6~~	0	0
Wrybill	150	0	0.4 ~~0.08~~	0	0

Table 19: Assessment of potential effects of operational disturbance and displacement on the local coastal avifauna populations

SPECIES	EST. WHANGAREI HBR POP	PROPORTION WHANG. HBR POP WITHIN E3		ECOLOGICAL VALUE[5]	MAGNITUDE OF EFFECT[7]	LEVEL OF EFFECT[8]
		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% ~~0.008%~~	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%~~	0.03% ~~0.02%~~	Very High	Negligible	Low
Pied shag	>50 birds	0.05% ~~0.03%~~	0	Moderate	Negligible	Very Low
Pied stilt	~800 birds	0	0	-	-	-
Red-billed gull	>1,190 pairs	0.99% ~~0.34%~~	0.51% ~~0.34%~~	High	Negligible	Very Low
Reef heron	>10 pairs?	0	0	-	-	-
Royal spoonbill	~40 birds	0	0	-	-	-
SBBG	Abundant	0.037% ~~0.023%~~	0.013% ~~0.008%~~	Low	Negligible	Very Low

SPECIES	EST. WHANGAREI HBR POP	PROPORTION WHANG. HBR POP WITHIN E3		ECOLOGICAL VALUE[5]	MAGNITUDE OF EFFECT[7]	LEVEL OF EFFECT[8]
		Low-mid tide	High tide			
SIPO	~2,500 birds	0.002% ~~0.001%~~	0	-	-	-
VOC	~350 birds	0.113% ~~0.065%~~	0.036% ~~0.024%~~	Moderate	Negligible	Very Low
White-faced heron	~100 birds	0	0	-	-	-
White-fronted tern	>100 birds	0	0	-	-	-
Wrybill	~150 birds	0	0.017% ~~0.011%~~	Very High	Negligible	Low

4.4 Food supply and foraging ability

The data collected during the winter 2022 surveys has not changed the overall level of potential effects on coastal avifauna food supply and foraging ability associated with the project. As such, the level of potential effects determined by Boffa Miskell (2022) remain the same (Table 20).

Table 20: 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[5]	MAGNITUDE OF EFFECT[7]	LEVEL OF EFFECT[8]
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

4.5 Artificial lighting

The data collected during the winter 2022 surveys has not changed the overall level of potential effects on coastal avifauna from artificial lighting associated with the project. As such, the level of potential effects determined by Boffa Miskell (2022) remain the same (Table 21).

Table 21: 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[5]	MAGNITUDE OF EFFECT[7]	LEVEL OF EFFECT[8]
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

4.6 Pollution

The data collected during the winter 2022 surveys has not changed the overall level of potential effects of pollution associated with the project on coastal avifauna. As such, the level of potential effects determined by Boffa Miskell (2022) during the construction (Table 22) and operational (Table 23) phases remain the same.

Table 22: Assessment of potential effects of construction-related pollution on local populations of coastal avifauna

SPECIES	EST. WHANGAREI HBR POP	ECOLOGICAL VALUE[5]	MAGNITUDE OF EFFECT[7]	LEVEL OF EFFECT[8]
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

SPECIES	EST. WHANGAREI HBR POP	ECOLOGICAL VALUE[5]	MAGNITUDE OF EFFECT[7]	LEVEL OF EFFECT[8]
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

Table 23: Assessment of potential effects of pollution on local populations of coastal avifauna

SPECIES	EST. WHANGAREI HBR POP	ECOLOGICAL VALUE[9]	ECOLOGICAL VALUE[5]	MAGNITUDE OF EFFECT[7]
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

[9] Refer to Table 1, page 7

SPECIES	EST. WHANGAREI HBR POP	ECOLOGICAL VALUE[9]	ECOLOGICAL VALUE[5]	MAGNITUDE OF EFFECT[7]
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

4.7 Re-creation of high tide roost habitat

The location of the proposed high tide roost within the intertidal zone 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 has been overlaid on the coastal avifauna and benthic macro-invertebrate maps (Maps 9-22) for wading and shorebird species that primarily forage in the intertidal zone.

Only one bird was recorded foraging within the footprint of the proposed high-tide roost during the winter 2022 survey, that being a single bar-tailed godwit (Table 24). As such, a total of 98 birds were recorded over the course of all the shorebird surveys under the footprint of the proposed high tide roost and comprised the following species (Table 24): northern NZ dotterel (Map 9), lesser knot (Map 13), pied stilt (Map 14), SBBG (Map 19), white-faced heron (Map 21), Caspian tern and bar-tailed godwit. Given these species were recorded during the low-mid tide surveys, we have assumed that these birds were utilising this area to forage. As such, the proposed high tide roost will result in the loss of approximately 4,573 m^2 of foraging habitat for those species.

Table 24: Species and number of coastal birds recorded within the proposed sandbank footprint

SPECIES	No. BIRDS	DATE OBSERVED
Lesser knot	30	20/12/2017
Lesser knot	50	6/11/2019
Pied stilt	1	4/06/2021
White-faced heron	1	28/06/2021
NZ dotterel	2	5/07/2021
Southern black-backed gull	11	13/07/2021
Caspian tern	1	20/07/2021
Caspian tern	1	25/07/2021
Bar-tailed godwit	1	29/6/22

Given the addition of only a single bar-tailed godwit, the potential level of effect of the re-creation of the high tide roost to the west of Northport on local (wider Whangarei Harbour) coastal avifauna species remains the same as previously determined and outlined below in Table 25.

Table 25: 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 POPULATION	ECOLOGICAL VALUE[10]	MAGNITUDE OF EFFECT[11]	LEVEL OF EFFECT[12]
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%[13]	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	-	-

4.8 Summary of potential effects

A summary of the potential effects identified in Sections 4.1-4.7, based on the implementation of the management and mitigation measures identified, is provided in Table 26.

[10] Refer to Table 1, page 7

[11] Refer to Table 2, page 9

[12] Refer to Table 3, page 10

[13] Based on a conservative approach of assuming 50 pairs (i.e. the lower range of the estimated Whangarei Harbour population)

Table 26: 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	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

5.0 Conclusions

- The key results of the winter 2022 wading bird data were as follows:
  - Three new species not previously recorded were detected. A single Asiatic whimbrel in survey area Expanded 3 (Map 4), a single black-fronted tern in survey area Expanded 4 (Map 6), and 15 black-billed gull (all to the west of Northport; Map 6). All these observations were well away from the eastern expansion.
  - The same patterns of high tide and low tide activity that had been reported previously (Boffa Miskell Ltd, 2022) were observed, with no meaningful changes in patterns, distribution or species numbers.
- The updated assessment based on these results determined that the level of effects identified by Boffa Miskell (2022) are unchanged.
- As such the measures outlined in the original assessment to address the effects of the project remain the same and must be implemented. However, the results of the winter 2022 data have not resulted in the requirement of any additional measures.

6.0 References

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Appendix 1: Winter 2022 survey effort

N° of survey	1
Date	15 & 16/06/2022
Surveyors	Daniel Ahern Cat Davis
Weather	15/06: Rain at times and up to ~10knot winds

Notes

Compartment	Low Tide	Mid Tide	High Tide
	15/06/2022	**15/06/2022**	**16/06/2022**
East Site 1	1300-1310	1030-1045	0755-0805
East Site 2	1310-1315	1045-1050	0805-0810
East Site 3	13115-1320	1050-1055	0810-0815
West Site 3	1330-1345	1125-1130	0905-0910
West Site 2	1355-1405	1145-1155	0920-0930
West Site 1	11420-1435	1155-1205	0930-0935
Expanded Site 1	1325 – 1335 People with drag net and boat in shallows	1545 – 1115	0815 – 0820 Person feeding seagulls
Expanded Site 2	1345 – 1355	1115 – 1125	0825 – 0835
Expanded Site 3	1400 – 1435	1135 – 1200 Dog on beach but not disturbing birds	0840 – 0850
Expanded Site 4	1425 – 1435	1215 – 1225	0850 – 0905
Expanded Site 5	1440 - 1500	1230 - 1250	0905 – 0910 Beach entirely covered by tide
Port Site	-	-	0815-0845

N° of survey	2
Date	30/06/2022 & 01/07/2022
Surveyors	Daniel Ahern Cat Davis
Weather	Sunny, 15-20 knots from SW

Notes

Compartment	Low Tide	Mid Tide	High Tide
	30/06/2022	**30/06/2022**	**01/07/2022**
East Site 1	1335 – 1340	1045 – 1050	0820 – 0825
East Site 2	1340 – 1345	1050 – 1055	0825 – 0830
East Site 3	1345 – 1350	1055 – 1100	0830 – 0835
West Site 3	1400 – 1410	1120 – 1130	0940 – 0950
West Site 2	1425 – 1435	1140 – 1150	1000 – 1005
West Site 1	1435 - 1445	1205 - 1215	1005 – 1010
Expanded Site 1	1330 – 1340	1040 – 1050	0820 – 0830
Expanded Site 2	1345 – 1405	1100 -1105	0840 – 0845
Expanded Site 3	1410 – 1425	1115 – 1125	0850 - 0905 Dog on beach
Expanded Site 4	1435 – 1445	1130 – 1140	0910 – 0915
Expanded Site 5	1450 – 1510 Person fishing on outer bank outside of compartment with many gulls and oyster catchers around (too far to id)	1145 - 1155	0920 – 0925
Port Site	-	-	0840 – 0850

N° of survey	3
Date	11/07/2022
Surveyors	Marie Knue Pamela Kane-Sanderson
Weather	Light rain turning heavy in the afternoon; 15-25 knots; 16 °C Had to cancel high tide survey due to heavy rain and poor visibility.

Notes

Compartment	Low Tide	Mid Tide	High Tide
Conditions	Overcast/raining, 5-10 knots, 14 °C	Overcast/raining, ~25 knots, 16 °C	Heavy rain, gusting over 25 knots, 15 °C
East Site 1	1000 – 1010 Dog being walked on beach	1315 – 1320	1630 – 1640 Limited visibility due to heavy rain. Only larger sp able to be identified
East Site 2	1010 – 1020 Dog being walked on beach	1320 – 1325	
East Site 3	1020 – 1025 Ppl fishing off beach	1325 – 1330	
West Site 3	1045 – 1055	1340 – 1345	Cancelled due to heavy rain/poor visibility
West Site 2	1115 – 1125	1400 – 1410	
West Site 1	1135 – 1145 Dog being walked on beach	1420 – 1425	
Expanded Site 1	1000 - 1010	1300 – 1310	Start Survey 1630 Drive along compartments; Heavy rain and winds No birds Finish Survey 1700
Expanded Site 2	1020 – 1030	1325 – 1335	
Expanded Site 3	1045 – 1055	1350 – 1400	
Expanded Site 4	1105 – 1115	1405 – 1415	
Expanded Site 5	1135 – 1145 4 Fisherman/shellfish collectors out near spit.	1420 – 1430	
Port Site	-	-	1600 - 1630

N° of survey	4
Date	18/07/2022
Surveyors	Marie Knue Cat Davis
Weather	Partially sunny with light rain in the afternoon; 5-10 knots; 10 - 16 °C

Notes

Compartment	Low Tide	Mid Tide	High Tide
Conditions	Overcast, light rain, 10 knots, 16°C	Sunny, 10 knots, 16°C	Overcast, 5 knots, 10°C
East Site 1	1540 – 1545	1310 – 1315	1010 – 1015
East Site 2	1545 – 1550	1315 - 1320	1015 – 1020
East Site 3	1550 - 1555	1320 – 1325	1020 – 1025
West Site 3	1605 – 1615	1340 - 1345	1115 – 1120 (no birds observed)
West Site 2	1630 – 1640	1410 – 1420	1135 – 1140
West Site 1	1645 - 1655	1430 - 1435	1140 - 1145
Expanded Site 1	1500 – 1510	1315 – 1320	1020 – 1030 Two people standing on beach
Expanded Site 2	1520 – 1540	1325 – 1330	1030 - 1035
Expanded Site 3	1600 – 1620	1345 – 1350 People at northern end of compartment playing in the water	1045 – 1050
Expanded Site 4	1620 – 1630	1350 – 1400	1055 – 1100
Expanded Site 5	1630 – 1650	1400 – 1410	1100 – 1105
Port Site	-	-	1035 – 1105

N° of survey	5
Date	01/08/2022
Surveyors	Marie Knue Jacqui Wairepo
Weather	Sunny, 0-5knots; 10 - 15 °C

Notes

Compartment	Low Tide	Mid Tide	High Tide
Conditions	Sunny, 0-5 knots, 10°C	Sunny, 0-5 knots, 15°C	Sunny overcast, 5 knots, 10°C
East Site 1	1505 – 1510	1220 – 1225 Dog running along the beach	0910 – 0920
East Site 2	1510 – 1515	1225 – 1230	0920 – 0925
East Site 3	1515 – 1520 People fishing off beach	1230 – 1240	0925-0930
West Site 3	1540 – 1550	1250 – 1300	0950 – 1000 Large group of people walking along mangroves
West Site 2	1605 – 1620	1310 – 1320	1015 - 1025 Large group of people walking along mangroves
West Site 1	1630 – 1640	1320 – 1330	1025 - 1030
Expanded Site 1	1509 – 1519 Overcast, cool, light breeze	1223 – 1233 Cool, light breeze, overcast	0932 – 0942 Warm, sunny, light breeze
Expanded Site 2	1530 – 1540 Warm, sunny, no breeze	1241 – 1251	0953 – 1003
Expanded Site 3	1551 – 1601	1257 – 1307	1014 – 1024 Lady walked through with dog
Expanded Site 4	1614 – 1624	1313 – 1323	1040 – 1050 Warm, sunny, no breeze
Expanded Site 5	1633 - 1643	1326 – 1336	1054 - 1104
Port Site	-	-	Survey could not be completed due to port cancellation

N° of survey	6
Date	03/08/2022
Surveyors	Marie Knue Jacqui Wairepo
Weather	Sunny, 0-5knots; 10 - 15 °C

Notes

Compartment	Low Tide	Mid Tide	High Tide
Conditions	Overcast, 0-5knots, 16°C	Overcast/sunny, 0-5 knots, 16°C	Sunny, 0-5knots, 15°C
East Site 1	1615 – 1620	1330 – 1340	1030 – 1035
East Site 2	1620 – 1625	1340 – 1350	1035 – 1040
East Site 3	1625 – 1630	1350 – 1400	1040 – 1045
West Site 3	1645 – 1700	1410 – 1420	1135 – 1140
West Site 2	1715 – 1725	1430 – 1440 Two dogs running on beach	1155 – 1205
West Site 1	1740 – 1745 Dog running on beach	1440 – 1450	1205 – 1210 People walking on beach
Expanded Site 1	1417 – 1427 Overcast, cool. 2x men pulling in boat lines between C1 & C2	1335 – 1345 Overcast, cool, calm	1031 – 1041 Warm, sunny, no breeze
Expanded Site 2	1730 – 1740 Went last to avoid disturbance of men pulling in boat lines	1351 – 1401	1050 – 1055 Left after 5mins as people and children playing on small beach – no birds
Expanded Site 3	1712 – 1722 Lady with dog walking right through foraging birds	1408 – 1418	1103 – 1113
Expanded Site 4	1655 – 1705 Sunny, warm, no breeze	1424 – 1434	1120 – 1130
Expanded Site 5	1634 – 1647 10x spoonbills on the sandbar just beyond edge of compartment	1440 – 1450 Man and dog walked past playing fetch with ball	1135 - 1145
Port Site	-	-	1050 – 1120

N° of survey	7 – Additional survey to cover missed hightide survey from 11th July (survey 3)
Date	15/08/2022
Surveyors	Marie Knue Jacqui Wairepo
Weather	Overcast with light rain, 5 knots rising to 15 in the afternoon, 11 – 16°C

Notes

Compartment	Low Tide	Mid Tide	High Tide
Conditions	Light rain, 0-5 knots, 11°C	Overcast, 0-5 knots, 16°C	Light to moderate rain, 15 knots, 14°C
East Site 1	1505 – 1515	1205 – 1210 Dog running on beach	0925 – 0930
East Site 2	1515 – 1525	1210 – 1215	0930 – 0935
East Site 3	1525 – 1535 Boat beached	1215 – 1225 Person fishing off beach	0935 – 0940
West Site 3	1555 – 1605	1240 – 1250	1020 – 1025
West Site 2	1620 – 1630	1310 – 1320	1040 – 1045
West Site 1	1630 – 1640	1320 – 1330	1045 – 1050
Expanded Site 1	1518 – 1528	1212 – 1222	0934 – 0944
Expanded Site 2	1534 – 1544	1229 – 1239	0951 – 1001
Expanded Site 3	1549 – 1559	1244 – 1254	1006 – 1016
Expanded Site 4	1610 – 1620	1259 – 1309	1020 – 1030
Expanded Site 5	1627 – 1637	1314 – 1324	1034 – 1044
Port Site	-	-	0945 – 1005

About Boffa Miskell

Boffa Miskell is a leading New Zealand professional services consultancy with offices in Auckland, Hamilton, Tauranga, Wellington, Christchurch, Dunedin and Queenstown. We work with a wide range of local and international private and public sector clients in the areas of planning, urban design, landscape architecture, landscape planning, ecology, biosecurity, cultural heritage, graphics and mapping. Over the past four decades we have built a reputation for professionalism, innovation and excellence. During this time we have been associated with a significant number of projects that have shaped New Zealand's environment.

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File Ref: BM19997.aprx / BM19997_M01_Eastern_SiteContext_A3L

Raumanga
Sherwood Rise
Owhiwa
Awahou Bay
Port Whangārei
Rukuwai
Waikaraka
Toetoe
Onerahi
Parua Bay
Tamaterau
Wellington Reach
Matakone/Limestone Island
Otaika
Parua Bay
Munro Bay
Portland Reach
Tamaterau Reach
The Nook
Puwera
Portland
Jacksons Bay
Whangārei Harbour
Shelly Cut Reach
McLeod Bay
Whangārei Heads
Ocean Beach Reserve
Reotahi Bay
Taurikura
High Island
Oakleigh
Marsden Bay
Marsden Bay
McKenzie Bay
Takahiwai
Ocean Beach
Calliope Island
One Tree Point Rd
Urquharts Bay
Marsden Point
Mata
Bream Head Reserve
Smugglers Bay
Peach Cove
Frenchman Island
Busby Head
15
(264, 659)
Springfield
Ruakaka
Mckenzies of Limestone Hill Park
Ruakaka Estuary
Bream Bay

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0 2 km
1:75,000 @ A3

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND
- Northport
- OSNZ Atlas Square
- Significant Bird Area - Proposed Regional Plan (Decisions Version)

Data Sources: 4Sight Consulting, Northland Regional Council, Ornithological Society of NZ, Basemap Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors., Esri, NASA, NGA, USGS

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

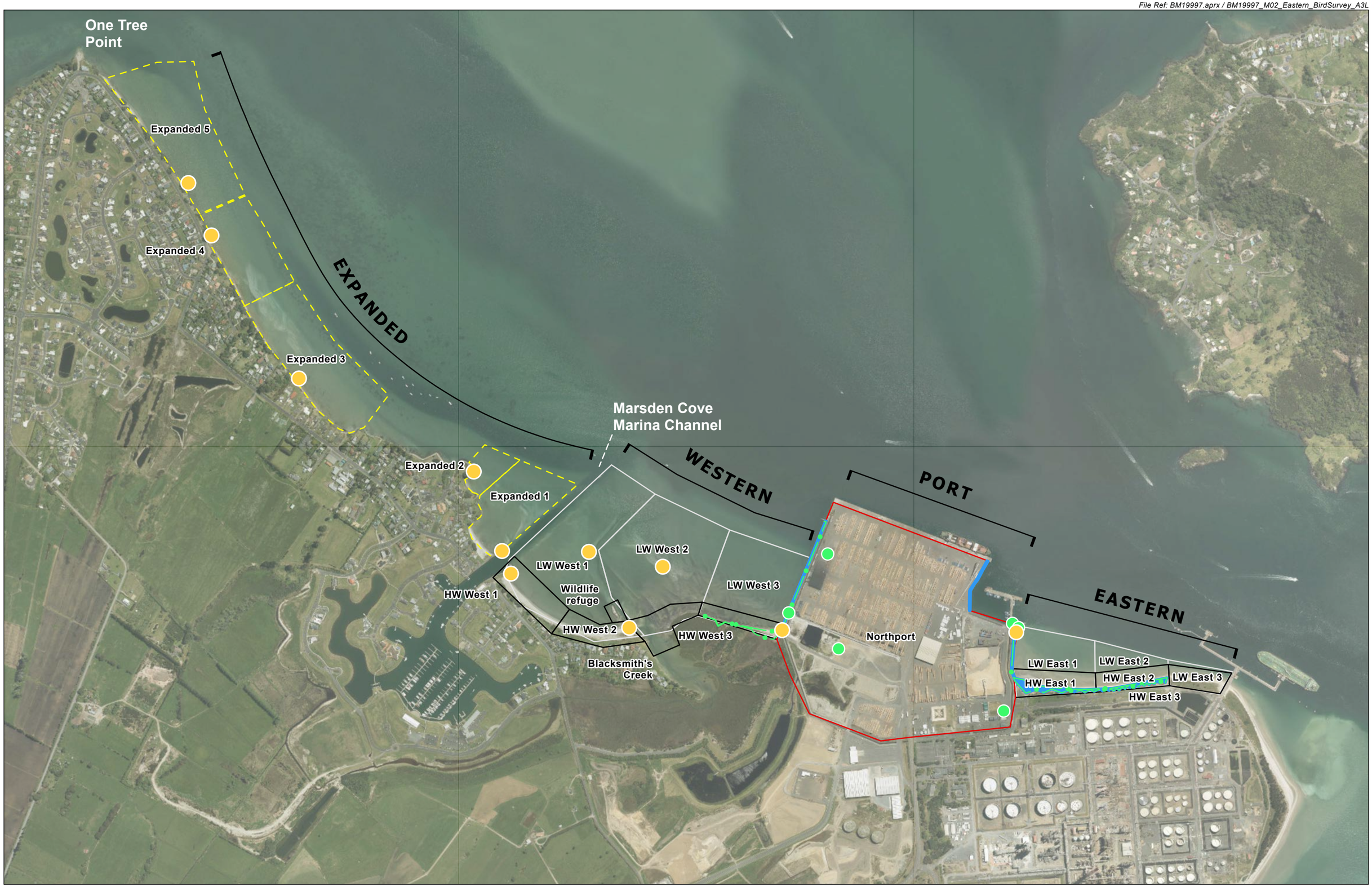
VFG Eastern Expansion - Site Context

Date: 03 October 2022 | Revision: 0

Plan prepared for NorthPort by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 1



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Data Sources: 4Sight Consulting, Boffa Miskell, Aerial Imagery: LINZ Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Northport
- Low Water Compartment
- High Water Compartment
- Expanded Compartment
- Penguin Survey
- Wading Bird Observer Points
- Nesting Survey Observer Points
- Nesting Survey

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

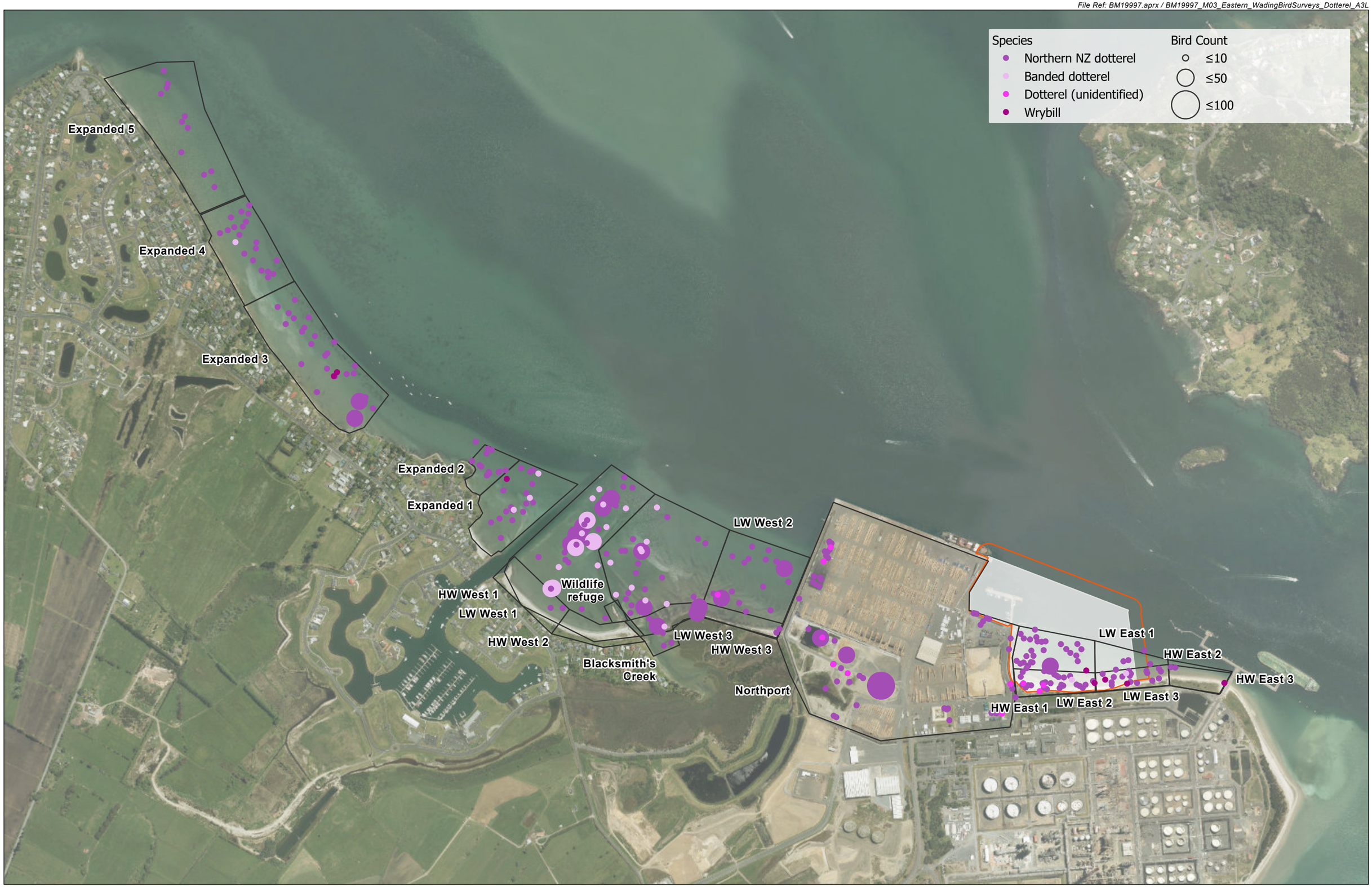
VFG Eastern Expansion - Bird Survey Locations

Date: 03 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: HHu | Checked: LBu

Map 2



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Data Sources: 4Sight Consulting, Northport, Boffa Miskell, Basemap Imagery: Land Information New ZealandEagle Technology, Land Information New Zealand, GEBCO, Community maps contributors
Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND
- Compartment
- Coastal Disturbance Zone
- Reclamation

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

VFG Eastern Expansion - Wading Bird Surveys: Dotterels

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: HHu | Checked: LBu

Map 3

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Data Sources: 4Sight Consulting, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Compartment
- Reclamation
- Coastal Disturbance Zone

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

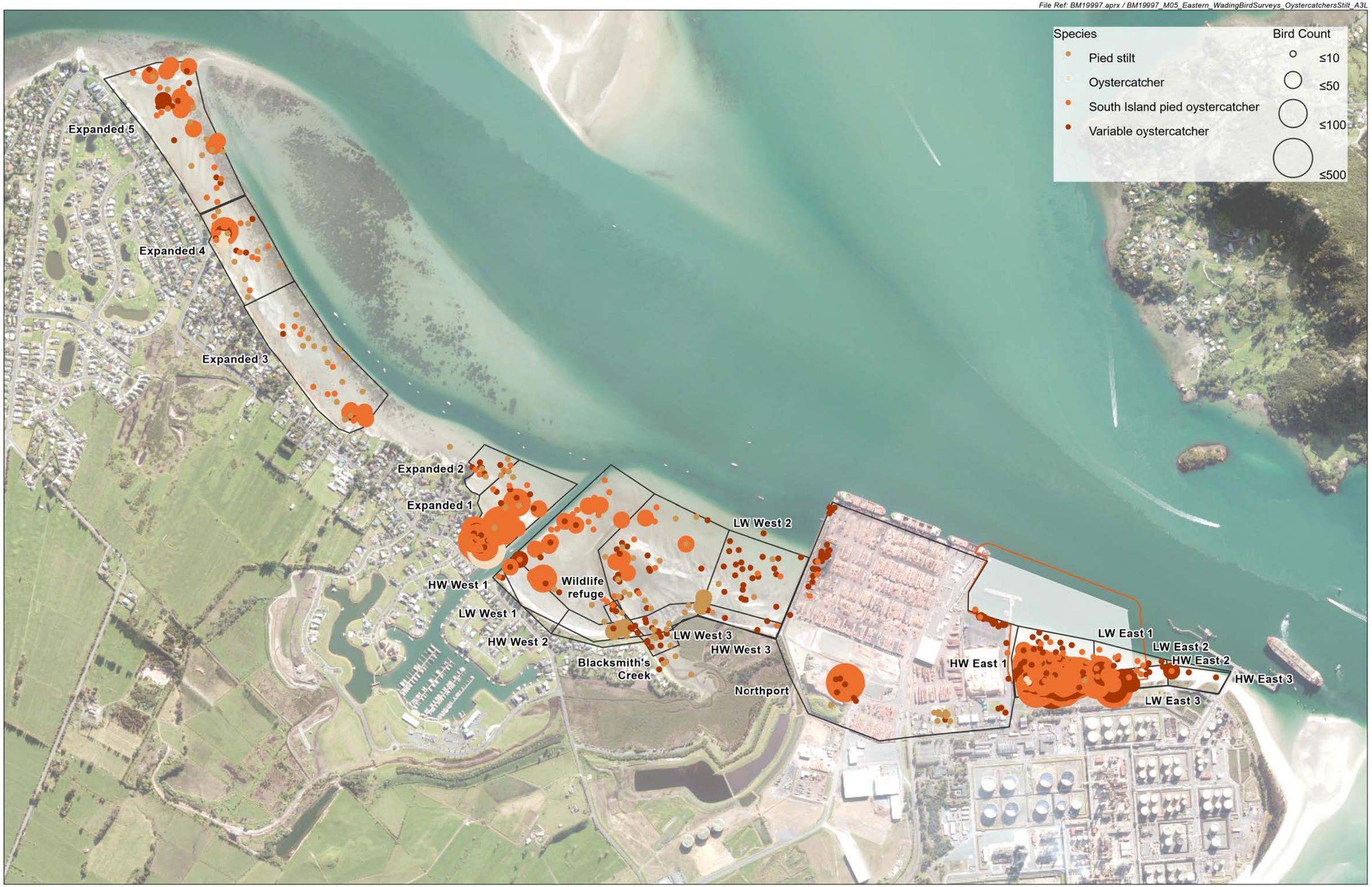
VFG Eastern Expansion - Wading Bird Surveys: International Migrant waders

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: HHu | Checked: LBu

Map 4



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1:12,000 @ A3

Data Sources: 4Sight Consulting, Northport, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND
- Compartment
- Reclamation
- Coastal Disturbance Zone

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

VFG Eastern Expansion - Wading Bird Surveys: Oystercatchers stilt

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: HHu | Checked: LBu

Map 5

Species
- Caspian tern
- White-fronted tern
- Red-bill gull
- Black-billed gull
- Southern black-backed gull
- Black fronted tern

Bird Count
- ≤10
- ≤50
- ≤100
- ≤500
- ≤1000

Expanded 5
Expanded 4
Expanded 3
Expanded 2
Expanded 1
LW West 2
HW West 1
LW West 1
HW West 2
Blacksmith's Creek
LW West 3
HW West 3
Northport
LW East 1
HW East 1
LW East 2
LW East 3
HW East 3

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Data Sources: 4Sight Consulting, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND
- Compartment
- Reclamation
- Coastal Disturbance Zone

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

VFG Eastern Expansion - Wading Bird Surveys: Gulls & Terns

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: HHu | Checked: LBu

Map 6

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Data Sources: 4Sight Consulting, Northport, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Compartment
- Reclamation
- Coastal Disturbance Zone

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

VFG Eastern Expansion - Wading Bird Surveys: Herons & Royal Spoonbill

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: HHu | Checked: LBu

Map 7

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Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Compartment
- Reclamation
- Coastal Disturbance Zone

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

VFG Eastern Expansion - Wading Bird Surveys: Shags

Date: 14 October 2022 | Revision: 0

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Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: HHu | Checked: LBu

Map 8

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Data Sources: 4Sight Consulting. Coast & Catchment, Northport, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Individual macroinvertebrates
High: 190
Low: 35

Reclamation
Coastal Disturbance Zone
Avifauna survey compartment
Initial Sandbank Footprint
Final Sandbank Footprint

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

Benthic macroinvertebrate and northern NZ dotterel

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 9

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Data Sources: 4Sight Consulting. Coast & Catchment, Northport, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Individual macroinvertebrates
High: 190
Low: 35

Reclamation
Coastal Disturbance Zone
Avifauna survey compartment
Initial Sandbank Footprint
Final Sandbank Footprint

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

Benthic macroinvertebrate and banded dotterel

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 10

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Data Sources: 4Sight Consulting. Coast & Catchment, Northport, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Individual macroinvertebrates
High: 190
Low: 35

Reclamation
Coastal Disturbance Zone
Avifauna survey compartment
Initial Sandbank Footprint
Final Sandbank Footprint

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

Benthic macroinvertebrate and wrybill

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 11

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Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Individual macroinvertebrates
High: 190
Low: 35

Reclamation
Coastal Disturbance Zone
Avifauna survey compartment
Initial Sandbank Footprint
Final Sandbank Footprint

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

Benthic macroinvertebrate and bar-tailed godwit

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 12

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Data Sources: 4Sight Consulting. Coast & Catchment, Northport, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Individual macroinvertebrates
High: 190
Low: 35

Reclamation
Coastal Disturbance Zone
Avifauna survey compartment
Initial Sandbank Footprint
Final Sandbank Footprint

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

Benthic macroinvertebrate and lesser knot

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 13

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Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Individual macroinvertebrates
High: 190
Low: 35

Reclamation
Coastal Disturbance Zone
Avifauna survey compartment
Initial Sandbank Footprint
Final Sandbank Footprint

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

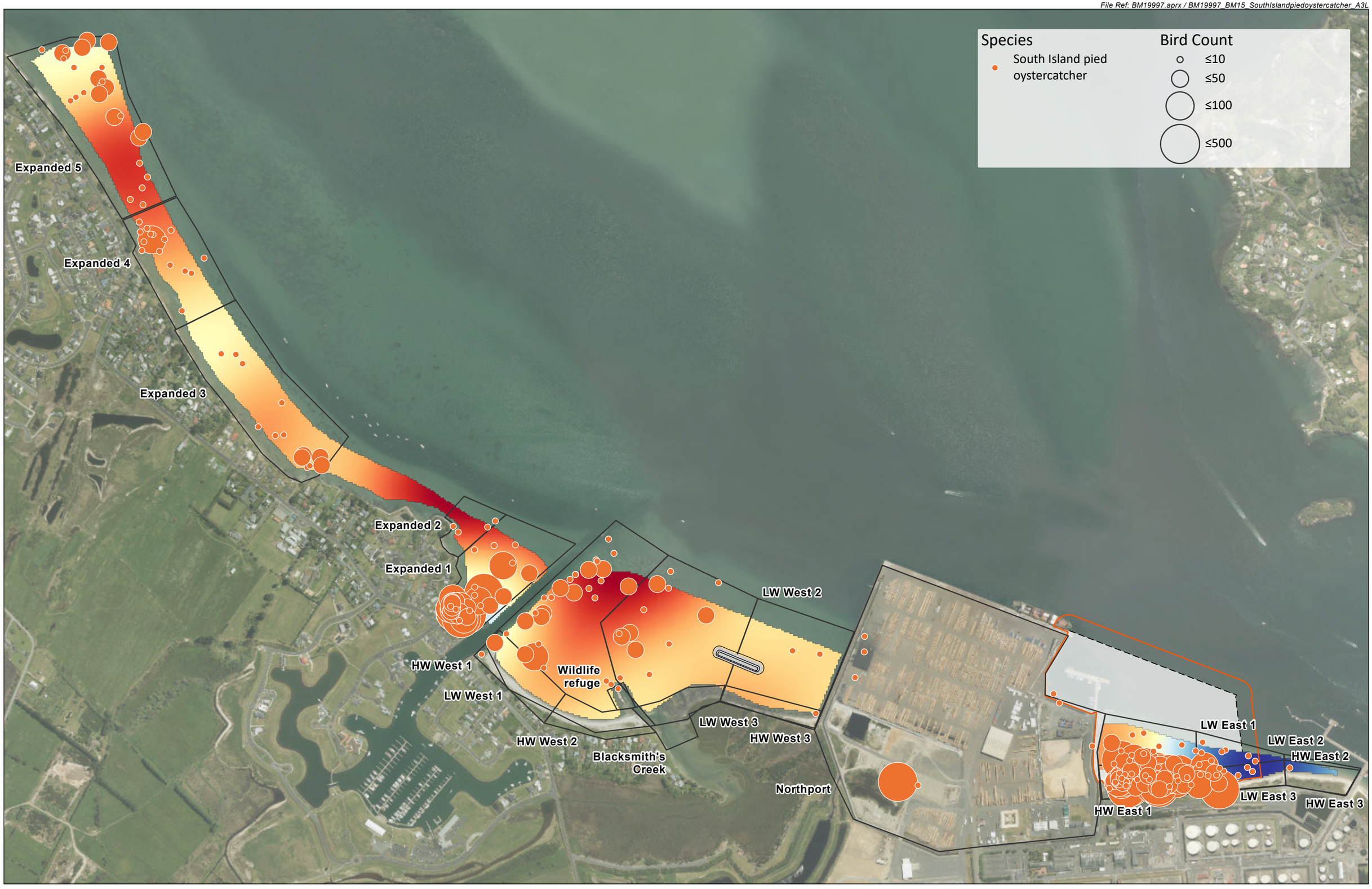
Benthic macroinvertebrate and pied stilt

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 14



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1:10,000 @ A3

Data Sources: 4Sight Consulting, Coast & Catchment, Northport, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Individual macroinvertebrates
High: 190
Low: 35

Reclamation
Coastal Disturbance Zone
Avifauna survey compartment
Initial Sandbank Footprint
Final Sandbank Footprint

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

Benthic macroinvertebrate and South Island pied oystercatcher

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 15

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Data Sources: 4Sight Consulting, Coast & Catchment, Northport, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Individual macroinvertebrates
High: 190
Low: 35

Reclamation
Coastal Disturbance Zone
Avifauna survey compartment
Initial Sandbank Footprint
Final Sandbank Footprint

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

Benthic macroinvertebrate and variable oystercatcher

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 16

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0 200 m

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Data Sources: 4Sight Consulting, Coast & Catchment, Northport, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Individual macroinvertebrates
High: 190
Low: 35

Reclamation
Coastal Disturbance Zone
Avifauna survey compartment
Initial Sandbank Footprint
Final Sandbank Footprint

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

Benthic macroinvertebrate and red-bill gull

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 17

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Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Individual macroinvertebrates
High: 190
Low: 35

Reclamation
Coastal Disturbance Zone
Avifauna survey compartment
Initial Sandbank Footprint
Final Sandbank Footprint

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

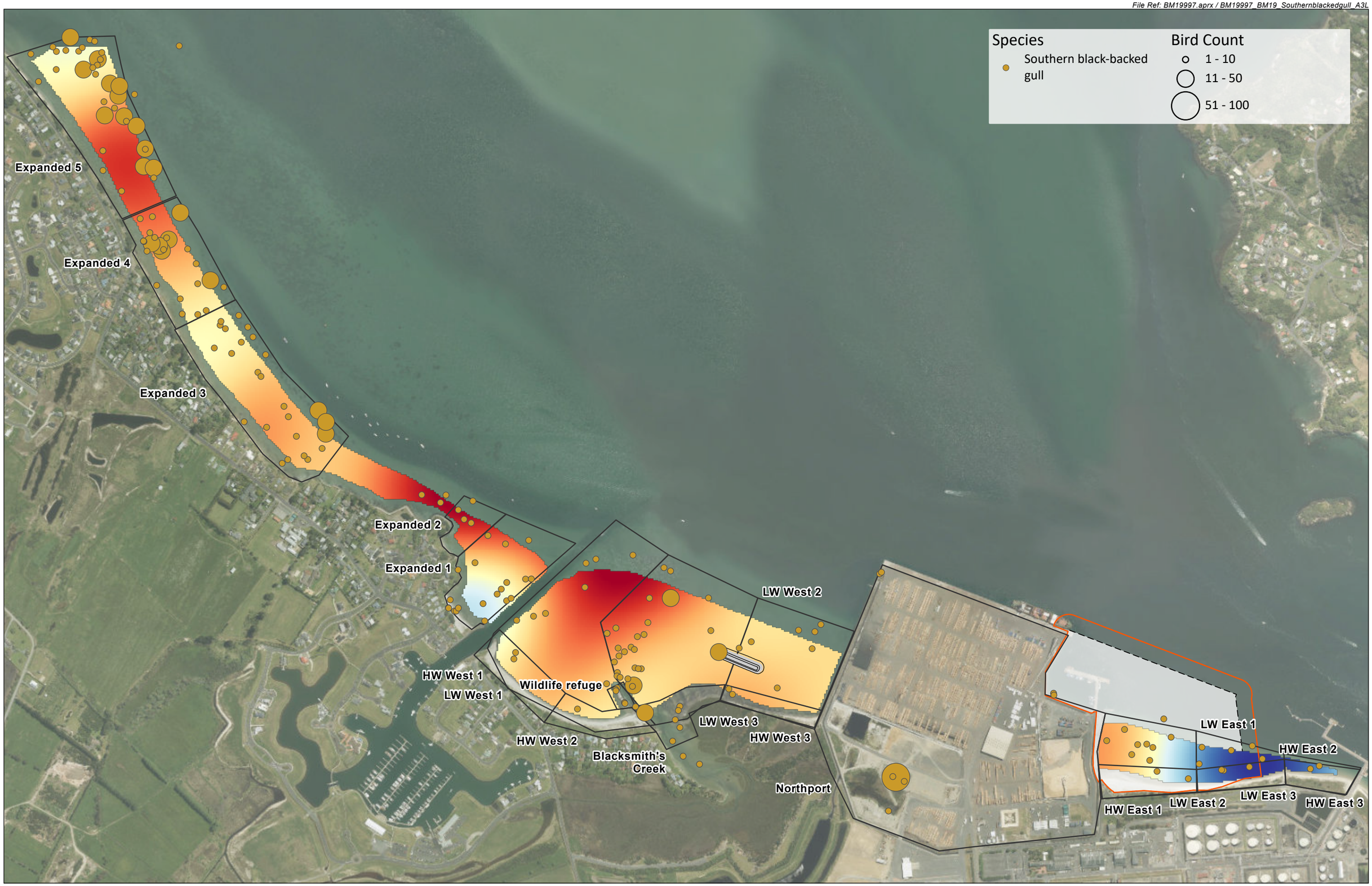
Benthic macroinvertebrate and black-billed gull

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 18



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0 200 m

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Data Sources: 4Sight Consulting, Coast & Catchment, Northport, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Individual macroinvertebrates
High: 190
Low: 35

Reclamation
Coastal Disturbance Zone
Avifauna survey compartment
Initial Sandbank Footprint
Final Sandbank Footprint

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

Benthic macroinvertebrate and southern black-backed gull

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 19

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0 200 m

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Data Sources: 4Sight Consulting. Coast & Catchment, Northport, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Individual macroinvertebrates
High: 190
Low: 35

Reclamation
Coastal Disturbance Zone
Avifauna survey compartment
Initial Sandbank Footprint
Final Sandbank Footprint

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

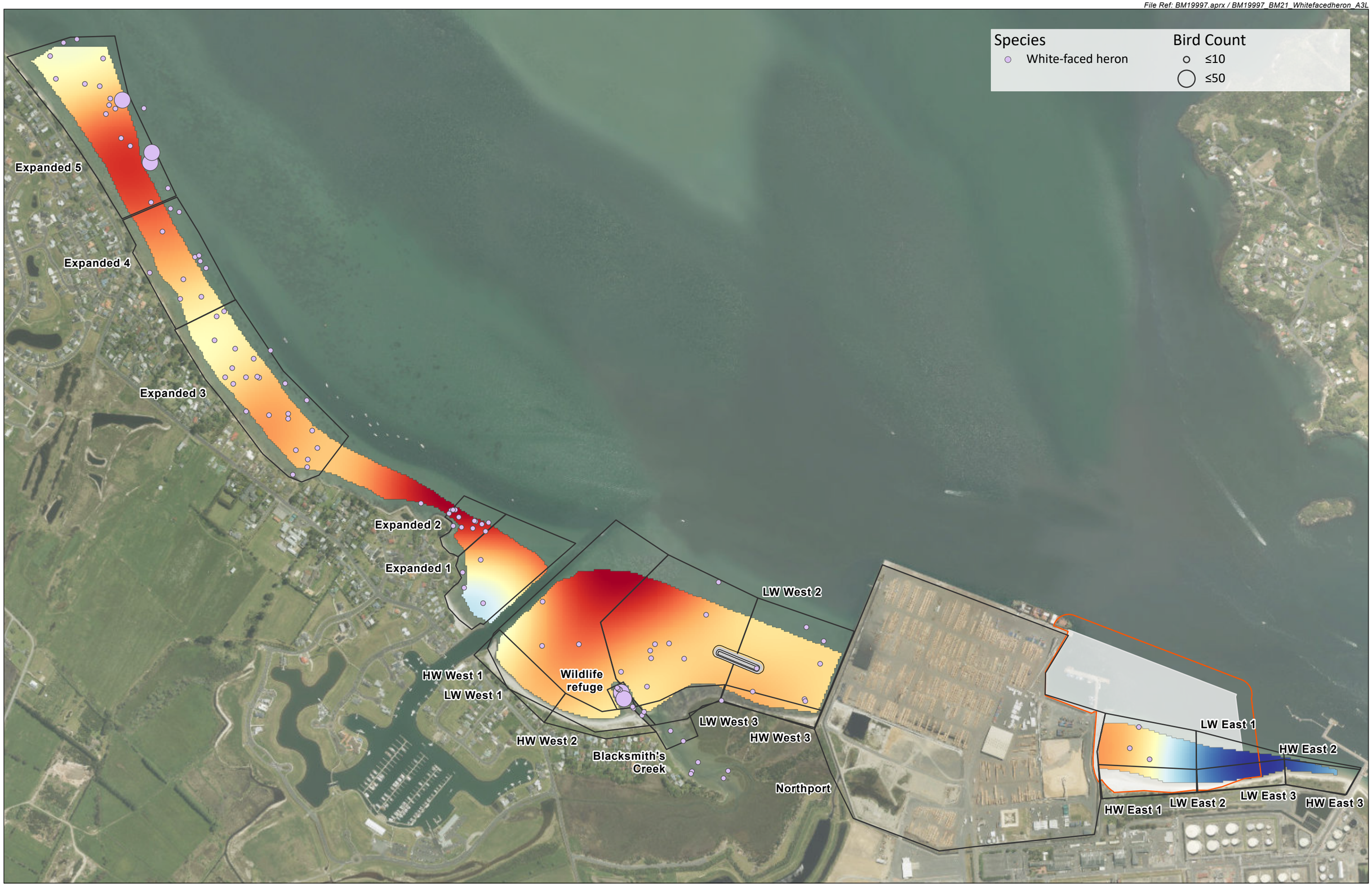
Benthic macroinvertebrate and reef heron

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 20



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1:10,000 @ A3

Data Sources: 4Sight Consulting. Coast & Catchment, Northport, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Individual macroinvertebrates
High: 190
Low: 35

Reclamation
Coastal Disturbance Zone
Avifauna survey compartment
Initial Sandbank Footprint
Final Sandbank Footprint

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

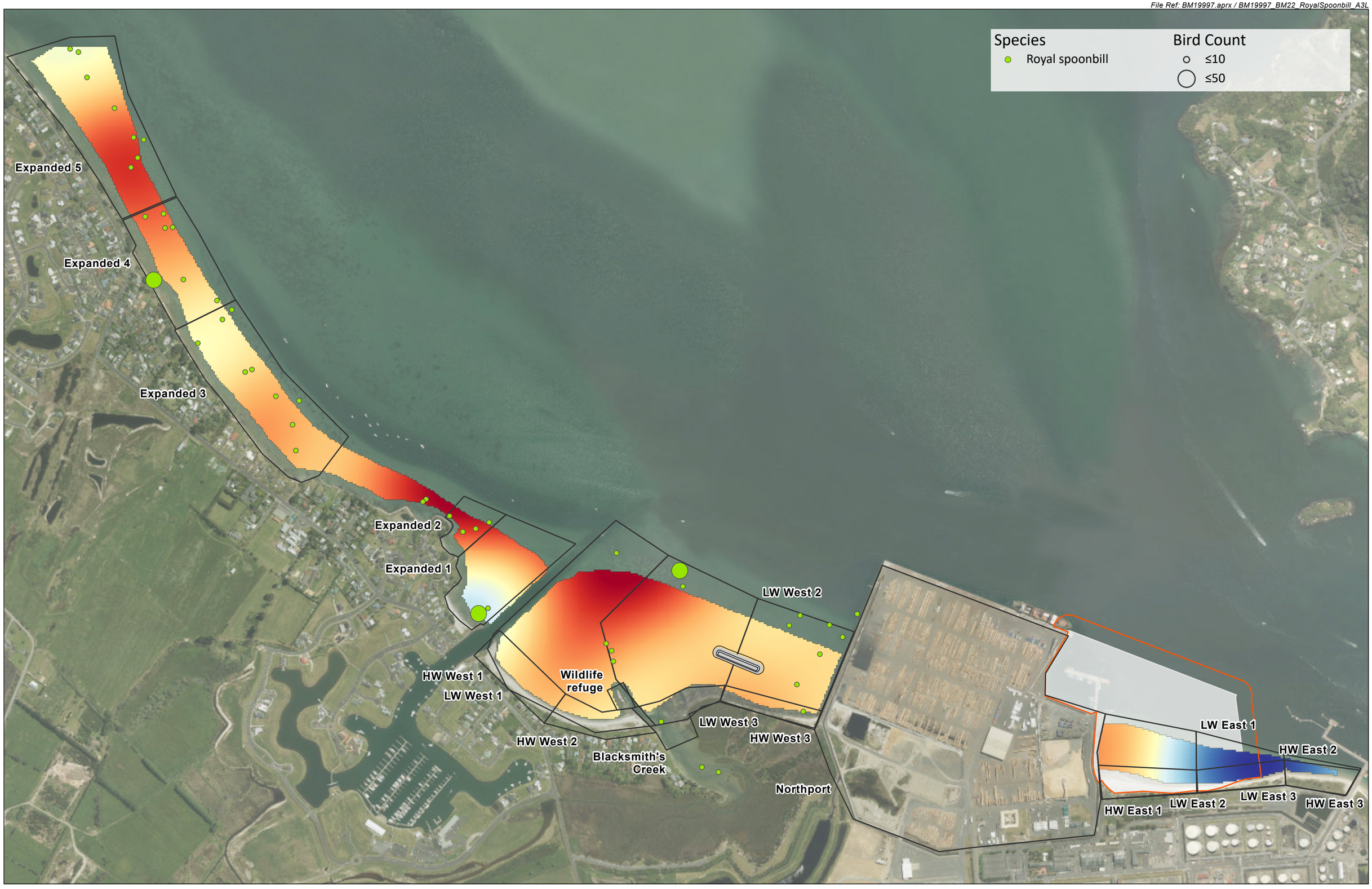
Benthic macroinvertebrate and white-faced heron

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 21



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Data Sources: 4Sight Consulting. Coast & Catchment, Northport, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

Individual macroinvertebrates
High: 190
Low: 35

Reclamation
Coastal Disturbance Zone
Avifauna survey compartment
Initial Sandbank Footprint
Final Sandbank Footprint

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

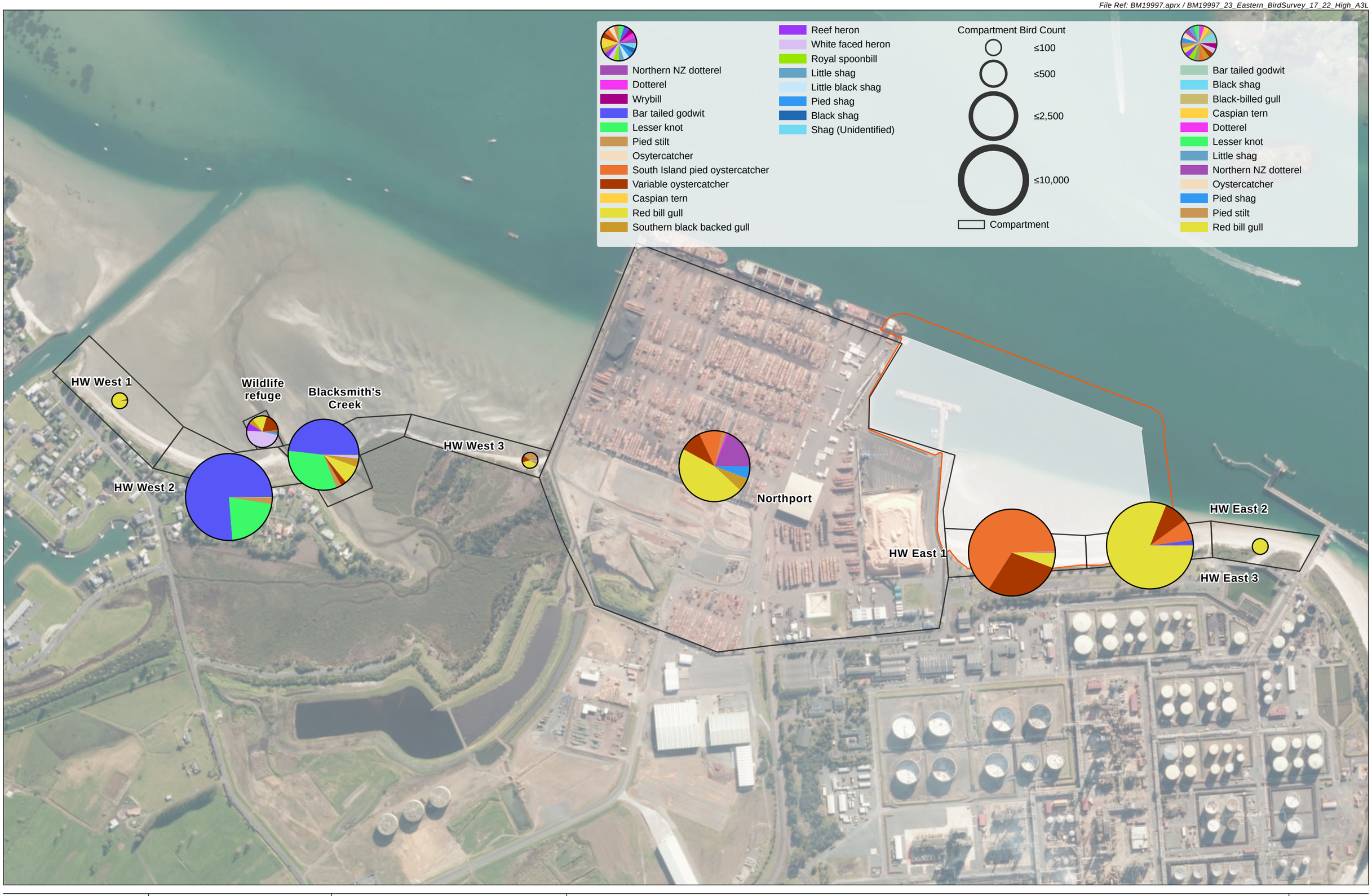
Benthic macroinvertebrate and royal spoonbill

Date: 14 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 22



Boffa Miskell

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0 250 m

1:7,000 @ A3

Data Sources: 4Sight Consulting, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Compartment
- Reclamation
- Dredge Area
- Coastal Disturbance Zone

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

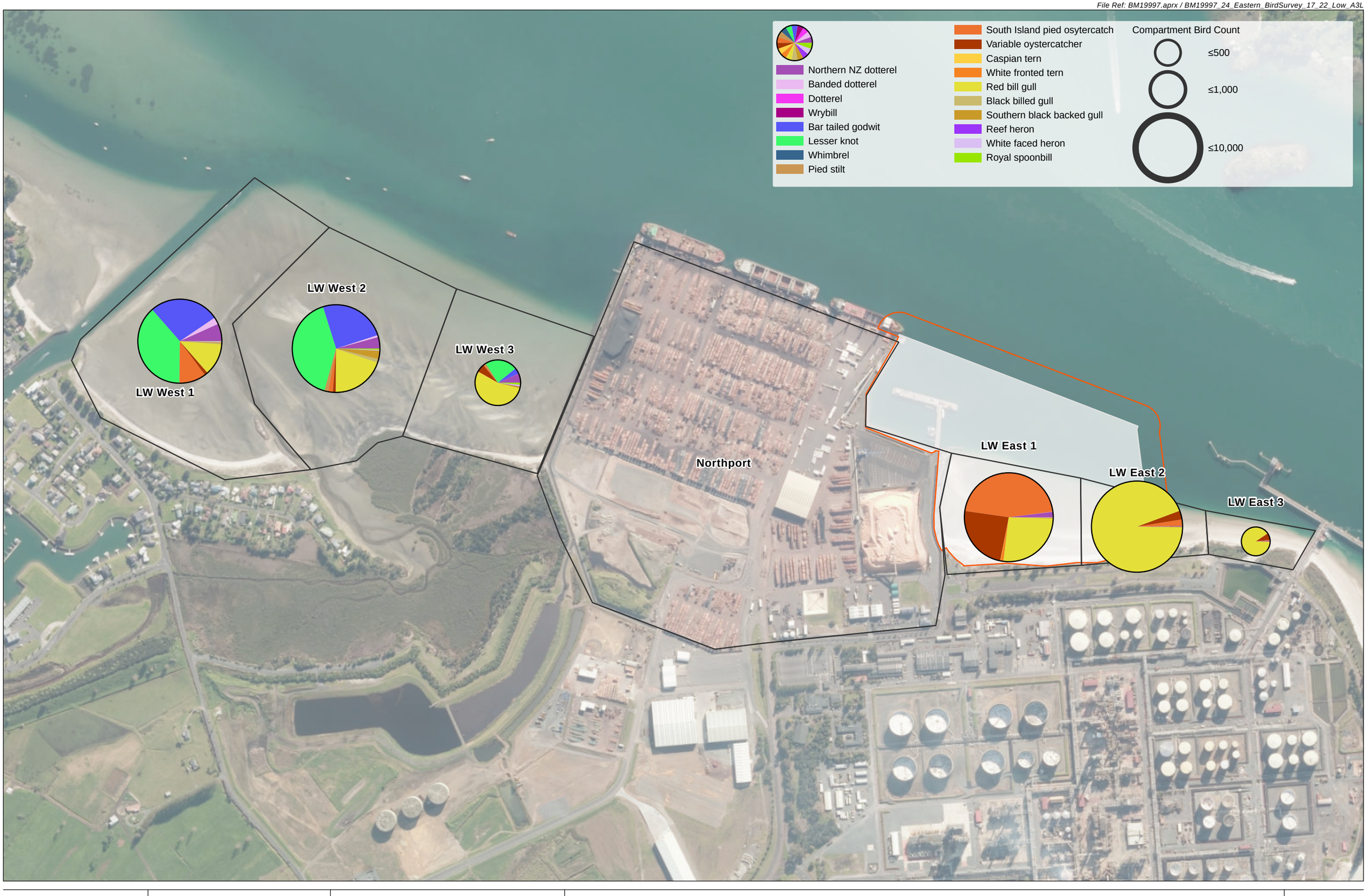
VFG Eastern Expansion - Wading Bird Survey: 2017 - 2022 (High Tide)

Date: 28 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 23



Boffa Miskell

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0 250 m

1:7,000 @ A3

Data Sources: 4Sight Consulting, Boffa Miskell, Basemap Imagery: Land Information New Zealand

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Compartment
- Reclamation
- Dredge Area
- Coastal Disturbance Zone

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

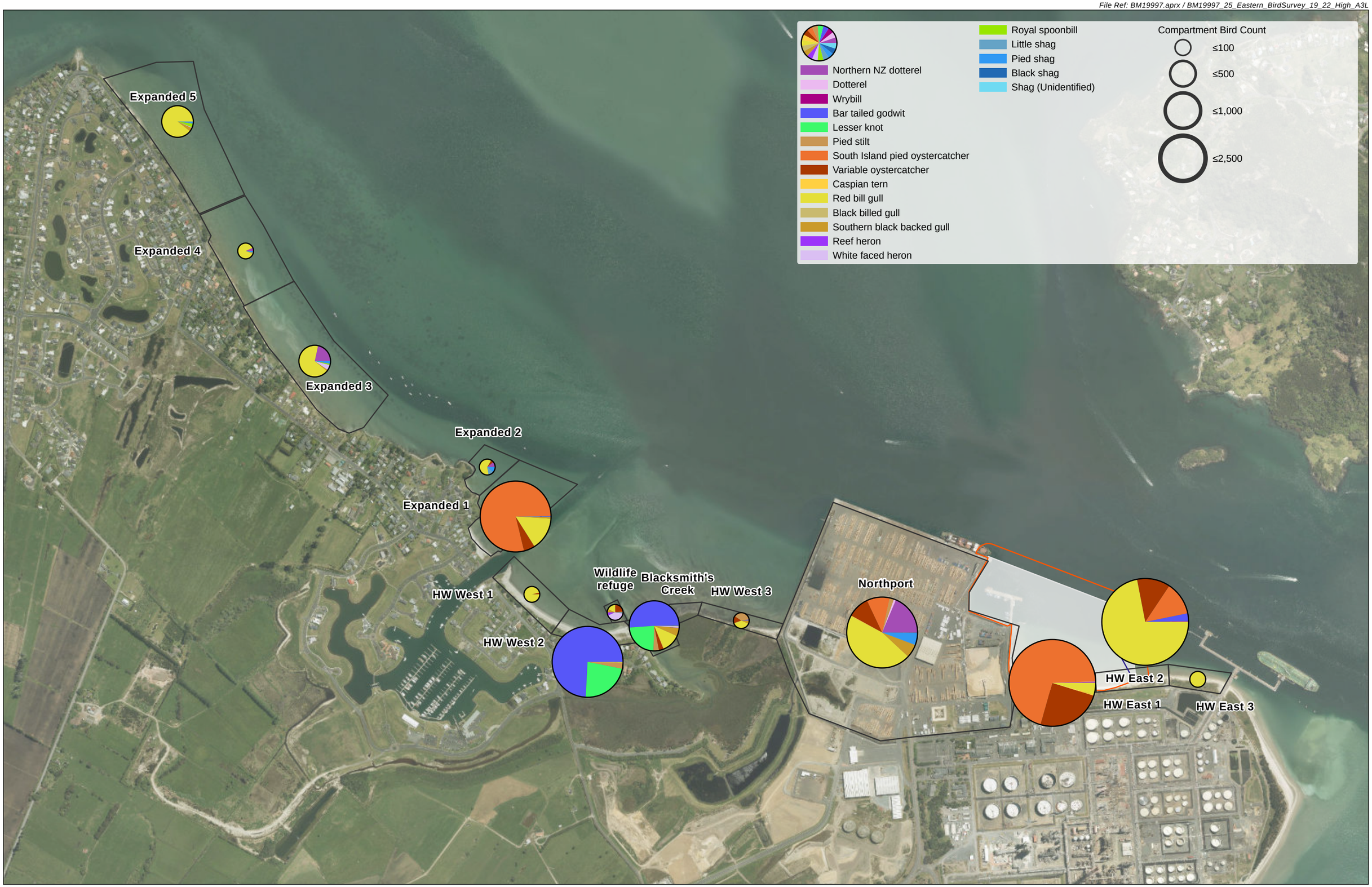
VFG Eastern Expansion - Wading Bird Survey: 2017 - 2022 (Low Mid Tide)

Date: 28 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 24



Boffa Miskell

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0 250 m

1:12,000 @ A3

Data Sources: 4Sight Consulting, Boffa Miskell, Basemap Imagery: Land Information New Zealand Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Compartment
- Reclamation
- Dredge Area
- Coastal Disturbance Zone

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

VFG Eastern Expansion - Wading Bird Survey: Dec 2019 - 2022 (High Tide)

Date: 19 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: HHu | Checked: LBu

Map 25

Boffa Miskell

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0 250 m

1:12,000 @ A3

Data Sources: 4Sight Consulting, Boffa Miskell, Basemap Imagery: Land Information New Zealand Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors
Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND
- Compartment
- Reclamation
- Dredge Area
- Coastal Disturbance Zone

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

VFG Eastern Expansion - Wading Bird Survey: Dec 2019 - 2022 (Low Mid Tide)

Date: 19 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 26

Boffa Miskell

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0 150 m

1:5,000 @ A3

Data Sources: 4Sight Consulting, Boffa Miskell, Aerial Imagery: LINZ

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Compartment
- Coastal Disturbance Zone
- Reclamation
- Nesting Survey
- Northern NZ dotterel
- Variable oystercatcher
- Pied stilt
- Dog indications

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

VFG Eastern Expansion - Nesting Birds

Date: 03 October 2022 | Revision: 1

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: HHu | Checked: LBu

Map 27

Boffa Miskell

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0 250 m

1:12,000 @ A3

Data Sources: 4Sight Consulting, Boffa Miskell, Basemap Imagery: Land Information New Zealand Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Compartment
- Reclamation
- Coastal Disturbance Zone

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

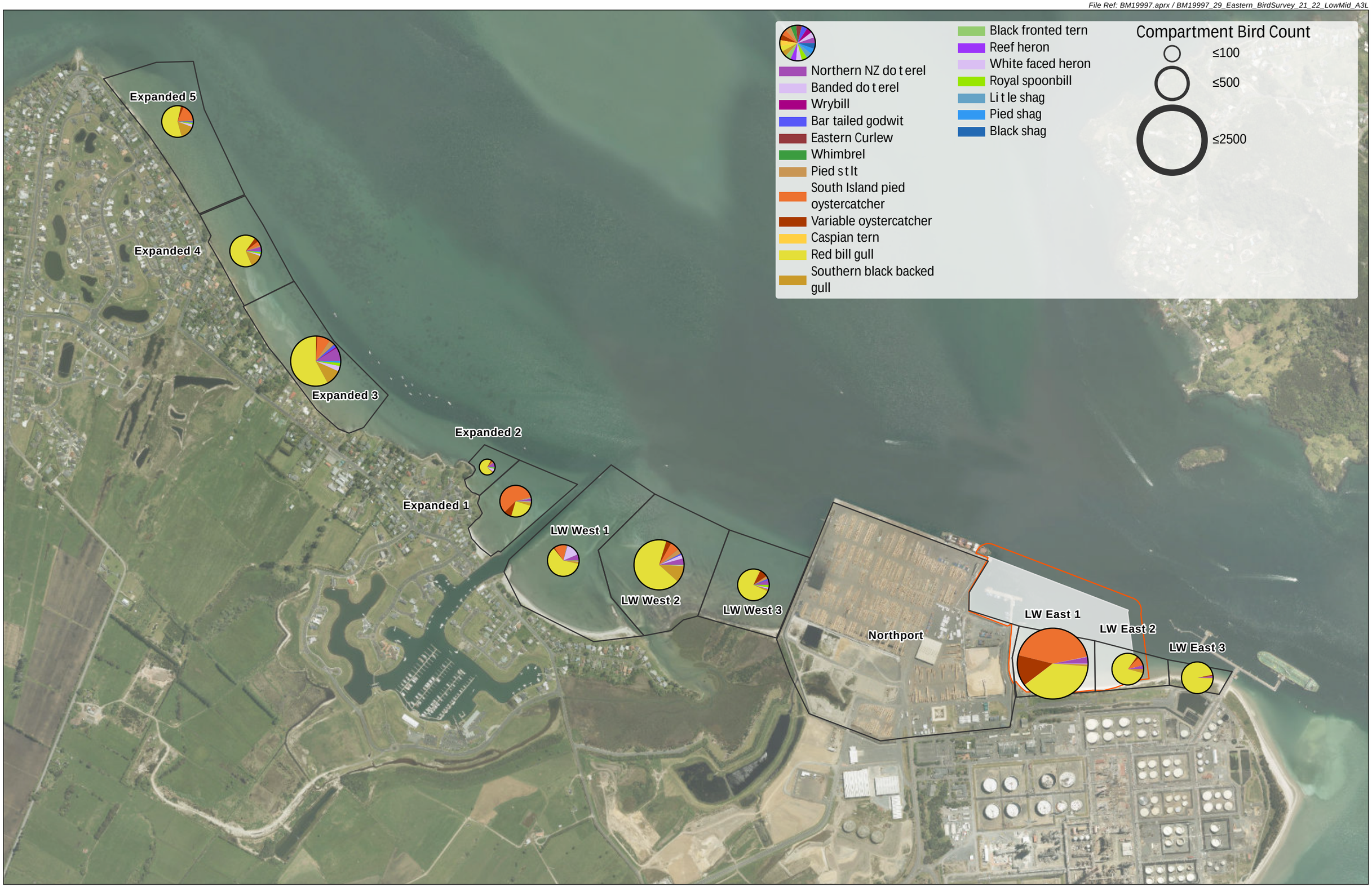
VFG Eastern Expansion - Wading Bird Survey: Winter 2021 and 2022 (High Tide)

Date: 28 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 28



Boffa Miskell

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0 250 m

1:12,000 @ A3

Data Sources: 4Sight Consulting, Boffa Miskell, Basemap Imagery: Land Information New Zealand Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors
Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND
Compartment
Reclama t on
Coastal Disturbance Zone

NORTHPORT EXPANSION COASTAL BIRD ASSESSMENT

VFG Eastern Expansion - Wading Bird Survey: Winter 2021 and 2022 (Low Mid Tide)

Date: 28 October 2022 | Revision: 0

Plan prepared for Northport by Boffa Miskell Limited

Project Manager: leigh.bull@boffamiskell.co.nz | Drawn: KMa | Checked: LBu

Map 29