Before the Hearings Commissioners at Gisborne District Council

under: the Resource Management Act 1991

in the matter of: An application by Eastland Port Limited for land use consents, coastal permits and other consents related to the Port of Gisborne upgrade project known as "Twin Berth Stage 2"

between: **Eastland Port Limited**
Applicant

and: **Gisborne District Council**
Consent Authority

Statement of evidence of **Mark Poynter** on behalf of Eastland Port Limited

Dated: 3 October 2023

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STATEMENT OF EVIDENCE OF MARK POYNTER ON BEHALF OF EASTLAND PORT LIMITED

INTRODUCTION

1 My full name is Mark Raymond Poynter.

2 I am Technical Director (Marine Ecology) for 4Sight Consulting Ltd (Part of SLR) (*4Sight*). I hold a Bachelor of Science Degree in Zoology and a Master of Science with Honours in Marine Ecology, both from the University of Auckland.

3 I have over 40 years' experience covering marine, freshwater and terrestrial ecosystems, including running my own consulting practice for 23 years. My work experience includes ecological and water quality impact assessment, environmental management, and design and implementation of environmental monitoring programmes. I have had a particular focus on marine and estuarine investigations and water quality issues. I have assessed projects against the requirements of the New Zealand Coastal Policy Statement 2010 (*NZCPS*), National Environmental Standards, regional plans and related documents. I have participated in expert caucusing, mediation and consultation with iwi and resource users and provided evidence as an expert witness in relation to Resource Management Act 1991 (*RMA*) proceedings on multiple occasions.

4 My evidence is given in support of Eastland Port Limited's (*Eastland*) applications for land use consents, coastal permits and other consents (*Application*) for the second and final stage of the Twin Berths Project (the *Project*).

5 Examples of my ecological and water quality assessment experience of relevance to the Project include:

5.1 In the 1990s I was responsible for monitoring and reporting to support resource consent applications for stormwater discharges from Port Whangarei. These included discharges from unsealed log yards; chip pile storage; abrasive blasting operations; ship construction and repair; and discharges from maintenance dredging and disposal of dredgings to land.

5.2 I was involved in the design and monitoring of the stormwater discharges from the logport at Northport at Marsden Point, since it opened in 2002 and similarly involved with the discharges from the Marsden Maritime Holdings Ltd (formerly Northland Port Corporation) industrial estate discharges to the harbour at the same location.

5.3 I co-authored a paper on the Northport discharges[1] which was presented at the NZ Stormwater Conference, Nelson, May 2016 and was also presented by my co-author at the Australasian Coasts and Ports conference in Cairns in 2017.

5.4 I undertook the ecological and water quality impact assessment for the development of the Northport Deepwater Port facility at Marsden Point. This project involved extensive capital dredging, reclamation and stormwater management at a greenfield site of high ecological and water quality value. I have since carried out ecological and water quality studies around the port.

5.5 I have also overseen and undertaken extensive environmental work at the Port of Gisborne/Eastland Port (*Port*) since 2014. This has included:

(a) monitoring of stormwater discharge from the log storage yards and receiving environment quality;

(b) surveys and data interpretation to characterise the texture and contaminant status of sediment at various locations within the Port, the port navigation channel (*PNC*), a background site in the Tūranganui River, and in Poverty Bay including at the offshore disposal ground (*OSDG*); and

(c) fauna surveys of intertidal communities within the Port and Kaiti Reef and benthic macroinvertebrates within the Port and at the OSDG. This work has included several years of monitoring crayfish settlement at a site within the Port and several surveys of crayfish on the Outer Breakwater.

6 I am familiar with the area that the Project covers. I am the author of the Assessment of Ecological and Water Quality Effects[2] (*Ecology Assessment*) and the 4Sight Technical Reviewer of the Little Penguin/Kororā Assessment[3] (*Kororā Asssessment*) lodged in relation to the Project. Other 4Sight or SLR staff with relevant specialist expertise assisted and advised me on particular topics

[1] 'NZ's Newest Port 13 Years On: A Stormwater Review'. Prepared by M Poynter and P Kane.

[2] 4Sight, Gisborne Port Twin Berths Project – Resource Consent Applications Assessment of Ecological and Water Quality Effects, 21 July 2022 (*Ecology Assessment*).

[3] 4Sight, Gisborne Port Twin Berths Project – Little Penguin / Kororā Assessment of Ecological Effects, August 2022 (*Kororā Asssessment).*

where their expertise was helpful. I have acknowledged this assistance in my evidence below where relevant.

7 I am familiar with the Project site having visited the site on many occasions since I started advising Eastland in 2014. I visited the site most recently in March 2023 when I undertook a field survey to collect seabed samples of the Port, OSDG and Poverty Bay for contaminant analysis.

8 I have read the relevant sections of the Assessment of Environmental Effects that accompanied the Application as relevant for preparing my evidence. I have also read the public submissions lodged in relation to the Project, four of which raise ecological matters. I also reviewed the evidence of Mr Benjamin Lawrence as it relates to underwater noise and marine mammals.

9 As indicated above, aspects of my evidence have relied on assessments on which I worked in cooperation with other experts. In particular:

9.1 Ms Cat Davis, Senior Ecologist, and Dr Peter Wilson, Principal Coastal Scientist, both from 4Sight Consulting provided specialist support in relation to the Kororā Assessment; and

9.2 Ms Helen McConnell, an associate marine ecologist at SLR Consulting, provided specialist support in relation to marine mammal ecology and conservation and authored the assessment of effects on marine mammals (*Marine Mammals Assessment*)[4] and the updated assessment that is attached to Mr Lawrence's evidence[5] – both of which I have reviewed.

10 I understand that, should it be necessary, Dr Wilson and Ms McConnell have indicated that they are happy to respond to any specific questions at the hearing of the Application and can make themselves available, if necessary. Ms Davis is currently on maternity leave so her ability to attend via audio link is constrained but she is very happy to provide written responses to queries if required.

CODE OF CONDUCT

11 Although these proceedings are not before the Environment Court, I have read the Code of Conduct for Expert Witnesses in the

[4] SLR, Twin Berths Project, RFI Response, Marine Mammals, 10 May 2023 (*Marine Mammals Assessment*).

[5] Helen McConnell, Eastland Port Twin Berths Stage 2 Updated underwater noise modelling: Implications for marine mammal assessment and recommendations, 29 September 2023.

Environment Court Practice Note (2023), and I agree to comply with it as if these proceedings were before the Court. My qualifications as an expert are set out above. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

12 My evidence will deal with the following:

12.1 A summary of the methodology and assessments that were undertaken in order to reach a view on the ecology and water quality effects of the Project;

12.2 The existing ecological values of the Project site and its surrounds;

12.3 A summary of my assessment of ecology and water quality effects as applicable to each of the Project elements, specifically:

(a) the Wharf 8 development;

(b) the Southern Log Yard (*SLY*) reclamation area;

(c) the stormwater discharges from the proposed upgraded stormwater treatment system servicing the SLY and the new reclamation area;

(d) the Outer Breakwater upgrade;

(e) the capital and maintenance dredging;

(f) the disposal of dredged material; and

(g) project-wide effects on aviafauna.

12.4 My response to ecology and water quality issues raised in public submissions;

12.5 My response to the ecology and water quality matters addressed in the Council Officer's Report under section 42A of the RMA (*Officer's Report*), and associated draft conditions; and

12.6 My conclusions in relation to the ecological effects of the Project.

SUMMARY OF EVIDENCE

13 I consider that the ecological effects of the constituent parts of the Project are as follows:

13.1 **Wharf 8:** The Wharf 8 development will not cause adverse ecological or water quality effects.

13.2 **Reclamation and outer seawall:** The reclamation will result in minor adverse effects on marine ecology and minor but temporary adverse effects on water quality. No significant or otherwise notable ecology will be lost or otherwise affected. In my opinion the new ecology that will establish on the outer seawall following reclamation will have significantly improved habitat conditions, given the likely similarity to the existing Outer Breakwater habitat, which has been shown to host a moderately diverse ecology and to provide habitat for crayfish.

13.3 **Stormwater discharges:** Stormwater discharges from the upgraded and integrated reclamation/SLY treatment system will significantly improve the quality of current discharges, mainly by reducing suspended sediment concentrations.

13.4 **Outer Breakwater upgrade:** The Outer Breakwater upgrade will cause a temporary and staged loss of ecological value but that value is expected to be fully restored following completion of construction.

13.5 **Dredging and disposal:** The capital and maintenance dredging and the disposal of dredged material will cause only minor adverse ecological or water quality effects, the scale and intensity of which is anticipated to remain similar to those associated with existing operations.

14 Specific mitigation measures are warranted and proposed in relation to potential effects on Little Penguin (*kororā*), marine mammals, and discharges during and from the reclamation construction. In particular:

14.1 **Kororā:** Effects on Kororā will be managed through the proposed Avian Management and Monitoring Plan (*AMMP*) which is required by the proposed conditions of consent and has been prepared by appropriately qualified specialists from 4Sight. The AMMP will require monitoring of Kororā activity in the lead up to and during construction of the reclamation and identifies a range of management options to be applied depending on the presence of active burrows at the site. I consider that the AMMP is comprehensive and is an appropriate approach to identify

and manage Kororā activity at the site and will avoid adverse effects on the local population. Notably, that view is shared by experts from the Department of Conservation (*DOC*) who have confirmed that the AMMP is fit for purpose,[6] and save for specific points addressed below, is also largely supported by Council's technical reviewer Dr Gary Bramley.

14.2 **Marine Mammals:** Effects on marine mammals have been assessed by Ms McConnell to be low and able to be managed through a Construction Noise Management Plan (*CNMP*), which is proposed as a condition of consent, as attached to Ms McPherson's evidence. The key requirements of the CNMP include:

(a) surveillance of the area near to active piling activity associated with the Wharf 8 construction for the presence of marine mammals;

(b) implementation of shut down zones which require the cessation of piling in the event of marine mammal sitings;

(c) soft starts on piling activity;

(d) validation of underwater noise modelling;

(e) the use of a bubble curtains during piling to minimise the transmission of acoustic signals from the construction site; and

(f) regular maintenance of dredging equipment.

14.3 I consider that the CNMP is comprehensive and is an appropriately conservative approach to avoid adverse effects of construction and dredging on marine mammals;

14.4 **Reclamation construction:** Reclamation construction discharges will be managed through an Erosion and Sediment Control Plan (*ESCP*), which is required by the proposed conditions of consent, as attached to Ms McPherson's evidence. In addition to the high energy nature of the location (which provides high potential for rapid dilution and dispersion of suspended sediment and related plumes), the ESCP will include factors to mitigate water quality risk from construction related discharges of sediment, including:

[6] By way of email to Mr Bayley dated 12 June 2023.

(a) the reclamation being undertaken within a bunded, and therefore confined, area created by the establishment of a new outer seawall; and

(b) the nature of discharges through the seawall being either diffuse or located towards the northwestern end of the site.

14.5 In my view any sediment-related effects on water quality will be minor, and importantly will avoid any risk to the ecology of the Kaiti reef system which in my opinion is the nearest potentially sensitive ecology.

15 Overall, I consider that the above mitigation measures reflect a precautionary approach and that in adopting the mitigation the Project will have a minor effect on the existing ecological and water quality environment and will maintain indigenous biodiversity.

16 The Officer's Report and its supporting technical reviews by Dr Shane Kelly and Dr Bramley confirm there is substantive ecological assessment and reporting to inform the assessment of ecological values and effects, and general alignment in the conclusions drawn by the expert ecologists. There are several relatively technical points of difference in relation to specific potential effects, but there is overall agreement that effects can be appropriately managed and mitigated through consent conditions.

METHODOLOGY OF EFFECTS ASSESSMENT

EIANZ 2018

17 My effects assessment used a derivation of the Ecological Impact Assessment Guidelines for New Zealand 2018 (*EIANZ*).[7] These Guidelines have been developed for terrestrial and freshwater ecosystems but the underlying principles are applicable to, and the framework they provide has been adapted for, use in estuarine environments.[8] Although EIANZ does not apply to all the environments affected by the Project, I consider the Guidelines (as adapted) provide a useful structured regime to assist with assessing ecological values and effects.

18 As detailed in the Ecology Assessment, EIANZ (as adapted):

18.1 includes a criteria-based regime for separately assessing the 'Ecological Value' of both estuarine species and habitats;

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7 *Ecological Impact Assessment Guidelines for New Zealand*, 2nd Edition (2018).

8 Dr Sharon de Luca and Boffa Miskell Ltd, "Queens Wharf Dolphin: Marine Ecology Assessment" (2018) - Report- prepared by Boffa Miskell Ltd for Panuku Development Auckland.

18.2 provides a five-level hierarchy for assigning the 'Magnitude of Effect' to the specific Project elements; and

18.3 integrates the assessed Ecological Value and Magnitude of Effect descriptors to provide what I refer to as an overall 'Derived Effect Level' (*DEL*) which also has five categories (Very Low, Low, Moderate, High and Very High).

19 The detailed EIANZ matrix tables and criteria applied in the Ecology Assessment are attached as **Appendix A** to this statement.

20 EIANZ provide for an assessment at the scale of the 'ecological feature' should be done. In this case the 'feature' is the harbour ecosystem at the Port plus the wider coastal setting of Poverty Bay, which includes the extended Kaiti reef system. I have contextualised the local footprint effects by assessing ecological features within this wider harbour ecosystem and an appropriate temporal scale where applicable.

EXISTING ECOLOGICAL VALUES ASSESSMENT

General Ecological Setting

21 The physical footprint of the Project is mostly a highly modified and/or man-made environment, which is dominated, or affected, by the existing Port and its operations. **Figure 1** below identifies the Project 'footprint' which includes the Port area, the PNC and the OSDG.

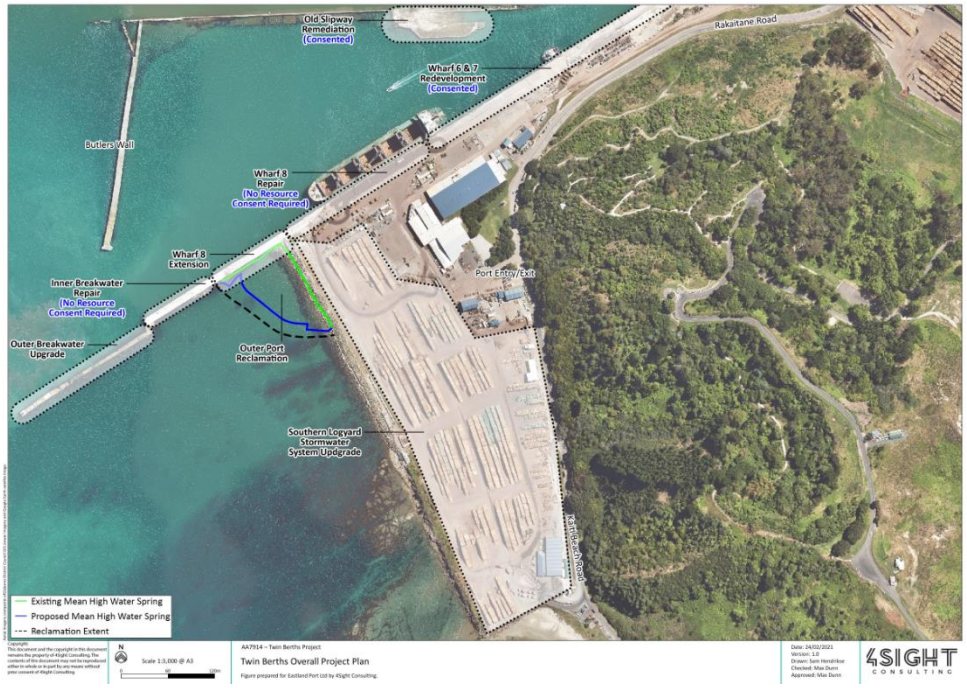

Figure 1: Key Project Elements

22 More specifically:

22.1 the proposed Wharf 8 development, reclamation and breakwater upgrade construction activities are located at or adjacent to existing Port infrastructure;

22.2 operational stormwater discharges will be located where existing Port discharges occur and in the same location as existing Port stormwater infrastructure; and

22.3 the proposed dredging and related discharges will predominantly occur in areas that have been the subject of extensive past and current dredging, vessel utilisation and dredge material discharges.

23 Consequently, I consider the ecological values of the existing environment within these areas is already heavily influenced by Port activities. As is outlined below, and in greater detail in the Ecology Assessment, I consider that:

23.1 excluding the OSDG, the ecological values and water quality within Project footprint are already largely limited by the existing and past Port activities;

23.2 the character of the OSDG is likely to be largely governed by proximity to the Waipaoa River and associated discharges and sediment deposition from the river; and

23.3 the ecological and water quality sensitivity of the existing environment to the proposed Project is low.

Existing ecological values

24 Since 2014 I have carried out, overseen and reviewed a number of assessments of the fauna, flora and habitat within and near the Port, the PNC and the OSDG. This has included:

24.1 assessments of benthic communities within the Project footprint as part of dredging projects;

24.2 assessing intertidal areas as part of the inner harbour consented slipway redevelopment;

24.3 monitoring post larval crayfish settlement into artificial habitats beneath Wharf 6 and 7 as part of the Wharf 7 redevelopment in cooperation with the University of Auckland;

24.4 assessing the Kaiti reef, an area adjacent to the Project footprint that is an intertidal area of elevated ecological value;

24.5 assessing the natural reef areas that are adjacent to the outer PNC and which are also of elevated ecological value;

24.6 annually assessing the seabed sediments within the Project area and at background sites in Poverty Bay for

contaminants related to dredging sediment disposal from the Port; and

24.7 undertaking a detailed survey of some 70 seabed samples of the fauna and textural composition of sediments within and near the OSDG as part of 5 yearly consent monitoring requirements.

25 As I outlined in the Ecology Assessment, no specific features of significant marine scientific or marine ecological conservation importance or value are located within the Project footprint.

26 In relation to marine mammals, Ms McConnell's Marine Mammals Assessment identifies and discusses the presence of common dolphins and killer whales in Poverty Bay. She notes that these species have a large home range and that "*there is no evidence to suggest these species have a sustained presence here"*. The Marine Mammals Assessment notes a small number of New Zealand fur seals are present year-round in Poverty Bay and notes the presence of five other species (four whale species and leopard seals) which may be present from time to time. The Marine Mammals Assessment conclusion is that '*Overall, the sightings and strandings data suggest Poverty Bay does not constitute important marine mammal habitat'*.[9]

27 Notwithstanding, the conclusion above, I consider the following ecological elements within the Project footprint have some ecological value:

27.1 the use of the Outer Breakwater by small post juvenile kōura;

27.2 potential itinerant use of the Outer Breakwater by small flocks of white fronted tern and red-billed gull;

27.3 the use of parts of the existing SLY seawall by kororā; and

27.4 a small isolated subtidal patch of weed covered rock (less than 25m^2) which sits within the reclamation footprint which is otherwise a sandy/silt substrate.

28 Additionally, the following ecological elements *adjacent* to the Project footprint have some noteworthy ecological value:

28.1 seasonal settlement of post-larval crayfish (kōura, or red rock lobsters) beneath part of Wharf 7;

[9] SLR, Twin Berths Project, RFI Response, Marine Mammals, 10 May 2023 (*Marine Mammals Assessment*).

28.2 the Kaiti Reef, which is an extensive area of intertidal and shallow subtidal habitat and patch reef which, although not directly within the Project footprint, is biodiverse and a potentially sensitive adjacent ecological feature; and

28.3 the presence of a rocky reef habitat of moderate ecological value adjacent to the outer PNC and which is part of the broader reef area known as the 'Foul Grounds'.

29 How each of these elements has been assigned or contributed to an assessment of ecological value is discussed in the next section of this evidence where I describe the EIANZ approach as it relates to 'species' (relating to marine invertebrates and birds, in particular Kororā) and habitats.

EIANZ: Species

30 EIANZ uses a threat classification basis for assigning relative value. However, over 95% of the New Zealand marine invertebrate fauna remains unassessed in the New Zealand Threat Classification System.[10] Species recorded in the Project footprint are commonly encountered in similar estuarine harbour environments including those elsewhere in the Port, the lower tidal sections of the Tūranganui River estuary and in nearshore coastal areas. Monitoring suggests this is also true of the OSDG benthic community.

31 Based on the result of sampling and research, I have assessed that the marine species (invertebrates and macroalgae other than seagrass) present in the Project footprint or which are in adjacent areas that could be affected by Project activities, are not rare or threatened nationally and also do not have a distribution limited to or dependent on the Project footprint. They are common locally. Therefore, under EIANZ criteria, the Ecological Value (of Marine Species) in the Project Footprint is most appropriately described as 'Low' for all Project elements (Appendix A).

Seagrass

32 Seagrass (*Zostera muelleri* subsp. *Novazelandica*) is now classified as "at risk - declining".[11] It occurs on the Kaiti reef adject to the Project area to the south. It has a 'High' Value under EIANZ.

[10] D Freeman, K Schnabel, B Marshall, D Gordon S Wing, D Tracey and R Hitchmough (2013). 'Conservation Status of NZ Marine Invertebrates', Threat Classification Series 9.

[11] de Lange, P.J.; Rolfe, J.R.; Barkla, J.W.; Courtney, S.P.; Champion, P.D.; Perrie, L.R.; Beadel, S.M.; Ford, K.A.; Breitwieser, I.; Schonberger, I.; Hindmarsh-Walls, R.; Heenan, P.B.; Ladley, K. (2018): *Conservation status of New Zealand indigenous vascular plants, 2017*. New Zealand Threat Classification Series 22. Department of Conservation, Wellington. 82 p.

Birds

33 17 species of coastal birds are known to inhabit Poverty Bay of which 11 are classified as threatened or at risk.[12] Any of these highly mobile species might be present at one time or another within the Project area and under EIANZ would be recorded as a species of 'High' ecological value. Two species, white fronted tern and red-billed gull, have been known to use the elevated concrete pedestal containing a port channel marker at the seaward end of the Outer Breakwater for resting but they can also be found elsewhere in the Port and on local beach areas. However, none are known to nest or breed within the Project footprint and there is no evidence that the Project footprint represents notable habitat.

34 Kororā are the species of most interest in terms of potential effects because of the use they make of parts of the SLY seawall for breeding and moulting including potentially that part of the seawall within the Project footprint. They are therefore the primary focus of the avifauna effects assessment.

35 As a species, Kororā have a threat classification status of "At Risk – Declining" and because of this, they have a 'High' ecological value[13] and are assigned an ecological value of 'High' under EIANZ.

EIANZ: Habitat

36 The ecological value of the marine habitat for each Project element is assessed against three levels (Low, Moderate/Medium and High), each of which has eight descriptors covering biological, biophysical, quality and habitat modification criteria. The source information to allocate habitat into this categorisation is detailed in Section 3 of the Ecology Assessment and also includes further work carried out in response to the peer review and subsequent section 92 further information request.

37 Not all descriptors are relevant to each Project element, or are required to trigger a particular level, or need be confined to just one of the three levels. My categorisation of the Project elements in relation to this hierarchy is tabulated in **Appendix B** and is summarised below in **Table 1** for each Project element.

Project Element	Habitat	Value	Main Reason

[12] Robertson, H.A., Baird, K, Dowding, J.E., Elliott, G.P., Hitchmough, R.A., Miskelly, C.M., McArthur, N., O'Donnell, C.F.J., Sagar, P.M., Scofield; R.P., Taylor, G.A. (2017) ' New Zealand Threat Classification Series 19' 27 p. Table 1.

[13] Roper-Lindsay, J., Fuller, S. A., Hooson, S., Sanders, M. D., & Ussher, G. T. (2018). Ecological impact assessment (EcIA). *EIANZ guidelines for use in New Zealand: Terrestrial and freshwater ecosystems* (2nd ed.). Environment Institute of Australia and New Zealand. See also above, n 9.

Outer Breakwater Upgrade	Reef-concrete	Medium	Man-made reef type substrates with moderate species richness, diversity and abundance, crayfish habitat; outer end used by red-billed gulls and white fronted tern
Wharf 8 Upgrade	Reef-concrete/steel	Low	Highly modified substrates; limited physical area; limited biota and diversity
Reclamation and Outer Seawall	Soft Sediment	Low-Medium	Low species richness, diversity and abundance
	Seawall	Low	Low species richness, diversity and abundance; small scale
	Isolated patch reef	Low	Low species richness, diversity and abundance; small scale
Capital Dredging	Port soft sediment	Low	Low species richness, diversity and abundance
	Outer PNC-soft sediment	Medium-High	Medium high-reflects the higher Shannon-Weiner Index;[14] small physical area
	Outer PNC hard substrate	Low	Low species richness, diversity and abundance
Maintenance Dredging	Soft sediment	Low	Highly modified and frequently disturbed; low species richness, diversity and abundance
OSDG	Soft sediment	Medium	Moderate species richness, diversity and abundance; natural uncontaminated substrate
Not within a project element	Reefs adjacent PNC	Medium-High	Moderate species richness, diversity
Not within a project element	Kaiti Reef	High	Seagrass and moderate biodiversity

Table 1: EIANZ: Habitat Value of Each Project Element

[14] The Shannon–Wiener index a metric used in ecology for representing diversity by taking into account the number of species living in a habitat (richness) and their relative abundance (evenness).

Kororā

38 The Kororā Assessment provides a summary of Kororā ecological values as applicable to the habitat used by Kororā. The Kororā, as assessed under EIANZ, is presented as **Table 2** below.

Species or habitat	**Ecological value**
Kororā	High
Habitat areas within the Project footprint:	
SLY seawall	Moderate or Low (depending on presence or absence of Kororā)
SLY Inner Seawall (rockwall)	Moderate or Low (depending on presence or absence of Kororā)
Habitat areas outside the Project footprint	
SLY Seawall Enhancement Area	High
Buffer Seawall	Moderate to High
Waikahua seawall adjacent to Kaiti Beach	Low

Table 2: EIANZ: Kororā Species and Habitat Ecological Value

Existing water quality

39 I am well informed about existing water quality in the area having designed, undertaken, reported and reviewed water quality assessments at the Port since 2014. Those assessments have been required for resource consent applications for stormwater discharges and maintenance dredging and disposal operations and also for monitoring required by Eastland consents. These assessments have included sampling discharges and receiving waters, observations of the condition of the port waters and also Whole Effluent Toxicity testing of stormwater discharges using formal bioassay assessments. In conducting these assessments I have liaised with other specialist Peer Reviewers as required such as Cawthron Institute scientists and Dr Kelly. Gisborne District Council (*GDC*) has been provided with results of this work as required by monitoring conditions.

40 Existing water quality in and around the Project footprint already reflects the influence of existing Port activities (in particular ship movements and tug activity which frequently cause high turbidity

and reduced water clarity) and other local stormwater and stream discharges.

41 Leaving aside the effect of Port activities, water quality within the Project footprint typically reflects the water quality (and clarity) of the wider Poverty Bay. At times, and sometimes cumulatively with existing Port related activity, the water quality is strongly adversely influenced by discharges from the Kopuawhakapata Stream, and the Tūranganui and Waipaoa rivers following significant rainfall. These discharges increase suspended sediment and turbidity and decrease visual quality of local waters including at the Port (and the PNC), the OSDG and more generally throughout Poverty Bay.

42 The receiving waters within the Project footprint are classified under the Tairāwhiti Resource Management Plan (*TRMP*). The classifications are SC within the Port; SB within the PNC; and SA within the reclamation area and at the OSDG.[15] **Figure 2** below shows the extent of these classifications in and around the Project Footprint.

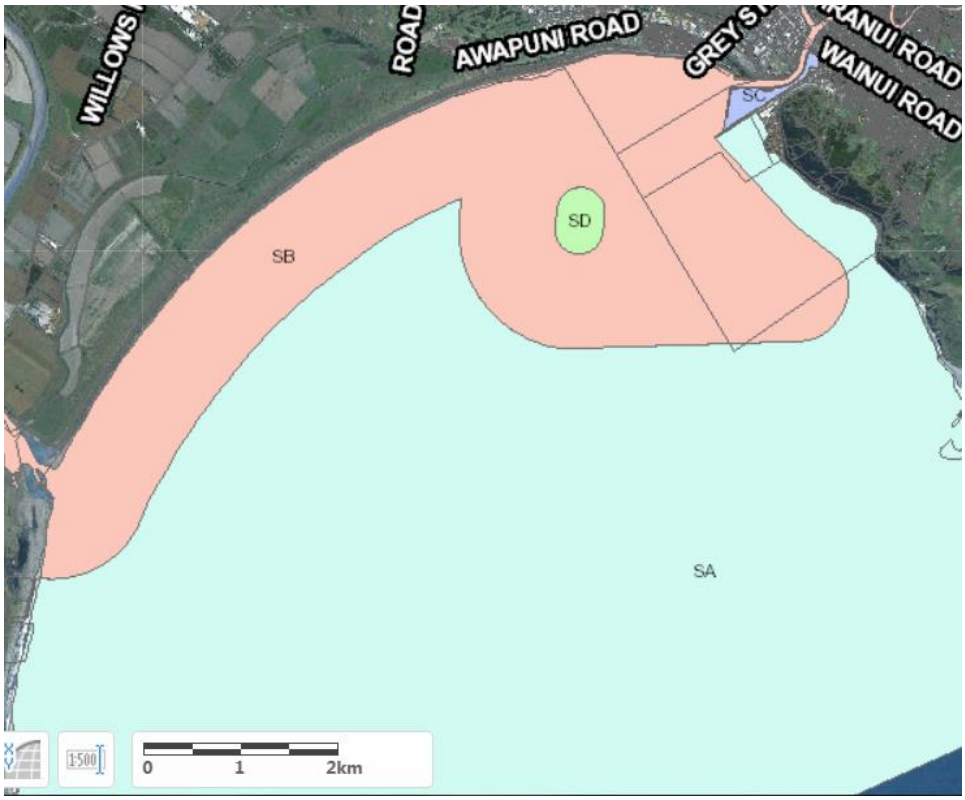

Figure 2: Water classifications

[15] I note a further classification SD which is shown in Figure 2, which is not relevant to the Project, being Gisborne City's treated municipal wastewater discharge which occurs just southwest of the PNC.

43 **Table 3** below summarises the TRMP's standards that apply to each water classification (SC within the Port; SB within the PNC; and SA within the reclamation area and at the OSDG).

Requirements	SA	SB	SC
The quality of the Class SA, SB and SC waters shall conform with the following requirements:			
a. The natural temperature shall not be changed by more than 3 degrees Celsius	X	X	X
b. The natural pH of the waters shall not be changed by more than 0.1 unit and at no time shall be less than 6.7 or greater than 8.5	X	X	X
c. There shall be no destruction of natural aquatic life by reason of a concentration of toxic substances nor shall waters emit objectionable odours	X	X	X
d. The natural colour and clarity of the water shall not be changed to a conspicuous extent	X	X	X
e. Aquatic organisms shall not be rendered unsuitable for human consumption by the presence of contaminants, and	X		
The water shall not be rendered unsuitable for bathing by the presence of contaminants	X	X	

Table 3: Water Classification Standards

44 Table 3 shows that the three classifications have common Standards in respect of broad water quality characteristics (temperature, pH, toxic substances and odour and colour and clarity). They are only differentiated in respect of Standard (e) which has two components. These are specifically directed at protecting water quality in relation to human consumption of seafood which only applies to SA areas and secondly, protecting areas for bathing which applies to SA and SB areas.

45 It is my opinion based on my assessments, that the existing water quality of receiving waters within and around the Project footprint would meet Standards (a), (b), (c) and (e) in Table 3. At times Standard (d) may not be met due to existing Port activities and natural events that effect the clarity of the local waters within the Port.

EFFECTS ASSESSMENT

EIANZ: Marine Habitat: Magnitude of Ecological Effect

46 **Table 4** below provides a summary of the 'Magnitude of the Ecological Effect' for each Project element in relation to the 5-level hierarchy (Very High/High/Moderate/Low/Negligible). The supporting reasons for my assessment of the magnitude of each effect are set out in final column. The italicised text in Table 4 is the EIANZ criteria (which are included in full as part of Appendix A), and

I have also included some clarifying notes for several Project elements.

Project Element	**Habitat**	**ME**	**Main Reason**
Outer Breakwater Upgrade	Reef-concrete	Low	*Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of baseline condition* (ie the post Project environment) *will be similar to pre-development circumstances/patterns* Temporary effect; new structure available for recolonisation and ecological recovery
Wharf 8 Upgrade	Reef-concrete/steel	Negligible	*Very slight change from baseline condition*
Reclamation	Soft Sediment and Seawall	Medium (=Moderate)	*Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of baseline will be partially =changed* Subtidal a naturally unstable soft sediment substrate due to exposure and resulting low species richness, diversity and abundance; extensive contiguous areas of similar subtidal habitat not affected; existing seawall intertidal and minimal fauna/habitat;
	Reef patch and seawalls	Low	Small scale, new seaward revetment has positive ecological potential subtidally
Capital Dredging	Port	Negligible-Low	*Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of baseline condition will be similar to pre-development circumstances/patterns*
	Outer PNC-soft sediment	Negligible-Low	

	Outer PNC Hard substrate	Negligible-Low	*Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of baseline condition will be similar to pre-development circumstances/patterns*
Maintenance Dredging	Soft sediment	Negligible - Low	*Character/composition/attributes of baseline condition will be similar to pre-development circumstances/patterns*
Dredging Disposal to OSDG	Soft sediment	Medium	*Character/composition/attributes of baseline condition will be similar to pre-development circumstances/patterns*
Sediment plumes outside of Project footprint (from Dredging and/or reclamation)	Reefs adjacent PNC and Kaiti Reef	Negligible	*Character/composition/attributes of baseline condition will be similar to pre-development circumstances/patterns*

Table 4: EIANZ Magnitude of Effect (ME) for Each Project Element

EIANZ: Species/Habitat: Derived Ecological Effect Level

47 As noted above, the DEL uses a matrix combining 'ecological value' and 'magnitude of effect' both for 'species' and 'habitat'. I have included this EIANZ matrix as part of Appendix A.

48 **Table 5** below summarises the DEL for each Project element. In all cases the DEL is determined to fall within a range from 'Very Low' to 'Low' (but see later footnote clarification regarding Capital Dredging in the Outer PNC soft sediment).

Project Element	**Species**	**DEL**
All Elements		Low
Project Element	**Habitat**	**DEL**
Outer Breakwater Upgrade	Reef-concrete	Low

Wharf 8 Upgrade	Reef-concrete/steel	Very Low
Reclamation	Soft Sediment	Very Low-Low
	Reef patch	Very Low
Capital Dredging	Port and inner PNC soft sediment	Very Low-Low
	Outer PNC-soft sediment	Very Low-Moderate*
	Outer PNC hard substrate	Low
Maintenance Dredging	Soft sediment	Very Low
Dredging Disposal to OSDG	Soft sediment	Low
Sediment Plumes Outside of Project footprint	Reefs adjacent PNC and Kaiti Reef	Very Low-Low

Table 5: EIANZ: DEL for Project Elements

* see discussion of dredging effects below.

49 In applying an EIANZ based approach, the Guidelines suggest that levels of effect 'moderate' or greater, *may* warrant offset or compensation actions.[16] I have concluded through this assessment approach that all DEL values are moderate or less and no offset or compensation actions are required.

50 Effects on kororā has been assessed separately because the DEL varies depending on whether active burrows are present at the specific time of construction. This more nuanced kororā assessment and mitigation approach is discussed in detail in the next section.

[16] EIANZ, page 84.

SUMMARY OF ECOLOGICAL EFFECTS OF THE PROJECT

51 This section sets out a summary of the key ecological and water quality effects assessment findings, with cross references to the Ecology Assessment, the Peer Review Reports and Section 92 Response Report. The findings are grouped in relation to each major aspect of the Project, as outlined above.

Wharf 8 extension

52 The Wharf 8 extension will require new steel sheet piles along the existing concrete quay wall. This will cause the loss of about 250m^2 of soft, muddy seabed on the harbour side of the structure, and the loss of a small section of the existing revetment on the seaward southern side. There is negligible value to be assigned to the species or habitat at this location and any impacts will be similarly Negligible to Very Low and not a material concern in terms of the assessment of effects.

53 As outlined in the Ecology Assessment, I do not consider there will be any water quality issues arising from the Wharf 8 extension. Turbidity arising from sediment disturbance during piling and construction will have a localised, temporary and minor effect on adjacent water quality. The scale and intensity of any water quality impacts will be less than that arising from regular vessel movements at the Port.

54 The Ecology Assessment was the subject of a Peer Review by Dr Kelly (Coast and Catchment). Dr Kelly queried the potential for impacts on marine mammals, including the potential for acoustic impacts, arising from pile driving associated with the Wharf 8 extension.

55 The Marine Mammals Assessment specifically considered the nature of potential effects on marine mammals and made the following recommendations to manage theadverse effects of pile driving associated with the Wharf 8 extension works:

55.1 Use of bubble curtains during pile driving to reduce the propagation of underwater noise;

55.2 Establishment of shutdown zones in accordance with the results of underwater acoustic modelling to protect marine mammals from potential auditory injury associated with pile driving;

55.3 Monitoring of shutdown zones by dedicated, trained Marine Mammal Observers (or remote monitoring technologies subject to an appropriate methodology), with stop-work procedures and delayed starts implemented when marine mammals enter relevant shutdown zones;

55.4 Commencement of piling activities by way of soft start measures;

55.5 Validation of the results of the underwater noise modelling with in-situ measurements at the outset of piling operations to confirm the appropriateness of shutdown zones; and

55.6 Development of a marine mammal management plan to establish all operational details associated with the control measures that are required to protect marine mammals from adverse effects and provision for its revision following the above validation process.

56 I consider that the Marine Mammals Assessment recommendations provide a comprehensive, and highly conservative effects management approach that I consider will avoid adverse effects associated with the Wharf 8 extension's pile driving activity on marine mammals. I concur with the recommendations and note that they have been adopted in the recommended consent conditions which are included as attached to Ms McPherson's evidence.

57 I note the Officer's Report and Dr Kelly's technical review is supportive of the analysis and recommendations in the Marine Mammals Assessment. I further note that Ms McConnell's addendum report (dated 29 September 2023) which considered further noise modelling information confirms the recommendations of the Marine Mammals Assessment.

SLY Reclamation Area

58 The seabed area which will be lost to the Project's proposed new reclamation area adjoining the SLY, is 0.63ha. The Ecology Assessment considered the effects of the reclamation on the following matters, each of which is discussed below:

58.1 coastal habitats present in the reclaimed area;

58.2 water quality in relation to the construction activities; and

58.3 stormwater discharges taking into account the upgraded stormwater discharge management that is proposed as part of the Project.

59 In addition, following the Ecological Peer review, additional consideration was given to the extent and effects of the Project on seagrass. That assessment is also set out below.

Effects of reclamation on coastal habitats (excluding kororā)

60 There are two zones of existing habitat impacted by the Project's reclamation:

60.1 **Intertidal zone:** Seawall deconstruction adjacent to the SLY is confined to the approximately 100m section of the seawall shown in **Figure 3** below. This section is composed of concrete units and rubble. The low tide mark on the intertidal zone along this part of the seawall is very near its base and the intertidal zone is effectively located on the seawall itself. There is no significant area of natural reef substrate. The Ecology Assessment concluded that the existing intertidal habitat and biota in the areas associated with the deconstruction of the existing seawall is very limited and any intertidal impacts are Negligible. There will be no impacts on intertidal areas beyond the deconstruction zone itself.

60.2 **Subtidal zones**: Benthic sampling undertaken by 4Sight as part of the Ecology Assessment and a subsequent additional dive survey (undertaken by SLR), confirms that the seabed is mostly a layer of shelly sand overlying bedrock. Because this location is exposed to high wave energy, this surficial substrate is unstable which limits the development and complexity of the marine community. There is also a small (less than about 25m^2), isolated patch of algal covered rock which will fall within the reclamation footprint. Divers inspected this and confirmed it is covered by common algal and encrusting biota.

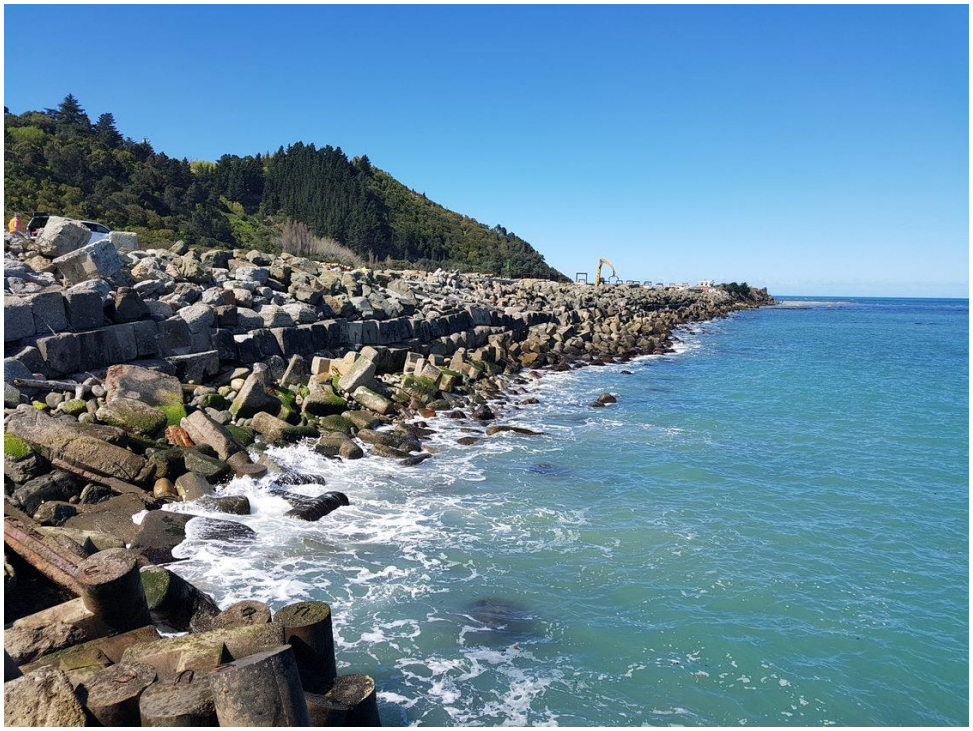

Figure 3: SLY seawall

61 Overall, the surveys confirmed that the seabed hosts common marine soft sediment taxa dominated by bristle worms and a community composition which is similar to that in the soft substrates beyond the reclamation footprint. Consequently, although the Project's reclamation represents a net loss in marine habitat, in my opinion it remains a small impact on habitat and ecological values. Specifically, under the EIANZ assessment regime I have detailed above, the DELs related to the reclamation are as follows:

61.1 DEL for 'marine species' affected by the reclamation: 'Very Low'; and

61.2 DEL for 'habitat' is:

(a) 'Very Low – Low' for the soft sediment; and

(b) 'Very Low' for the algal covered rock.

62 The Project will also involve the construction of a new seawall to protect the seaward side of the reclamation. Based on the indicative design of the seawall, the new structure is estimated to be 60% voids. As such, this structure will offer refuge habitat that is not available at the existing SLY seawall.

63 The new seawall will also sit in water of about 6 m depth on average. This is unlike the existing SLY seawall which, for all practical purposes, sits above the low tide mark and therefore does not provide habitat for marine species (save for kororā which are discussed below).

64 Consequently, the Project's new seawall structure will be in the subtidal zone and will be expected to develop a subtidal ecology like that associated with other local hard substrate subtidal habitats, both natural and introduced. This habitat will be more similar in nature to the Outer Breakwater. The Ecology Assessment and the subsequent diver-based surveys reported that the man-made substrates on the Outer Breakwater host a moderate diversity of marine life including algae, sponges, marine invertebrates including crayfish, and fish.

65 In my view, leaving aside the effects on kororā which are separately addressed below, the new seawall will:

65.1 provide an area of new subtidal hard reef-type habitat additional to that currently present and which will develop a reef type ecology of a similar type and ecological value to that on other local hard, man-made substrates (and which for example under my EIANZ assessment I concluded to be of Moderate Value for the Outer Breakwater habitat);

65.2 provide new subtidal rock habitat will more than offset the effect of the loss of a small, isolated patch of rock within the reclamation footprint; and

65.3 have an overall positive impact in terms of ecological values.

Effects of the reclamation on kororā

66 The Kororā Assessment thoroughly investigated the nature and extent of kororā use of the existing SLY seawall and the potential effects of the Project.[17]

67 Kororā are known to rest within crevices in seawalls, within rock stockpiles and under artificial structures and may colonise the new habitat areas as they are created. These are marginal habitats and within the Project area, due to the high wave energy environment, are less favourable than the habitat along the south eastern parts of the seawall which gain increasing protection for the Kaiti reef. Consequently, the Kororā Assessment considered both:

67.1 direct effects on kororā during the construction and operational phases of the Project; and

67.2 effects of the Project on kororā habitat.

68 With respect to direct effects on kororā, a summary of the Kororā Assessment's conclusions on potential effects is set out in **Table 6** below.

Potential Effect	**Ecological Value**	**Magnitude of Effect**	**Overall Level of Effect**
Construction effects			
Kororā mortalities	High	Negligible	Very Low
Noise		Negligible	Very Low
Sediment		Negligible	Very Low
Lighting		Negligible	Very Low
Disturbance		Low (temporary)	Low (temporary)
Post-construction effects			

[17] Eastland Port Twin Berths Project - Little Penguin / Kororā (*Eudyptula minor*) Assessment of Ecological Effects, Prepared for Eastland Port, 4Sight Consulting, August 2022.

Ship strike (increase shipping traffic)	High	Negligible	Very Low
Interactions with port operations		Negligible	Very Low

Table 6: EIANZ Summary of Kororā Effects

69 There is risk of kororā mortalities if kororā remain present in an active construction area, given the use of large machinery and other construction activities such as rock movement. Consequently, a range of management control actions have been imposed via the proposed AMMP to discourage kororā from entering the working area or establishing active burrows in vulnerable locations over the extended works period. These measures include:

69.1 exclusion fencing including the use of geotextile or other 'wrapping' to exclude kororā access to crevices in the new seawall or stockpile material;

69.2 rock storage either below mean highwater spring level or off site beyond kororā access; and

69.3 no movement of rocks within 20 m of an active burrow.

70 As set out in Table 6 above, with the successful exclusion of kororā from the new seawall construction area prior to works, the magnitude of effect has been assessed as Negligible and the DEL (referred to as the overall level of effect in the Kororā Assessment) is assessed as Very Low. I note that birds excluded from the construction area are not damaged in any way and are likely to explore the enhanced and better quality habitat opportunities in the neighbouring sections of the SLY seawall.

71 The Kororā Assessment also concluded that the potential magnitude all other potential construction and operational effects on kororā (including related to noise, sediment and lighting effects) was Negligible with a DEL of Very Low, save for effects related to disturbance where the Magnitude of Effect and the DEL were both assessed as Low but temporary (related only to the construction period).

72 With respect to habitat effects, the Kororā Assessment provides the following table which summarises habitat ecological value; the

magnitude of habitat effect and the overall derived level of habitat effect under EIANZ.[18]

Potential Effect	Habitat Ecological Value	Magnitude of Effect	Overall Level of Effect
No active burrows identified within SLY Outer Seawall			
Loss of habitat	Low	High	Low
Active burrows identified within SLY Outer Seawall – no habitat enhancement			
Loss of habitat	Moderate	High	Moderate
Active burrows identified within SLY Outer Seawall – with habitat enhancement			
Loss of habitat	Moderate	Low	Low

Table 7: Summary of potential effects on kororā habitat

73 The primary reason for the above habitat ecological value assessments is that the area it is *potentially* used by kororā to breed and moult, even though as noted it may be considered marginal habitat. Considering that this habitat is an artificial structure, is exposed to high wave energy and storm surge, and limited number of kororā indications, its ecological value under EIANZ is considered to be:

73.1 moderate if pre-construction monitoring identifies active burrows; and

73.2 low if monitoring confirms that there are no active burrows within the expected breeding/moulting season.

74 It is also to be noted that the seaward revetment for the new reclamation will be constructed before the deconstruction of the existing SLY seawall. This staging is necessary to protect the reclamation construction area and will also ensure that kororā will not be able to directly access the existing seawall area from the sea at the time of deconstruction. Effectively a new area of potential habitat will be created before the removal of the existing area of potential habitat. Furthermore, given this construction methodology, there is also opportunity to prevent kororā tracking into the

[18] Note the use of the EIANZ methodology for assigning value to a habitat was not directly relevant in this report as the habitat being assessed is an artificial structure and does not fit with the criteria outlined by the EIANZ guidelines. Consequently, the Kororā Assessment applied professional judgement, guided by the EIANZ principles.

deconstruction area from elsewhere on the SLY seawall, further mitigating the potential for this deconstruction to effect kororā.

75 The Kororā Assessment notes the inner rockwork of the seawall which separates the SLY from the track that sits atop the seawall is also a potential habitat which, based on findings to date, has a 'Low' habitat value but which, if active burrows were to be located in the future, would be upgraded to a 'Moderate' value under EIANZ.

76 I understand that this inner armouring was put in place largely because of the effect of storm waves causing the sea to wash over the crest of the seawall and erode its inner margins. This further illustrates why the section of seawall to be deconstructed is considered marginal habitat.

77 If active burrows are located in the SLY Outer Seawall within the Project footprint then the overall level of effect on kororā could be 'Moderate'. Consequently, the AMMP includes measures for the appropriate monitoring, identification and management of habitat values associated with the active burrows. In the event active burrows are identified and lost as a result of the Project works, the conditions provide for the implementation of habitat enhancement of neighbouring existing habitat, which is assessed to result in the effect being reduced to 'Low'.

78 In his initial Kororā Peer Review, Dr Bramley considered that '*appropriate field work and surveys (including using a conservation dog) have been undertaken to identify potential kororā habitats at the site and confirm the need for a kororā management plan in order to manage effects due to the proposed works*'.[19]

79 A draft kororā management plan has been prepared as part of a wider AMMP. Dr Bramley identified matters which he considered should be covered in the AMMP as it relates to kororā including:

79.1 pre-construction surveys;

79.2 actions to deter and relocate kororā;

79.3 identification of kororā;

79.4 contingency measures for ongoing discovery of kororā; and

79.5 provision of nesting habitat within and near the site.

80 I concur with Dr Bramley's view that these matters can readily be addressed via consent conditions and the condition of consents

[19] Kororā Peer Review, page 3.

related to the AMMP now proposed by Eastland (as attached to Ms McPherson's evidence) require the AMMP to address each of these matters.

81 In overview with respect to kororā, the draft AMMP (a copy of which is attached to my evidence at **Appendix C**) requires that a suitably qualified and experienced ecologist (*SQEE*) undertakes the following:

81.1 Prior to construction, and during construction, within the Project monitoring area (defined in the AMMP), monitoring in the breeding and moulting season at least monthly.[20]

81.2 Daily within the Project construction area and extending 20 m into the adjacent 'Buffer' area of seawall, a determination of the presence (if any) of active burrows and/or resting kororā. This needs to be done or approved by an SQEE, before any construction works within 20 m of a kororā activity site.

81.3 Within the active construction area (also defined in the AMMP), implement the kororā exclusion methods and protocols in the AMMP.[21] This includes, for example, exclusion fencing, storage of rock below mean high water spring, and covering materials stockpiles with bidum cloth.

82 The AMMP also provides detail on the following: rock removal procedures; methods avoiding handling and relocation of kororā where possible; protocols and permit requirements should this be unavoidable; and buffer area enhancement through nest boxes and predator control.[22]

83 I concur with the view of the lead author of the Kororā Assessment (Ms Davis),[23] that the implementation and compliance with the AMMP will ensure that adverse effects on kororā can be avoided during both the construction and operational phases of the new reclamation. My understanding is that DOC have reviewed the draft AMMP and consider it fit for purpose. I note in my response to the Officer's Report below, the additional comments from Dr Bramley which can be accommodated as further refinements to the AMMP.

[20] AMMP, Table 4, page 3 of monitoring methods.

[21] AMMP, pages 13-14.

[22] AMMP, pages 14-17.

[23] Subsequently confirmed by personal communication, 2 October 2023.

Effects of reclamation on water quality

84 Deconstruction of the existing seawall, construction of the new seawall and discharges during the filling of the reclaimed area will generate sediment.

85 There is potential for such sediment to have adverse effects on the Kaiti Reef System which lies immediately to the south. These adverse effects could either occur through:

85.1 suspended sediment and increased turbidity reducing light penetration and affecting the diverse algal assemblage that occurs on this reef; or

85.2 excessive sediment deposition on the productive intertidal and shallow subtidal Kaiti reef habitat.

86 The sediment dispersion modelling conducted by MetOcean Solutions[24] predicts that increases in suspended sediment will be limited to the construction period and will be localised and occur at low concentrations that will not significantly change background concentrations of suspended sediment beyond the works area. MetOcean also conclude that, *"Deposition of the fine sediments on the seabed occurs mostly west of the reclamation site, along the southern side of the breakwater, and at the entrance of the port and navigation channel*".[25] The scale of such deposition is predicted to be very small and mostly <1mm. A narrow depositional zone of up to 2-3mm is predicted along the southern side of the Outer Breakwater.

87 Thus the sediment plumes and deposition are predicted most likely to move away from the sensitive zone of the Kaiti reef system which is south of the reclamation.

88 In my view, the seabed to the north is not likely to be ecologically sensitive to this source of sediment because these areas, which include the PNC and the offshore beach zones, are predominantly soft sediment and sandy substrates.

89 A characteristic of the reclamation locality which further mitigates the risk of material sediment related adverse effects on water quality and habitat from the Project, is the highly exposed and well flushed location. These factors mean that any sediment that accumulates close to the reclamation can be expected to rapidly disperse and dilute suspended sediment loads. As a result, I

[24] Gisborne Port – Twin Berths Project Assessment of potential sediment plume during Port reclamation works, Prepared for Eastland Port, Gisborne, September 2022.

[25] MetOcean, September 2022, page 43.

consider that it would be unlikely that plumes will have the opportunity to concentrate over successive tidal cycles.

90 An example of the physical damage that can occur to intertidal habitat in this exposed location was illustrated by adverse weather events in early 2023 (following Cyclones Hale and Gabrielle). Under my direction, 4Sight ecologists inspected this shoreline following the sequence of storms. The damage to seagrass beds and other habitat was obvious and was recorded and reported as part of 4Sight's response to the section 92 further information response.[26]

91 Finally, an ESCP is proposed as part of the construction methodology. The ESCP will include specific measures to control and limit the loss of sediment beyond the reclamation site. The applicant's proposed consent conditions (attached to Ms McPherson's evidence) include an obligation to prepare, certify and implement the ESCP.

92 Given the ESCP and the MetOcean predictions above, my conclusion is that the reclamation proposed as part of the Project will have no more than minor adverse water quality related effects extending to any areas containing sensitive ecology. Such effects as might occur will be short term, relatively localised and of a small scale in the context of the typical ambient range.

Effects of reclamation on stormwater discharges

93 An upgraded SLY stormwater treatment system is proposed as part of the Project. The proposed system will integrate the management of stormwater from the existing SLY with that of the Project's new reclamation area. This will use an enhanced 'treatment train' approach which will provide additional storage and incorporate a now proven chemical flocculation and particulate interception system, which has been developed for and successfully implemented at the other Eastland logyards.

94 Since 2014, I have overseen the water quality monitoring of the:

94.1 stormwater treatment systems for Eastland's Upper Logyard (*ULY*) and Wharfside Logyard (*WLY*) – both of which have been progressively upgraded over that period; and

94.2 the SLY discharges which are yet to be upgraded.

95 The monitoring data on the upgraded ULY and WLY systems now extends for several years and shows consistent improvement in

[26] Twin Berths Ecology – Section 92 Response, May 2023, section 6.4, page 20p.

reducing the concentration of suspended sediment in logyard discharges.

96 By comparison, the SLY data, which covers a 9-year period, shows that the SLY discharges have struggled to achieve a consistently high quality in respect of reduced sediment load. This is due mainly to the difficulty in intercepting the fine particulate and sediment that are a characteristic of log yard runoff.

97 By way of example, the table below provides a summary of median concentrations of total suspended sediment for the upgraded (ULY and WLY) and not upgraded (SLY) logyard stormwater discharges as reported in or assessed from the cited monitoring reports. The table shows median total suspended solids (*TSS*) in the discharges from the treatment systems in the ULY and WLY systems to be much lower than the current SLY M1 (Harbour) discharge which has not been subject to an upgraded treatment process.

Logyard	**Median TSS** g/m^3	**Number of samples**	**Period**
ULY[27]	56	17	April 2017 to Sept 2022
WLY[28]	98	11	Aug 2020 to Sept 2022
SLY (M1)[29]	640	27	Feb 2017 to Jan 2023

Table 8: Comparison of suspended sediment concentrations in Eastland logyard stormwater discharge

98 In my view, the monitoring data for the upgraded systems is reliable and is a good predictor of future quality to be expected from the implementation of a similar treatment system for the SLY and new reclamation area. In my opinion, with the Project's improved stormwater treatment system installed and operating, the future stormwater discharge quality from the SLY will improve significantly as a result of reduced sediment concentrations and reduced turbidity, both of which will improve the clarity of the discharge. I consider the monitoring requirements currently applying to the ULY and WLY systems to be appropriate and would support similar requirements for the new SLY system.

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27 Eastland Port Upper Logyard Water Quality Sampling Report-Quarter 1 2022. Prepared for Eastland Port Ltd. 4Sight Consulting. May 2022.

28 Wharfside Logyard and Port Entry Commissioning Phase Performance Report. Prepared for Eastland Port. 4Sight Consulting December 2022.

29 Eastland Port Southern Logyard Sampling Report-Quarter 1 2023. Prepared for Eastland Port. 4Sight Consulting March 2023.

99 I expect that with the Project's improved stormwater treatment system installed and operational:

99.1 stormwater discharge quality will be significantly improved from the current discharges;

99.2 the SLY discharges will not pose any threat to the local receiving environment or its ecology; and

99.3 the applicable water quality standards for both the Port area (SC) and the coastal area adjacent to the SLY (SA) will be met.

Effects of the reclamation on Seagrass

100 Following a request for assessment in the Ecology Peer Review by Dr Kelly, the extent of seagrass (*Zostera muelleri* subsp. *novazelandica*) cover on the Kaiti intertidal reef was assessed by visual inspection on the 24 January 2023 along an approximately 1km section of Kaiti Beach. Seagrass was present in discrete areas from approximately 5m^2 to 1.5ha. A figure prepared by 4Sight following the inspection showing the cover of seagrass is presented below at **Figure 4**.

Figure 4: Seagrass on Kaiti Beach

101 As all seagrass habitat that could be affected by the Project is in the coastal marine area, and based on the reasoning set out in Ms McPherson's evidence, I understand that an assessment against the Resource Management (National Environmental Standards for Freshwater) Regulations 2020 is not necessary.

102 Seagrass is classified as 'At Risk-Declining'.[30] Ecological threats to seagrass include invasive species, and specifically the mat forming *Caulerpa brachypus* which is not currently known to be present within Poverty Bay or the Gisborne area (and was not observed in the dive or intertidal surveys). Pollutants, including sediment and nutrient run off from land-based activities, can also impact seagrass.

103 Given the timing of this assessment significant post-Cyclone Hale impacts were observed and documented. These included exposed root mass and dislodged clumps of seagrass. This indicates the scale of natural physical impacts that the seagrass areas experience and which may at times control seagrass cover and health.

104 In my view there will not be adverse effects on seagrass from the Project. No aspect of the Project will impinge directly on seagrass. As discussed above, sediment discharges associated with the reclamation are unlikely to affect background concentrations of suspended or depositional sediment other than to a minor and localised extent and even then, mostly to the west and not toward the Kaiti reef or beach system.

105 Further, the projected improvement in stormwater discharge quality following the treatment upgrade will reduce the discharge of sediment from the southern stormwater outlet from the SLY relative to the existing situation. While the existing discharge does not appear to have affected the proliferation of seagrass nearby, the improved discharge quality will further mitigate this risk.

Outer Breakwater Upgrade

106 Once completed, the Outer Breakwater upgrade will:

106.1 occupy a slightly larger seabed area than the existing structure, the net loss of seabed being about 2,700m^2;

106.2 result in an increase in the intertidal area by 1,400m^2. This is because the proposed design increases the flanks of the upgraded structure, which will be comprised of concrete units and rock spalls; and

106.3 consist of concrete armouring likely to be large accropode blocks of the type shown below with an estimated 60% void space.[31]

[30] de Lange, P.J.; Rolfe, J.R.; Barkla, J.W.; Courtney, S.P.; Champion, P.D.; Perrie, L.R.; Beadel, S.M.; Ford, K.A.; Breitwieser, I.; Schonberger, I.; Hindmarsh-Walls, R.; Heenan, P.B.; Ladley, K. 2018: Conservation status of New Zealand indigenous vascular plants, 2017. New Zealand Threat Classification Series 22. Department of Conservation, Wellington. Page 82.

[31] Examples of the type of armouring is shown in Figures 3.5 and 3.6, page 10 of the Kororā Assessment.

107 Both sides of the existing structure, while being an introduced non-natural substrate, have large crevices and cavities suitable for various species including kōura, and host a reef-type community which includes algae, sponges, macroinvertebrates including kōura, and fish. Sampling by drop pots and dive surveys (including an early 2023 dive survey), indicate that kōura use the voids in the existing structure as refuge. The dive survey did not reveal any listed biosecurity species. This broad community type was confirmed by the diving survey also to be present on the reef habitat adjacent to the outer PNC and is assumed to also be present on the contiguous wider reef area known as the 'Foul Grounds'.

108 There will inevitably be effects on this existing habitat and the associated community during the upgrade of the structure. However, the interim effect of temporary loss of habitat during the construction period will, in my opinion, be mitigated by the proposed staging of the construction methodology. The loss and then replacement of the habitat by a new armouring is proposed to happen in pulses of construction over at least several summer seasons. This construction methodology provides opportunities for mobile marine species to recolonise unaffected areas outside the construction area, and for all marine communities to redevelop progressively along the structure as each reconstruction season is completed. Consequently, at no time will there be a complete loss of habitat. The temporary ecological effects associated with each construction period I consider to be minor.

109 The new structure will present a similar type of habitat to what is currently present, and my conclusion is that marine ecological values should be restored to at least a similar state in the long term.

110 Taking the above into account the ecological value of marine 'Species' associated with the structure is 'Low' (taxa are common) while that of the 'Habitat' is assessed as 'Moderate' value due to its reef type community and biodiversity. The magnitude of the ecological effect for 'Species' is 'Low' and 'Habitat' is 'Moderate'. The overall DEL from the Outer Breakwater upgrade is assessed as 'Very Low' for 'Species' and 'Low' for 'Habitat' largely because the effect is considered temporary and restoration of ecological values is expected.

Effects of the breakwater upgrade on kōura

111 As noted above, sampling and dive surveys indicate that kōura use the voids in the existing structure as refuge. This has been observed during dive surveys of the breakwater.

112 The upgrade and re-armouring of the breakwater will inevitably involve some disturbance of any kōura present at the time of works. However, I consider these effects will be minimised by:

112.1 the proposed staging of the breakwater construction works discussed above;

112.2 the timing of the breakwater works being proposed to be undertaken in summer/autumn periods, which does not coincide with peak kōura settlement times (being winter and spring); and

112.3 the potential to collect kōura (by drop potting) prior to any seasonal construction episode and transfer any captured animals to alternate habitats away from the construction zone. This requirement has been included in the consent conditions attached to Ms McPherson's evidence.

113 Following construction, in my view the breakwater will continue to provide habitat suitable for kōura as the breakwater's proposed design will provide voids for refuge and also community associated with the structure which may contribute to the foraging opportunities of kōura.

114 This very small scale of effect can also be considered within the context of this wider habitat and likely Poverty Bay kōura population. Dive surveys were conducted in 2023 by SLR but due to weather events and poor water visibility near the Port, it was not possible to conduct quantitative surveys. The dive surveys observed kōura on both the breakwater and at the Southern Reef dive site.

115 The Southern Reef is part of the wider feature called the 'Foul Grounds' which will not be affected by the Project. In my opinion it can be assumed that there is suitable habitat for kōura on the Foul Grounds. This view is supported by anecdotal information of catches of juvenile kōura in that area and by recreational kōura pots which were observed during the surveys in this area. Therefore there will continue to be a wide adjacent area of potential kōura habitat that will remain unaffected. There may also be some ecological connection between the Foul Grounds and the breakwater in terms of local kōura movement and seasonal or life history behaviour.

116 At a broader Poverty Bay scale, there are other reef systems such as the Waihora Rocks and the Kuri Banks located off the north-eastern tip of Te Kuri (Young Nicks Head) which are likely also to be suitable for kōura.

117 At a larger scale, the commercial kōura fisheries management area extends from East Cape to the Wairoa River (*CRA3*) and then the Hawkes Bay, Wairarapa and Wellington coasts, through Cook Strait and north to the Manawatu River (*CRA4*). This area spans roughly 260km of coastline for CRA3 and 540km for CRA4 (a total of over 800km). At this scale, the effects of the temporary and localised loss of habitat and potential mortality of juvenile kōura is unlikely to

be relevant to the commercial fishery. This geographic zone also represents a large area from which larvae in the Waiarapa Eddy (which is a permanent anticyclonic eddy situated off the east coast of New Zealand[32]) and beyond may originate and settle on the new breakwater structure.

118 In summary, I am of the view that the effects on kōura will be intermittent, temporary, and of a very small scale which is not ecologically significant, but which can be mitigated by the staging, timing and trap/transfer discussed above. In an EIANZ context, I assess the DEL for kōura and kōura habitat as 'Very Low' and 'Low' respectively.

Effects of the breakwater upgrade on other kai moana species

119 Other kai moana species of potential value were also identified in the SLR dive surveys that were also noted in the Cultural Impact Assessment or incidental to other 4Sight surveys in wider Project footprint.

120 These assessments indicate that few kai moana species are present within the Project footprint. Kina (*Evechinus chloroticus*) and Cook's turban snail (*Cookia sulcata*) were observed along the 'reef habitat' of the Outer Breakwater, along with kōura as discussed above. Anecdotal evidence suggests the Outer Breakwater is not readily harvested (or accessible) for kina or Cook's turban but it may be potted recreationally for crayfish on its southern side.

121 As previously noted, a small, isolated patch of rock will be lost within the reclamation footprint, however, no kai moana species were identified in this area during the dive survey. As also previously noted, the new reclamation seawall will provide a net increase in subtidal habitat. This may have positive effect on the above kai moana species.

122 In conclusion, I do not expect there to be any adverse effect on reef habitat suitable for kina, crayfish and Cook's turban, or more generally, any negative impacts on kai moana species resulting from the Project.

Effects of the breakwater upgrade on birds and seals

123 I note that resting flocks of seabirds (red-billed gulls and white fronted terns) use the outer end of this breakwater and one itinerant New Zealand fur seal was observed during the ecological surveys.

124 The birds can also be observed similarly resting in other parts of the Port and local beaches and high shore areas. There is no evidence

[32] S M Chiswell (2003) Circulation within the Wairapa Eddy, New Zealand, New Zealand Journal of Marine and Freshwater Research, 37:4, 691-704.

the structures are used for nesting, breeding or any other significant ecological activity by these or other bird species, save for kororā.

125 My observations confirm that these birds do occupy the structure concurrent with activities such as large vessels entering and existing the port, dredge operations and the daily traffic of small vessels and appear are tolerant of such activity.

126 The use (resting) these birds make of this part of the structure may be disturbed for a period when the upgrade reaches that outer end of the structure. I consider any disturbance of these birds from the breakwater upgrade to be a minor effect that does not warrant specific management or mitigation. Under EIANZ I would assess any effect as 'Very Low'. Also I note that on completion, the upgraded structure will sit considerably higher above MHWS and although it is designed still to be overtopped in severe storm conditions, its crest will offer additional resting area available to birdlife most of the time.

127 I note that the AMMP includes surveillance targeted at seabird species which may be nesting within the Project area (although as noted, with the exclusion of kororā, I have not observed nor am I aware of any record of nesting activity).

128 The Marine Mammals Assessment prepared by Ms McConnell makes no specific comment about fur seals as related to the breakwater upgrade but notes: *"A small number of New Zealand fur seals are present year round in Poverty Bay, with some seasonal residency apparent over winter (e.g. Gisborne Herald, 2017)*" and further, *"…that while a small number of NZ fur seals may be seasonally resident* [in Poverty Bay]*, this species typically forages well offshore …returning to shore every few days to rest".*[33]

129 Given the evident mobility of fur seals, their rarity at the Port, and their ability to avoid areas of disturbance, my view is that any potential effect on fur seals associated with the breakwater upgrade will be more than adequately mitigated by the mitigation measures proposed in the Marine Mammals Assessment (for example bubble curtains; soft starts on piling; well maintained dredging equipment; observers to ensure there are no construction activities if seals, or other marine mammals, are present or close to the working area). I consider any effect can be concluded to be very small and less than minor.

130 Inevitably there will be sediment disturbance during the construction, but I consider the only effects will be minor and localised turbidity effects from the construction activity.

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[33] SLR, Twin Berths Project, RFI Response, Marine Mammals, 10 May 2023 (Marine Mammals Assessment).

Dredging

131 The dredging proposed to be undertaken as part of the Project is largely limited to areas that have previously been dredged. Of the estimated 140,600m³ of substrate to be removed by capital dredging, only about 3,500m^3 (2.5%) is from a seabed area not previously dredged. The new dredging area footprint (i.e. the area that has not previously been dredged) is about 0.4ha or 1.7% of the existing maintenance dredged area. That is, in about 98% of the proposed dredging area, the existing ecological values reflect the impact of dredging activity and will not be compromised by a continuation of that activity.

132 The dredging volume is highly variable year on year. For example, while long term averages are in the order of 70,000m^3 I am advised that in the last year in the order of 130,000m^3 has been maintenance dredged.[34] Going forward, average annual volume may increase somewhat but maximum volume will be capped at 140,000m^3 as is presently the case.

133 I have discussed the matter of the capital dredging volume with Mr Martin Bayley and my understanding is as follows. There is an estimated capital dredging volume of up to 140,600m^3. That will involve an estimated 30-40,000m^3 of rock and the balance will be soft sediment. The capital dredging is likely to be undertaken over several years. Given that the capital dredging covers for the most part the same footprint as the maintenance dredging and the soft sediment portion of capital dredging will be dredged by the same equipment, my understanding is the capital and maintenance dredging in any 12 month period will not be 100% cumulative. In other words, there is no prospect of a cumulative 280,600 m^3 being dredged in a single 12 month period. Mr Bayley advises that the combined capital and maintenance dredging volume can likely be managed to have an upper ceiling of ~200,0000m^3 in any 12 month period.

134 In my view, given the low existing ecological values of areas that have been routinely dredged and otherwise impacted by vessel movements (in terms of both species and habitat), the ecological impacts of dredging are minimal in the soft substrate areas which dominate within the Port and most of the PNC. Diver based sampling undertaken in the PNC shows a trend of increasing (but still low) diversity in infauna with distance from the Port. This is not unexpected given that the substrate, while soft, becomes slightly coarser down the channel and dredging and other activities such as tug manoeuvring are likely less frequent and disturbing of the substrate.

[34] Personal communication with Mr Bayley, 27 September 2023.

135 Under the EIANZ I have assessed the ecological value of these soft substrates as 'Low', (notwithstanding the higher 'Medium' status given to a small area of the PNC[35]). The magnitude of the effect is assessed as 'Low to Negligible' (because in EIANZ parlance, *Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of baseline condition will be similar to pre-development circumstances/patterns).* The DEL is assessed to be 'Very Low to Low'.

136 In response to a suggestion from Dr Kelly in the section 92 Ecology Peer Review, additional diving work was also undertaken which confirmed that the outer PNC contains limited biology or habitat potential and that, while the adjacent rocky reef areas support relatively diverse community assemblages, these will not be directly or indirectly affected by the dredging or any other Project element.

137 A small area of seabed of potential ecological interest has been subject to additional investigation. This area comprises of a mosaic of outcropping and near-surface rock intermixed with sandy patches at the outer end of the PNC. This area of the PNC was created by the original capital dredging, but it may not have been dredged since as it has been at adequate depth. It is proposed to increase the depth through this area by about 0.6m as part of the Project.

138 The possibility that an ecology may have re-established on this outer more 'rocky' area of the PNC seabed has been investigated. A diving survey shows a mosaic of rock outcrops interspersed with or covered in a thin layer of mobile sand. This is an environment unlikely to support macroflora (like kelp forest) or the establishment of complex macrofaunal communities. The survey of this area of hard substrate confirms there is a limited ecology. The soft sediment in this zone (which may not have been dredged since the original capital dredging) did have higher species diversity than the soft sediment zones elsewhere in the PNC and Port (which are dredged) and was assessed under EIANZ to have 'Medium-High' habitat value and to generate a DEL of 'Very Low to Moderate'.

139 The extension of the DEL range to 'Moderate' reflects the elevated value assigned to the infaunal community but this was over a very small area. There was nothing in the outer PNC soft sediment infaunal community in terms of the species present or the community composition that was unexpected in this sediment type at this location. Of more interest is the hard substrate and under

[35] I note that the Outer PNC soft sediment habitat received a 'Very Low to Moderate' DEL. This upper range reflected the elevated Shannon - Weiner index for these soft sediments which are unlikely to have been dredged since the original capital dredging programme. The physical area of this soft sediment is small and while it may host a soft sediment community of mostly polychaete worms which is more diverse than elsewhere in the dredged port zones, it is unlikely to be any more ecologically valuable or different from the wider areas of soft sediment which occur beyond the port.

EIANZ I conclude this outer part of the PNC to also be of 'Low' ecological value, the magnitude of effect to be 'Low' and the overall DEL of dredging in this area to be 'Low'.[36]

140 The diving survey extended to the contiguous reef areas to the north and south of the rocky substrates in the outer PNC. The ecological information gathered during these surveys suggests these areas host a comparatively rich community of brown and red seaweeds, sponges, ascidians, bryozoa and macroinvertebrates including crayfish. I consider these areas to be of elevated ecological value. Under EIANZ these habitats are assessed as 'Moderate-High' value.

141 In my view, it is important that these adjacent reef areas, which are part of a wider reef zone called the 'Foul Grounds', are not adversely affected directly or indirectly by the dredging. I conclude they will not be adversely affected, and the wider role played by these adjacent reef areas in maintaining the local ecology, including for example biodiversity and crayfish habitat, will not be undermined. I am of this view for the following reasons:

141.1 there will be no direct effects because dredging will not extend into these zones;

141.2 dredging related sediment plumes are likely to be temporary and intermittent and are unlikely to cause smothering or other effects, particularly when seen in the context of the high natural sediment regime that characterises the locality;

141.3 the communities in these areas currently exist and have developed notwithstanding the existing ambient influences and dredging regime;

141.4 the scale of sediment generation from dredging is quite localised and will not appreciably alter the overall sediment concentrations that pass over or onto these substrates either now or into the future; and

141.5 sediment quality data has been collected as part of annual consent-related monitoring for Eastland's maintenance dredging.[37] This data confirms that the sediments to be

[36] I note an error in section 2.5 Table 4 of the Twin Berths Ecology – section 92 Response prepared for Eastland Port by 4Sight dated May 2023. Table 4, Outer PNC Reef/Overall Level of Effect should read 'Low' not 'Low - Moderate'.

[37] The Ecology Assessment focused on the contamination potential of maintenance dredging sediments which are predominantly near-surface sediments. While deeper clays, silts, sands and rock will also be removed as part of the capital dredging, these sediments have not been tested. I consider this to be appropriate because due to their depth of such sediments it is unlikely they have

dredged are unpolluted and not a source of bio-accumulative or otherwise potentially persistent or toxic contaminants. There is therefore no risk that such contaminants could be mobilised or transported at concentrations that would affect marine life or water quality – both within or beyond the Port zone, including at these reef areas.

142 The various ecological investigations undertaken specifically as part of the Project and more generally over time, have not identified important habitat or significant biota within the dredging footprint. No 'at risk', 'threatened', or species of conservation significance (as listed on the New Zealand Threat Classification System[38]), have been identified or are likely to be affected by the dredging.

143 Sampling of seabed within the proposed dredging footprint (by sediment grabs, diver cores, and diver observations) has not recorded any species of biosecurity concern, although Mediterranean fanworm has been recorded from the inner Port. The fanworm can be managed by appropriate inspections and removal, to the extent practicable, prior to construction works and capital dredging in undredged areas within the Port. These initiatives are to be incorporated into a Marine Pest Management Plan which is covered by the consent conditions attached to Ms McPherson's evidence.

144 In my opinion, understanding the effects of dredging on water quality and specifically turbidity, requires an appreciation of the Port environment, particularly the influence of shipping movements and storm events within the Port. Both natural storms/rain events and regular vessel movements frequently increase turbidity within the Port. In my view the harbour is frequently of low sensitivity to dredging related impacts on 'colour' and visual clarity due to these other and often prevailing background influences. The effects of dredging are intermittent because the dredge is typically in the Port for short periods (a week or so) separated by months. While dredge plumes can be conspicuous, particularly at times when water clarity in the Port is good and there are no ship or tug movements, in my experience they tend to be less intense, less conspicuous and less frequent than these existing natural and Port-related activities that are unrelated to the Project.

145 Overall, I consider that ecological and water quality effects of the Project's proposed dredging will be minor and the DEL is assessed as 'Very Low'. The temporary impact of dredging on visual clarity,

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been exposed to contaminant sources. In my view, their excavation and transport does not pose concerns regarding impacts on these wider reef areas.

38 D Freeman, K Schnabel, B Marshall, D Gordon S Wing, D Tracey and R Hitchmough 'Conservation Status of NZ Marine Invertebrates', Threat Classification Series 9.

although largely self-limiting because dredging is interrupted by disposal phases, can be managed through consent conditions.

146 The Port's existing dredging activities are managed through conditions and, while I accept that the Project's dredging is of a greater scale, I consider that similar management conditions are appropriate. Those conditions (which are attached to Ms McPherson's evidence) require a period of no more than 2 hours to elapse following the conclusion of a dredging episode, by which time any dredging related plume must not cause a conspicuous change in water clarity. This approach reflects current practice and existing consent requirements. In my view this is a pragmatic approach and I am unaware of any reported non-compliance issues.

147 In conclusion, in light of the above, I consider:

147.1 the ecological and water quality effects of the Project's proposed dredging will be minor;

147.2 water quality classification standards will be met in respect of dredging, other than effects on visual clarity which may be intermittently exceeded during, and for short periods after, a dredging episode; and

147.3 this minor level of effect can be appropriately managed by applying the proposed dredging management conditions.

148 I note in regard to marine mammal effects related to dredging, that the Marine Mammals Assessment considered that with the requirement to ensure dredging equipment is regularly maintained, effects on marine mammals will be low and the magnitude of effects will be negligible as they will be indiscernible from noise effects from existing vessel traffic in the area.[39]

Disposal of Dredged Material

149 The dredged material is to be discharged in the OSDG, which has been used for the disposal of dredged material since 2003.

150 An important consideration in assessing the actual and potential ecological effects of future disposal is the fact that the OSDG is close to the mouth of the Waipaoa River which is estimated to discharge some 12 million m^3 of sediment annually into Poverty Bay and the Tūranganui River a further 0.7 million tonnes.[40] Consequently, the OSDG has a naturally soft and muddy seabed.

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[39] Marine Mammals Assessment, section 3, page 13.

[40] Ecology Assessment section 5.5.7.1, page 53 citing Met Oceans Solutions Ltd (2017). 'Eastland Port Dredging Project. Morphological Model Validation. December 2017'.

151 Furthermore, coastal process studies[41] have confirmed the OSDG's existing natural substrate is highly mobile and the general direction of sediment transport in the area is offshore. These studies predict that the net 'export' of material from OSDG is of a similar order of magnitude as the annual average volume of dredging likely to be disposed as part of the Project. Indeed, the annual dredged volume disposed to the OSDG is, at its maximum, in the order of less than 1.5% of the natural combined estimated sediment discharge from the Waipaoa and Tūranganui Rivers. Specifically, MetOcean comments:[42]

> Between 68% – 83% of the disposed material associated with maintenance dredging is expected to be eroded and transported. This corresponds to between 50,000 m3 and 100,000 m^3 of sediment being advected from the disposal ground over a 1-year period (for "La Niña" and "El Niño" respectively). Most of the eroded material consists of the weakly-consolidated silt in the disposed sediment which is predicted to be winnowed from the disposal ground, diffused through the lower water column, and transported towards the shore or continental shelf by suspended-load transport ….

152 Ecological studies at the OSDG carried out over at least 10 years as part of consent monitoring by NIWA[43] and 4Sight[44] confirm that the benthos associated with this muddy, transient substrate is not of special ecological significance in terms of its structure or biodiversity. These studies also suggest that:

152.1 areas beyond the OSDG are either not affected by the existing dredging spoil disposal or the sediment that disburses beyond the OSDG affects all communities equally; and/or

152.2 any effects are masked by the effects of more dominant processes such as the natural flux in sediment discharge associated with the Waipaoa River, which is the primary determinant of the character of the OSDG.

153 Reef areas which might be regarded as the nearest potentially sensitive ecologies to the OSDG, include the Kuri Banks, the Foul Grounds, and Waihora Rocks. These are at least 2km from the edge

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41 MetOceans Solutions Ltd 'Eastland Port Dredging Project. Morphological response of the proposed offshore disposal ground to the discharge of maintenance dredging sediments' (November 2019). Prepared for Eastland Port, Gisborne,September 2021.

42 MetOcean Solutions Ltd, above at n 39, section 3.2 Disposal Ground Dynamics.

43 Edhouse, S., Hailes, S., & Carter, K. (2014). *Effects of Dredge Spoil Disposal on Benthic Fauna of the Eastland Port Offshore Disposal Ground* (p. 39). National Institute of Water and Atmospheric Research.

44 4Sight Consulting, March 2021 Offshore disposal ground for dredged material. Benthic fauna survey (July 2020). Prepared for Eastland Port, March 2021.

of the OSDG and not in the predominant direction of movement of sediment based on the predictions of the MetOcean physical modelling. Consequently, I consider that these areas are, and will be, unaffected by the disposal of dredged material.

154 The 2023 sediment quality survey[45] which was undertaken by 4Sight as part of existing consent-related annual monitoring included the OSDG and background sites throughout Poverty Bay. The findings of this survey are also particularly relevant to the assessment of the effects of heavy metal contamination risk associated with the discharge of dredged materials. The survey results showed sediment metal concentrations were below (i.e. complied with) sediment quality guidelines and that there is no elevation of heavy metals in either the sediments dredged from the Port or at the OSDG relative to background sites in Poverty Bay.

155 The survey results also showed that metals concentrations in sediment close to the more sensitive reef habitats were low and not of ecological concern. Consequently, I consider that the dredged material is appropriate for such disposal, does not result in the contamination of seabed in Poverty Bay, and does not pose a risk to sensitive reef habitats or other marine habitats.

156 In terms of water quality effects from disposal of the dredged material, there will be localised temporary sediment plumes and impacts on water clarity at the OSDG. Similar effects are well recognised as part of existing dredging programme. The duration and intensity of such effects will be no greater after each dredging episode than is currently the case for routine dredging operations.

157 In my opinion the disposal of dredging material as part of the Project does not require any particular management or protocols beyond current best practice. Best practice protocols include spreading the dumped material in different parts of the disposal ground with each dredge run to optimise the utilisation of the seabed within the area dedicated to that purpose and reduce the risk of mounding in any part of it, and appropriate record keeping of the volumes disposed and the location of each run. These, along with the continuation of the existing OSDG monitoring which includes the 5 yearly ecological monitoring and the annual monitoring of sediments for contaminants (both programmes include reference sites in Poverty Bay), are reflected in what I consider to be appropriate consent conditions proposed by Eastland (as attached to Ms McPherson's evidence) and which are discussed in further detail later in my evidence.

158 Overall, I consider the OSDG to be an ecologically appropriate and sustainable location to receive the capital and ongoing maintenance

[45] 4Sight Consulting, May 2023 Eastland Port 2023 Annual Sediment Monitoring Report. Prepared for Eastland Port, May 2023.

dredging from the Project. Under my EIANZ assessment I conclude the ecological habitat value of the OSDG to be 'Medium', the magnitude of the effect to be 'Low' and the overall DEL to be 'Low' as summarised in my Table 1, 4 and 5 of this statement.

Project-wide effects on avifauna (excluding kororā)

159 The Ecology Assessment notes 16 species of coastal birds inhabit Poverty Bay of which ten have a threat classification.[46] Any of these species might be present at one time or another as itinerants within the Project area. However only three species are notable in terms of a documented use of structures within the Project footprint. As I have discussed earlier, these are kororā, redbilled gulls and white fronted terns. I also note incidental observations by 4Sight staff of single birds including shags and variable oyster catcher. With the exception of kororā, identification of these species at the Port has been on a transient/itinerant basis, with no evidence of use of the Port site for sensitive life cycle stages such as nesting or breeding.

160 The Ecological Assessment was reviewed by Dr Bramley who considered that notwithstanding the modified nature of the Port and the low potential for significant adverse effects, the management plan approach being taken in relation to kororā should be broadened to encompass other bird species.

161 I agree with Dr Bramley that the risk is low and that management of the Project's potential effects on other bird species can be included in the proposed AMMP. I note that this extended coverage for the AMMP to bird species beyond kororā is addressed in the proposed conditions attached to Ms McPherson's evidence.

ECOLOGY ISSUES RAISED IN SUBMISSIONS

162 I have read all the submissions lodged on the Project that raise issues about ecology effects, and I make the following comments.

Director General of Conservation

163 The Director General of Conservation's (*DGC*) submission focuses on potential adverse effects on kororā and how these will be avoided, remedied and mitigated. The DGC seeks the following:[47]

> i. That the objectives and minimum survey, monitoring and exclusion measures of the TBKMMP [*Twin Berths Kororā Monitoring and Management Plan*] be defined within conditions of consent;

[46] Robertson, H.A., Baird, K, Dowding, J.E., Elliott, G.P., Hitchmough, R.A., Miskelly, C.M., McArthur, N., O'Donnell, C.F.J., Sagar, P.M., Scofield; R.P., Taylor, G.A. (2017) ` *New Zealand Threat Classification Series 19' 27* p.

[47] Director General of Conservation submission, dated 12 October 2022. at paragraph 15(b)i-iii.

ii. That the TBKMMP be prepared by appropriately qualified persons; and

iii. Suitable conditions and compensation to address my concerns.

164 The TBKMMP has subsequently been broadened to other avifauna and is now known as the AMMP. In relation to kororā, all the matters identified in the DGC submission are addressed in detail. The AMMP is required to be prepared by a suitably experienced ecologist with expertise in kororā management for a project of this type and the AMMP will be implemented by ecologists highly experienced and qualified in this area.

165 The integration of the AMMP is included in the draft conditions of consent attached to Ms McPherson's evidence. A draft of the AMMP has been prepared and is attached to my evidence as **Appendix C**. In my opinion the matters sought by the DGC have been fully provided for as is confirmed by DOC's confirmation that the AMMP is 'fit for purpose'.[48]

Tairawhiti Rock Lobster Industry Association

166 The Tairāwhiti Rock Lobster Industry Association (*TRLIA*) has submitted in support of the Project. In its submission (a letter signed by Mr Gordon Halley, TRLIA Chairman), TRLIA state:[49]

> The TRLIA agrees with the applicant, that the proposed work should have minimal effect on the local rock lobster stocks. TRLIA members fishing out of the port have offered to translocate as many lobsters as possible from the immediate site just prior to work commencing on the reclamation.

167 The offer to catch and move lobsters relates primarily to the works on the Outer Breakwater upgrade. In my view this a worthwhile mitigative action and provision for which has been incorporated into the draft conditions of consent attached to Ms McPherson's evidence.

168 The TRLIA submission also notes:

> The reclamation and breakwater rebuild offer the opportunity to enhance the rock lobster habitat and foraging ground available within and outside the harbour. The Port company has had discussions with the TRLIA on the subject of habitat enhancement and has committed to resourcing work inside the harbour…

169 Notwithstanding such initiative which reflects the positive approach and relationship between the TRLIA and Eastland, I do not consider

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48 By way of email to Mr Bayley dated 12 June 2023.

49 Submission by the Tairawhiti Rock Lobster Industry Association Inc, dated 27 October 2022.

that enhancement of lobster habitat and foraging area is specifically warranted to mitigate the effects of the Project on crayfish and therefore I have not recommended that specific consent conditions should be offered to cover this aspect.

Forest and Bird

170 The submission from Forest and Bird supports the Project carrying out the recommendations in the Kororā Assessment and the "TB Kororā Management and Monitoring Plan" and the Ecoworks "10 Year Kororā Conservation Management Plan" which are attached to the Kororā Assessment.

171 The Forest and Bird submission further seeks conditions that fulfil the recommendations in the above reports to support visiting kororā into the future. Specifically, the submission also seeks:

171.1 requirements for more than 10 years ongoing pest control and ecological monitoring; and

171.2 either carrying out construction and reclamation between May and July to avoid kororā distribution, or otherwise make the construction area uninhabitable prior to nesting and moulting time.

172 The AMMP which is covered in the consent conditions attached to Ms McPherson's evidence has been developed to require ongoing pest control and ecological monitoring including additional measures to address seasonal breeding concerns relating to nesting and moulting, such as identifying exclusion zones around active burrows, which will augment the existing conservation initiatives which are already in place for the balance of the SLY seawall area.

173 The AMMP is intended to address effects from the Project and for that reason is focused on the management of kororā during pre-construction period, construction and the operational phase of the Project only to the extent that active burrows are present and require the establishment of new burrows in alternative areas. In my view ongoing management and monitoring of kororā outside of this is not required to address the effects of the Project, but this may be something Eastland can address at the hearing.

Ms Bree Skinner

174 Ms Skinner opposes the TBP, '*…as the area of concern is in the direct vicinity of an identified and active taonga species habitat for breeding kororā (blue penguins)...*'.

175 As discussed above, the presence of kororā has been recognised and comprehensively assessed. I am confident that implementation and compliance with the AMMP will ensure that adverse effects on kororā can be avoided during both the construction and operational phases of the Project.

Ms Carrie Taoho

176 Ms Taoho states, '*…It is a habitat to many taonga species and one in particular kororā …*' and, '*…So we can all enjoy this area without getting sick from the treatment entering the moana*. *So that we can safely collect healthy kai for our whanau…*'.

177 In relation to kororā, my comments above are equally applicable to the concerns expressed by this submitter.

178 I am unsure of the specifics of the submitter's second point. If the concern relates to chemicals from water treatment systems, then I note that the upgraded Port logyards have an aluminium based 'treatment system' to flocculate and then intercept fine particulates (mostly clay and fine wood particles) that would otherwise be discharged. The chemicals used are the same as used in many water treatment systems supplying potable water.

179 In my view, based on the monitoring of the stormwater discharge consents for the ULY and the WLY, the treatment system carries no risk to public health or seafood through bioaccumulation or bioconcentration of treatment chemicals being released into the environment and potentially being exposed to the food chain. The existing SLY discharges will be significantly improved as a result of the Project with respect to quality and therefore any general risk to local kai moana such as occurs in the vicinity will be reduced not increased.

Mr Winston Moreton

180 In Mr Moreton's submission he comments, " *As a beach user I claim status to speak on the absence of aquatic life which can be attributed (at least in part) to the existing dump site about a kilometre out from the beaches…'.*[50]

181 The submitter does not identify the aquatic life being referred to. In any event as I have covered in the body of this statement, in my view it is most unlikely that there is any adverse effect on aquatic life on or in the vicinity of the beach, or anywhere else beyond the disposal site:

181.1 ecology studies have not identified adverse effects beyond the OSDG;

181.2 sediment quality studies have confirmed only low concentrations of heavy metals and have not detected differences in sediment quality between the OSDG and background sites;

[50] Paragraph 30.

181.3 coastal dynamics studies suggest most material depositing on the OSDG is moved offshore, not onshore; and

181.4 coastal dynamics studies suggest the annual dredged volume disposed to the OSDG is at worst in the order of less than 1.5% of the natural combined estimated sediment discharge from the Waipaoa and Tūranganui Rivers.

182 Finally, I observe that Eastland does not create the sediment that deposits in the Port. Other than perhaps a small proportion of particulates that escape the logyards, the sediment comes from the local catchments. That sediment, were it not to deposit in the deeper, quieter and more depositional environment of the Port and subsequently the OSDG once dredged, would be in the inshore, littoral sediment transport system, including the beaches.

RESPONSE TO THE OFFICER'S REPORT AND PROPOSED CONDITIONS

Overview

183 I have read the Officer's Report prepared by Mr Todd Whittaker on behalf of GDC dated 25 September 2023 and the specialist reports prepared by Dr Kelly (marine ecology) and Dr Bramley (avian habitats) attached to the Officer's Report.

184 The Officer's Report notes:[51]

> Overall, there is a general alignment between the [marine] expert ecologists on the body of information and assessment which has been undertaken to inform the understanding of the existing environmental qualities of the port basin, breakwater and reclamation areas, and the OSDG.

185 The Officer's Report goes on to conclude:[52]

> Based on technical reporting and assessment presented by Eastland Port and Dr Kelly's assessment and independent peer [review], it is my opinion that there is sufficient confidence to reach a conclusion that the potential and actual effects on ecological habits and water have been properly evaluated and that these effects can be appropriately managed and mitigated through consent conditions. Dr Kelly has identified matters to be addressed in the consent conditions in his technical memo.

186 The Officer's Report notes the focus of the DOC and Forest and Bird submissions is on kororā, which has resulted in the preparation by

[51] Section 5.3 'Marine Ecology', paragraph 109.

[52] Paragraph 111.

the Applicant of the draft AMMP.[53] The consultation with DOC on this has recognised a consequential requirement to obtain a necessary Wildlife Act Authority, which is underway and will be secured prior to any actions being undertaken that would require such authority. I note that Eastland has previously obtained such an authority and see no reason why such an authority would not be forthcoming.

187 A number of matters needing to be considered in the AMMP are further noted as having been identified by Dr Bramley and these too are presented as matters that can be dealt with by way of consent condition and are discussed below.

Dr Kelly's Review (Marine Ecology - Appendix 2 of the Officer's Report)

188 Dr Kelly presents three matters which he refers to as 'Matters in Contention'. I discuss each of these below.

189 The first of these matters relates to inferences I have made in Ecology Assessment about the likely causes mortality of juvenile crayfish in the Port being exacerbated due to what in my view are sub-optimal environmental and habitat conditions. Notwithstanding our differences of opinion here, Dr Kelly notes his view that he does not consider the effects of the proposed Project activities on juvenile crayfish to be a substantial issue of concern for the Project. I agree, and on that basis this is not a matter that requires to be reflected in consent conditions in some manner.

190 The second matter Dr Kelly raises is in relation to disposal operations for the dredged material. He notes his view that disposal volumes being sought in this Application are much greater than those previously deposited and the types of material also differ. He uses these reasons as a basis for positing a potential change in effects intensity at the OSDG that would warrant annual monitoring of ecology and the inclusion of texture in the monitoring (in addition to the ecology).

191 I have covered above in my evidence why in my view dredged volumes will not increase significantly.

192 In relation to Dr Kelly's point that the material will be of a different type, I consider that there is a difference in that the Project involves a volume of rock to be dredged as part of the capital dredging. That rock will be broken up into rubble as part of the extraction process and will also be disposed to the OSDG. In my view it will not cause an adverse environmental effect at the OSDG. Seen over the medium to long term, this volume of rock needs to be contextualised against the many millions of cubic metres of material that are discharged into this part of Poverty Bay annually by the

[53] Section 5.11, 'Avian Habitats'.

Waipaoa River, which I have noted earlier in my evidence. As for the balance of the capital dredging and the maintenance dredging going forward, it will be soft muddy/fine sandy material of a similar type and quality to past dredged material.

193 I do not agree with Dr Kelly that the future change either to volume or the quality of the dredged material disposed to the OSDG is such as to warrant annual monitoring as opposed to the existing consented regime of 5 yearly monitoring. I am advised there may be a few years where the cumulative volume may reach 200,000m^3 of maintenance dredging and capital dredging, but once the capital dredging component is complete the ongoing annual volume is proposed not to exceed the currently consented volume of 140,000m^3. I agree with Dr Kelly that adding textural analysis of seabed material at the OSDG should be added to that 5 yearly monitoring programme. Dr Kelly's third point is in relation to biosecurity. While again there is a difference of opinion between us on biosecurity risk, we agree on the important point that biosecurity risks can be managed through comprehensive conditions.

194 In his report Dr Kelly includes a section on 'Potential Risk of Transferring Marine Pests'. Dr Kelly presents a comprehensive list of matters[54] to be covered in a Marine Pest Management Plan which he recommends to be included as a consent condition requirement. He notes that Eastland has agreed to the inclusion of similar conditions as part of its Wharf One Consents.

195 I note I was involved in reviewing and assisting in the drafting of the Wharf One Consent conditions and have recommended the implementation of consent conditions for the Project based on that implemented for Wharf One. Those conditions are attached to Ms McPherson's evidence. In my view these conditions appropriately address the matters identified by Dr Kelly.

Dr Bramley's Review (Avian Habitats - Appendix 8 of the Officer's Report)

196 Dr Bramley notes the preparation by 4Sight of a draft AMMP which he has reviewed and which covers both the monitoring and management of kororā and other at risk and threatened birds prior to, during, and after construction. In his review conclusions he notes:

196.1 the draft AMMP proposes generally appropriate survey methods and management controls for coastal birds and kororā using the site;

[54] Page 21.

196.2 the draft AMMP requires amendment to fully protect Kororā from the proposed works. Dr Bramley recommends:

(a) the frequency of bird surveys (both coastal birds and kororā monitoring) should be monthly throughout the year;

(b) a trained dog survey for kororā should be required in the breeding and moulting season preceding works and regularly (at least annually) throughout the works;

(c) the conservation dog should be used during all rock removal to detect birds in advance of accidental discovery; and

(d) a Wildlife Act Authority should be obtained in advance of works commencing that anticipates the need to handle, move and mark birds.

197 Dr Bramley also recommends permanent marking of any birds which have to be relocated to assist in following their fate to inform the ongoing implementation of the AMMP.

198 I support Dr Bramley's suggestions but with the following clarifications:

198.1 First, and specifically in relation to the permanent marking of birds, I do not oppose this recommendation but consider that it would be appropriate for the marking of any birds to be agreed upon by DOC, via a Wildlife Act Authority, which the AMMP will in any event be required to comply with.

198.2 Second, and in relation to the use of dog monitoring, it will be necessary to ensure that the conditions are able to be practicably implemented. More specifically, it is my understanding that there are presently just two trained and approved dogs for this type of survey work, one in the North Island and one in the South Island. It may well be that a conservation dog is not available 'during all rock removal' and therefore this may need on occasion to be carried out by an SQEE with experience in such work. The AMMP needs to be flexible in this regard.

198.3 Third, the proposed monthly frequency for bird surveys throughout the year is accepted.

CONCLUSIONS

199 Most Project elements will have a minor effect (in EIANZ terms a DEL of 'Very Low' / 'Low') on species, habitats and water quality within an existing environment that is mostly highly modified and which is influenced by past and existing Port related activity.

200 Management measures, supported by consent conditions. have been identified for several Project elements, with GDC-certified management plans setting out specific measures to avoid effects on kororā (and other avian species); marine mammals; water quality effects associated with reclamation construction discharges; and biosecurity effects. A draft management plan has been prepared for kororā (and other avian species) and the key elements and actions as relevant to the other proposed management plans have been identified in the proposed consent conditions.

201 Taking the application of the proposed management measures into account, the effects analysis in my view has been highly conservative and there are no unanticipated risks, or risk of more than minor ecological or water quality impacts.

202 Finally I note the high level of agreement between myself and the other advising consultants (Ms McConnell, Ms Davis and Dr Wilson) and Dr Kelly and Dr Bramley, as has been acknowledged in the Officer's Report, and the agreement on the comprehensive suite of ecological and water quality consent conditions.

_____

Mark Poynter
3 October 2023

APPENDIX A: EIANZ MATRIX TABLES AND CRITERIA

Matrix combining magnitude and value for determining the overall level of ecological effect (after Boffa Miskell, 2018):

ECOLOGICAL VALUE (Species)	Species
Very High	▪ Nationally Threatened
High	▪ Nationally At Risk-Declining.
Moderate-High	▪ Nationally At Risk.-Recovering Relict, Naturally Uncommon
Moderate	▪ Locally uncommon/rare, not nationally threatened or at risk
Low	▪ Not threatened nationally, common locally

Criteria for describing effect magnitude (after EIANZ, 2018):

MAGNITUDE	DESCRIPTION
Very High	Total loss 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 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 baseline (pre-development) conditions such that post development character/composition/attributes will be fundamentally changed; AND/OR Loss of a high proportion of the known population or range of the element/feature.
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of baseline 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/attributes of 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 baseline condition. Change barely distinguishable, approximating to the "no change" situation; AND/OR Having negligible effect on the known population or range of the element/feature.

Matrix combining magnitude and value for determining the overall level of ecological effect (after Boffa Miskell, 2018):

EFFECT LEVEL		Ecological and/or Conservation Value			
		Very High	**High**	**Medium**	**Low**
Magnitude	**Very High**	Very High	Very High	High	Moderate
	High	Very High	Very High	Moderate	Low
	Moderate	Very High	High	Low	Very Low
	Low	Moderate	Moderate	Low	Very Low
	Negligible	Low	Low	Very Low	Very Low

APPENDIX B: CATEGORISATION OF PROJECT ELEMENTS-ECOLOGICAL VALUE

ECOLOGICAL VALUE (Habitat)		CHARACTERISTICS APPLICABLE TO TWIN BERTHS (from section 3 of report)					
		Outer Breakwater	**Wharf 8 Extension**	**Outer Reclamation**	**Capital Dredging***	**Maintenance Dredging**	**OSDG**
LOW	Benthic invertebrate community degraded and/or with low species richness, diversity and abundance.		X	X	NA	X	
	Benthic invertebrate community dominated by organic enrichment tolerant and mud tolerant organisms with few/no sensitive taxa present.	?	?	?	NA	X	X
	Marine sediments dominated by silt and clay grain sizes (>70%).	NA	NA		X	X	
	Surface sediment predominantly anoxic (lacking oxygen).	NA	NA		NA		
	Elevated contaminant concentrations in surface sediment, above ISQG high or ERC-red effects threshold concentrations.	NA	NA				

	Invasive, or opportunistic and/or disturbance tolerant species dominant.	?	?	X	NA	X	X
	Macroalgae provides minimal/limited habitat for native fauna.		X	X	N/	X	X
	Habitat highly modified.	X	X		NA	X	
MEDIUM	Benthic invertebrate community typically has moderate species richness, diversity and abundance.	X			NA		X
	Benthic invertebrate community has both (organic enrichment and mud) tolerant and sensitive taxa present.	?	?	?	NA		X
	Marine sediments typically comprise less than 50-70% silt and clay grain sizes.	NA	NA	X	NA		X
	Shallow depth of oxygenated surface sediment.	NA	NA	?	?	?	X
	Contaminant concentrations in surface sediment generally below ISQG-high or ERC-red effects threshold concentrations.	NA	NA	X	NA	X	X
	Few invasive, or opportunistic and/or disturbance tolerant species present.	?	?		NA		

	Macroalgae provides moderate habitat for native fauna.	X			NA		
	Habitat modification limited.			X	NA		X
HIGH	Benthic invertebrate community typically has high diversity, species richness and abundance.				NA		
	Benthic invertebrate community contains many taxa that are sensitive to organic enrichment and mud.			?	NA		
	Marine sediments typically comprise <50% silt and clay grain sizes.	NA	NA	X	NA		
	Surface sediment oxygenated.	NA	NA	X	NA	?	
	Contaminant concentrations in surface sediment rarely exceed the respective ISQG-low effects threshold concentrations.	N/A	NA	X	X	X	X
	Invasive, or opportunistic and/or disturbance tolerant species largely absent.	X	?		NA		
	Macroalgae provides significant habitat for native fauna.				NA		
	Habitat largely unmodified.			X	NA		

APPENDIX C: DRAFT AVIAN MANAGEMENT AND MONITORING PLAN

DRAFT Avian Monitoring and Management Plan

Eastland Port

Twin Berths Project

May 2023

REPORT INFORMATION AND QUALITY CONTROL

Prepared for:	Marty Bayley Ports Infrastructure Manager Eastland Port	
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1 INTRODUCTION

Eastland Port Ltd (Eastland Port) are seeking resource consents from the Gisborne District Council (Council) for Stage 2 of the Twin Berths Project (TBP). The development will enable up to a 185 m and a 200 m long ship to each berth at Eastland Port simultaneously, enabling greater capacity for bulk freight and potential options for container freight in the future. Stage 1 of the TBP was consented in December 2020.

Stage 2 provides for the remaining works required to complete the project, and this plan covers the following works:

a) Extension of the existing Wharf 8 structure (140 m long) a further 130 m into the area of the inner seawall,

b) Reclamation next to the southern log yard,

c) Upgrading the outer breakwater structure,

Several "at risk" and "threatened" coastal bird species including little penguin (*Eudyptula minor*, referred to as kororā) are known to be present within the vicinity of the proposed TBP works area.

The requirement for a Kororā Monitoring and Management Plan for the TBP was specified in the Assessment of Ecological Effects undertaken by 4Sight (2022) which assessed the effects of the TBP on Little Penguin/ Kororā (*Eudyptula minor*).

A peer review of the Assessment of Ecological Effects was undertaken by Ecological Solutions on the 15th of November 2022. The recommendations from this peer review were to provide an integrated Avian Monitoring and Management Plan (AMMP) that not only focuses on kororā but includes other at risk or threatened coastal birds. This advice has been incorporated into this plan.

The AMMP summarises the following:

- Key inputs and literature that informed this plan (section 1.1).
- Background on the coastal bird species that are included in the AMMP (section 1.3),
- Monitoring programme including objectives, methods, and frequency (section 2),
- The proposed construction work and staging of works (section 3),
- Construction management including timing of works to manage ecological effects and other management controls (section 4).
- Offsetting guidance (if required see section 4.4).

1.1 Key Inputs into this AMMP

Along with a detailed literature review, the Waikahua Kororā Conservation Management Plan (KCMP) and the Kennedy Point Marina Monitoring and Management Plan (Boffa Miskell, 2022) are key inputs into the development of this AMMP. These are discussed in more detail below.

1.1.1 Waikahua Kororā Conservation Management Plan (KCMP)

During the Southern Log Yard Seawall Maintenance Project, a population of kororā was identified along the seawall and Kaiti beach. In response, Eastland Port prepared a 10-year Kororā Conservation Management Plan (Waikahua KCMP), which has a purpose to '*develop a protected coastal habitat which protects and supports visiting and breeding kororā into the future'* (Ecoworks, March 2022, attached as Appendix D). The Waikahua KCMP is exclusive to the Southern log yard seawall section (referred to as the Southern log yard seawall enhancement area, see teal area in Figure 4) and it aims to:

- Protect the species from predators (stoats and rats) and port operations via predator control and a port exclusion fence,
- Provide habitat enhancement with rock reinstated with crevices suitable for kororā, and
- Provide planting for shade and at least 20 nest boxes.

The Waikahua KCMP provides important background information and conservation objectives to avoid impacts, enhance the habitat, and contribute to positive effects on the kororā population living in the port's southern logyard seawall.

The information in the Waikahua KCMP is aligned with the management and monitoring approach set out in this AMMP however, they are not directly related. The AMMP is focused on a different location to the Waikahua KCMP, so while the management plan will contribute to positive long-term effects (over 10 years) on the kororā population living within the Waikahua monitoring area, they are not interconnected and are separated spatially (refer to areas in Figure 4).

The AMMP provides detail around the management of kororā for the TBP pre, during and post construction, which are not specifically addressed by the Waikahua KCMP.

1.1.2 Kennedy Point Marina Monitoring and Management Plan (Boffa Miskell, 2022)

A Kororā Construction Monitoring & Management Plan was prepared for the Kennedy Point Marina development by a penguin expert, Dr Leigh Bull (Boffa Miskell Limited, 2022). 4Sight's ecologists are a part of this project.

The Kennedy Point Marina development on Waiheke Island involved the removal and reinstatement of rocks on a seawall which was known to be utilised by kororā. Construction activities on the rock wall were completed in May 2022 where the management and monitoring protocols along with a skilled construction team contributed to a successful outcome. This successful outcome was no kororā mortalities as a result of the works, retaining two burrows on the edge of the construction area (that were occupied by a pair of kororā that successfully fledged two chicks after construction activities were completed and show on-going use) and the establishment of new active burrows (parents with eggs) within the reinstated section of rock wall (as per the monthly monitoring session in August 2022). As such, the Kennedy Point Kororā Construction Monitoring & Management Plan has informed current best practice approaches to kororā management and has been used as a resource when assessing the effects of coastal construction on local kororā populations.

This AMMP compliments and draws on existing management protocols from the KCMP and Kennedy Point Kororā Construction Monitoring & Management Plan.

1.2 AMMP Objectives

The objectives of this AMMP are to ensure activities associated with construction of the reclamation and deconstruction of the existing southern logyard revetment avoid adverse effects on kororā and other threatened coastal bird species as well as managing adverse effects on potential kororā habitat.

The broad purpose of the monitoring proposed is to characterise the use of the monitoring area by coastal birds and kororā. There is a particular emphasis on the moulting and breeding season for kororā . The specific purpose of the monitoring is to inform management responses as required to avoid adverse effects from the TBP stage 2 works on kororā and also at risk or threatened coastal bird species.

1.3 Background

A total of 17 species of coastal birds are known to inhabit Poverty Bay of which 11 are classified as threatened or at-risk (Robertson *et al*., 2021, Table 1). Any of these species might be present at one time or another within the TBP area however to date only five species have been observed by 4Sight ecologists to use the structures within the TBP construction footprint (refer to sections 1.3.1 and 1.3.2 below).

Pre-construction monitoring (as detailed in section 2) will improve the knowledge of which species are using the TBP area and how frequently.

Table 1: Summary of bird species from eBird hotspot and iNaturalist citizen science databases recorded within Poverty Bay and their threatened status (Robertson *et al*., 2021).

Common Name	Scientific Name	Threat Category
Penguins		
Little penguin / kororā*	*Eudyptula minor*	At Risk - Declining
Gulls and Terns		
Black-billed gull	*Larus bulleri*	Threatened - Nationally Critical
Caspian tern	*Hydroprogne caspia*	Threatened- Nationally Vulnerable
Red-billed gull*	*Larus novaehollandiae scopulinus*	At Risk - Declining
Southern black-backed gull	*Larus dominicanus dominicanus*	Not Threatened
White-fronted tern*	*Sterna striata*	At Risk - Declining
Petrels, and Shearwaters		
Flesh-footed shearwater	*Puffinus carneipes*	Threatened- Nationally Vulnerable
Fluttering shearwater	*Puffinus gavia*	At Risk - Relict
Sooty shearwater	*Puffinus griseus*	At Risk - Declining
Wilson's storm petrel	*Oceanites oceanicus*	Migrant
Gannets and Shags		
Australasian gannet	*Morus serrator*	Not Threatened
Little black shag	*Phalacrocorax sulcirostris*	At Risk – Naturally Uncommon
Little shag	*Microcarbo melanoleucos*	Not Threatened
Pied shag*	*Phalacrocorax varius*	At Risk - Recovering
Shore Birds		
Pied stilt	*Himantopus leucocephalus*	Not Threatened
Variable oystercatcher*	*Haematopus unicolor*	At Risk – Recovering
White-faced heron	*Egretta novaehollandiae*	Not threatened

*Observed on site during 4Sight surveys. Threatened species highlighted in blue.

1.3.1 Coastal birds (other than kororā)

White fronted tern (*Sterna striata*) and red billed gulls (*Larus novaehollandiae*) have been observed by 4Sight ecologists resting on the elevated outer end of the outer breakwater (near the starboard channel marker for port entry, Figure 1 in June 2021). During a 4Sight site visit in January 2023, variable oyster catchers (*Haematopus unicolor*) were observed to be foraging on the outer breakwater (Figure 2). In a different location along the outer breakwater, a pied shag (*Phalacrocorax varius*) was observed to be roosting on the rock (Figure 3).

It is not known how frequently the birds use this site for foraging, resting and possibly roosting. It is understood that this site is unsuitable for nesting due to the wave exposure and the lack of nesting materials, however this will be confirmed with further monitoring of the site. Both species have a threatened conservation status of 'at risk-declining' (Robertson *et al*., 2021).

The monitoring programmes outlined in section 2.3 have been designed to characterise the use of the TBP area to inform management of these coastal birds during the construction and operational phases of the TBP.

Figure 1: Flock of red billed gulls observed in June 2021 at the end of the outer breakwater.

Figure 2: Three variable oyster catchers observed to be foraging on the outer breakwater on 24/01/2023.

Figure 3: A pied shag was observed to be resting on the outer breakwater on 24/01/2023.

1.3.2 Kororā

An Assessment of Ecological Effects was undertaken by 4Sight (2022) to assess the effects of the TBP stage 2 works on Little Penguin/ Kororā (*Eudyptula minor*). Kororā have high ecological value based on their New Zealand threat classification, which is 'At Risk - Declining'. The existing southern logyard seawall is potential kororā habitat and its ecological value is dependent on the use of this structure by kororā, notably during their breeding and moulting season.

The monitoring programme specified in this AMMP will characterise the use of the TBP area by kororā and inform the management protocols and the extent of offset/compensation measures that may be required.

A survey of the southern logyard seawall (from the deconstruction area to the south including the southern log yard enhancement area and the Waikahua seawall) in November 2021 by DabchickNZ and a conservation dog specifically trained for such work, identified 13 positive dog detections of kororā. One of these detections was within the section of southern log yard seawall that is proposed to be deconstructed.

The **following aspects of kororā biology and reproduction** have informed the monitoring programme and these are summarised below:

- Egg laying occurs from July through to November in Gisborne and incubation can last approximately 36 days (Table 2) Summary of Korora Annual Activity on Land (EcoWorks, 2022).,
- Chicks remain on land approximately 36 to 55 days before they fledge/exit the burrow,
- Individuals have high site fidelity, returning to the same colony or vicinity of their natal burrow to nest when they are adults,
- Breeding success can vary annually and is dependent on several environmental factors including age and experience of birds, viruses, land-based threats (human disturbance, dogs, predation by rats/stoats), as well as climate, food availability and nest factors (Mattern and Wilson, 2018),
- Replacement clutches can occur which means that a colony can have asynchronous breeding seasons,
- Breeding pairs are often faithful to their mate and nest however divorces and change of nest site can occur (Bull, 2000).

Table 2: Summary of Korora Annual Activity on Land (EcoWorks, 2022).

Activity	Month											
	J	F	M	A	M	J	J	A	S	O	N	D
Moulting												
Pair bonding, nest building and egg laying												
Chick Rearing/Fledging												
Potential Burrow Occupancy												

1.4 Definitions

The below definitions are used throughout this document and are defined as:

- **Active construction area** – is the operational construction area on the southern log yard seawall where heavy machinery and construction works are being undertaken on that day (excludes any areas where equipment or materials are stored). May not apply to the entire works footprint.
- **SQEE** is a **Suitably Qualified and Experienced Ecologist**. This is defined as a person with an ecology qualification and/or at least three years' experience in an ecological profession and experience working with kororā. Note that this role could be covered by several different people at any one time throughout the TBP works.
- **Active burrow (kororā) or coastal bird breeding locations** are defined as a location that contains, or is suspected to contain, adult kororā with viable nest contents (egg(s) or chick(s) alone or with adult(s) or a moulting bird based on the time of year or any signs that indicate moulting) or any other coastal bird egg(s) or chick(s) as determined by the SQEE. An active burrow can be deemed as not active by a SQEE through the monitoring methods outlined in section 2.2.
- When **coastal birds** are referred to this in this report, the term excludes kororā.
- **Breeding season –** when this is referred to for coastal birds (except kororā) this is generally September to March (inclusive).
- **Non-breeding kororā** are defined as kororā that are unlikely to be associated with a location that contains, or is suspected to contain, kororā egg(s) or chick(s) as deemed by the SQEE.
- **Non-moulting kororā** are defined as adults that have no moult feathers.
- **TBP construction phases:**
  - The **pre-construction phase** is defined as the time **before** the TBP construction works start directly on, or which may indirectly affect, the southern logyard seawall (within the TBP works area), reclamation, and/or the outer breakwater. This monitoring phase will capture the existing port environment before the TBP works start (i.e., baseline monitoring) before any site preparation works.
  - The **construction phase** is defined as the time when TBP construction works occur directly on, or which may indirectly affect, the southern logyard seawall (TBP works area), during reclamation works, and/or the outer breakwater. This is all works that are related to the TBP including site preparation and set up.
  - The **post-construction phase** is defined as the time **after** the TBP construction works (as above) have been completed within the TBP works area and/or the outer breakwater.

1.5 Limitations

The limitations for the monitoring of kororā at the site are described in this section.

1.5.1 Monitoring Within a Rock Wall (Southern Logyard Breakwater)

Monitoring kororā within a rock wall is more challenging and complex then monitoring within nest boxes or natural burrows (refer to monitoring methods in Table 3). Recording the exact number of kororā individuals present during a monitoring session is unlikely to be possible for all locations within the rock wall. This is also the case for exact numbers of breeding pairs, nest contents and chick fledging success. This is because the visualisation of birds and nest contents within the deep crevices of the rock wall is challenging even with an experienced person with a burrowscope and conservation dog. So, it is not always possible to confirm the breeding or moulting status.

While the location of kororā sign (guano, smell, scratching, and feathers) is useful to form a general picture of kororā presence and activity within the monitoring area, it does not provide certainty as to the presence or absence of kororā at any specific time.

Kororā often have a "secretive" path to their burrows underneath rocks in the breakwater to remain hidden from predators on land. This pathway is often through a labyrinth of rocks and crevices with no defined entry and exit point that is visible to an observer. The entry and exits points are also affected by tidal state.

Pit tags are also a highly invasive tagging method which is likely to cause stress to the individuals when they are tagged and handled during each monitoring session. Due to this, pit tags[1] (transponders) readers are not recommended as a practicable monitoring technique.

The position and location of CCTV cameras will affect how successful monitoring is utilising this method (method 4 in Table 3). This method works best within nest boxes and open foreshore areas (i.e., beaches). Due complex nature of the site, the use of CCTV footage for monitoring kororā presence cannot be relied upon in isolation.

To compensate for these methodological and site limitations, monitoring is conservatively approached by using a composite of methods and information sources. The lowest intervention monitoring methods have been chosen to minimise the potential for handling stress and to reduce the likelihood that repetitive monitoring could have measurable adverse effect on birds.

[1] A pit tag that is injected under the skin of the bird. Gives a unique ID that can be scanned by a reader.

2 MONITORING METHODS AND PROGRAMME

The following section outlines the monitoring programme, which includes detail on the methodologies, frequency, time frames and target species of the monitoring.

2.1 Monitoring Areas

The southern logyard seawall and outer breakwater have been categorised and named as follows (Figure 4):

- The **TBP monitoring area** for the monitoring of kororā and other coastal bird species (northern end of southern logyard; orange),
- The **outer breakwater monitoring area** is for coastal bird monitoring only (pink; the outer breakwater is not expected to be suitable habitat for kororā).
- The construction area for the inner and outer seawall (dark and light blue)
- Buffer seawalls with the outer buffer seawall proposed as an enhancement area if required (pink and orange dashed, refer to section 4.4.1),
- The Waikahua monitoring area which is excluded from this plan but is covered by the Waikahua Kororā Conservation Management Plan (noted in Section 1.1.1).

Throughout this report, the areas in Figure 4, most frequently the TBP monitoring area (orange), or the outer breakwater monitoring area (pink) will be referred to.

2.2 Monitoring Methods

The recommended monitoring methods are summarised below (Table 3).

It is recommended that either methods 1 and/or 2 are utilised as the main monitoring methods for kororā. For other coastal birds, methods 3 or 4 could be utilised as the main monitoring method. Method 5 is a supplementary method only for on-going management of the active construction area.

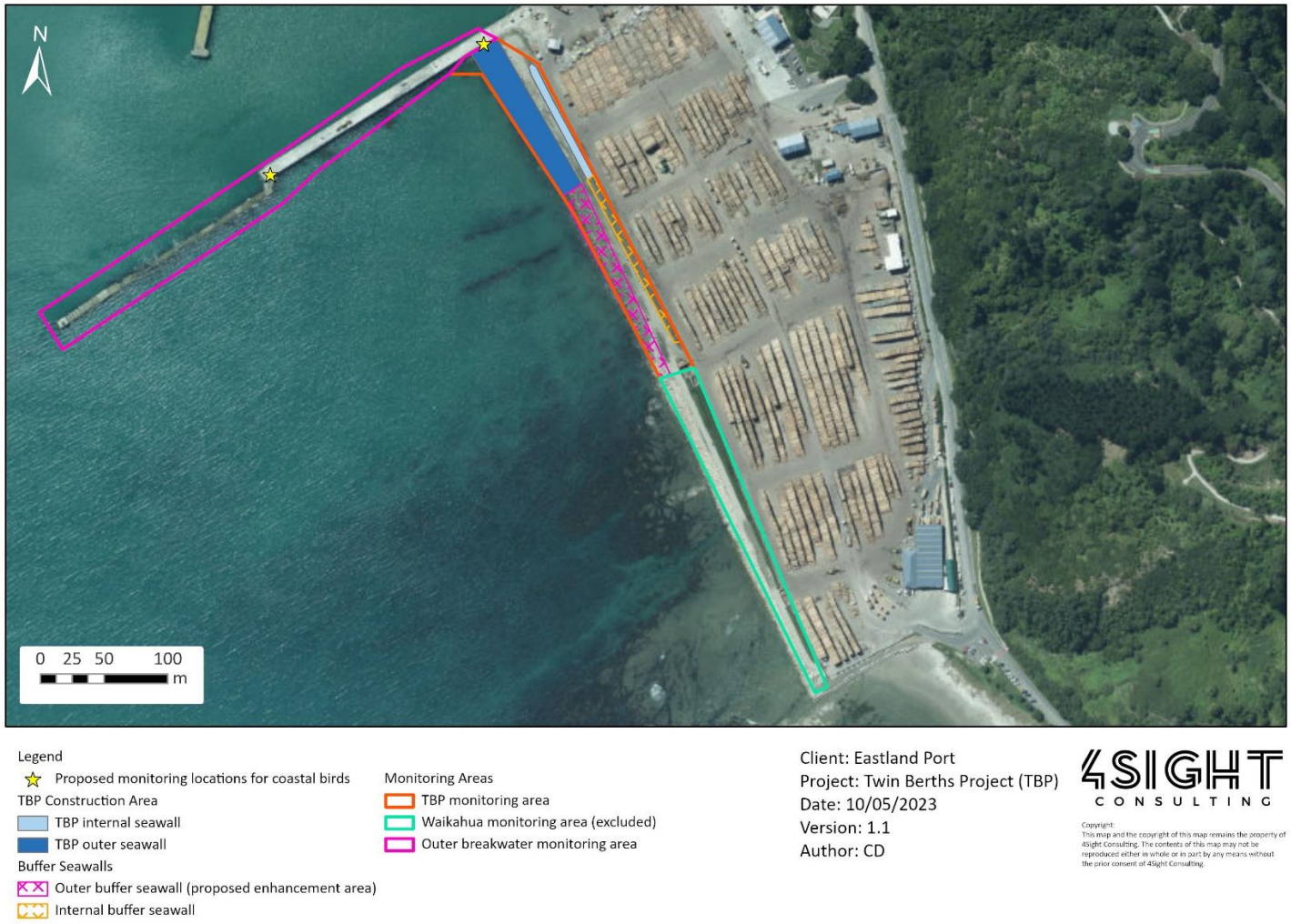

Figure 4: Map of proposed monitoring area for the TBP including the sites for monitoring of coastal birds. The Waikahua monitoring area in teal is covered by a different monitoring programme.

Table 3: Summary of the monitoring methods for birds including the monitoring objectives, target species and any other supporting details.

	Method	Monitoring Objective(s)	Target Species	Detail
1	A specialist conservation dog for seabirds.	On-going monitoring of the monitoring area for surveillance. To confirm the presence or absence of birds within a construction area.	**Kororā** but also other coastal birds	This survey is based on availability. This method provides the highest level of certainty for identifying the presence of kororā.
2	Visual survey for kororā and their sign (feathers and/or fresh guano) by a Suitably Qualified Experienced Ecologist (SQEE).	On-going monitoring of the monitoring area for surveillance. To confirm the presence or absence of birds within a construction area.	**Kororā**	Conducted using a phone camera and/or burrowscope as with a standardised method as described in Appendix B.
3	5 Minute Bird Count (5MBC) for coastal birds.	Identify the bird species present in the area at the time of the survey. Understanding of potential areas of interest for birds i.e., roosting locations.	**Coastal birds** and not appropriate for kororā	To be undertaken at low, mid and high tide each survey.
4	CCTV or trail cameras	To provide information to support whether it is likely that birds may be present or absent within the construction area. Provide insight into the bird species that utilise the area. Understanding of potential areas of interest for birds i.e., roosting locations.	**Coastal birds primarily**. Can be used as a supplementary method for kororā	Once the construction area has been surveyed to confirm there are no nesting or moulting kororā present, cameras can be installed to ensure that kororā exclusion measures are successful. Potential to install camera(s) to monitor coastal birds on the outer breakwater, specifically the use of the channel marker structure (Figure 1). The position and location of cameras will affect how successful monitoring is utilising this method.
Supplementary Method (to be utilised to ensure exclusion protocols from the active construction area are effective)				
5	Daily observations by nominated site staff utilising a standardised data sheet.	Another layer of information on bird presence within the construction area, to support other monitoring methodology. Provides intel about whether it is likely that birds may be present or absent within the construction area.	**Kororā.** Absence of **kororā** from the active construction area	This method cannot be solely relied upon as the only monitoring method. Each morning before the start of works, the site will be visually inspected to assess if kororā have entered the site overnight. Any observations of kororā sign and/or kororā must be immediately reported to the SQEE. The site staff will be nominated and will have received education as to what to look for and this will be reflected in the standardised data sheet.

2.3 Monitoring Programmes

There are four monitoring programmes proposed, three of which are related specifically to kororā (Table 4). These are:

- **General Coastal Bird Monitoring (CBM)** to characterise the use of the monitoring area by coastal birds and to understand the potential areas of interest for birds i.e., roosting locations.
- **General Kororā Monitoring (GKM)** with a higher frequency of surveys during breeding and moulting seasons. More details are provided on GKM in section 2.3.1.
- **Construction Area Monitoring (CAM)** which is specific to kororā habitat inside and within 20 m of the active construction area (refer to light and dark blue areas in Figure 4).
- **Daily observations by port staff.** Once the **active construction area** has been cleared by a SQEE, **daily observations** by port staff over the active construction area to ensure that exclusion management for kororā is effective (as per details in Table 3).

The type of monitoring programme required and when it is triggered for each of these categories, depends on the specific measurement objective and the project timing which can be separated into pre-construction, construction, and post-construction phases.

The monitoring programmes proposed are detailed in Table 4 and the monitoring areas are specified in Figure 4. Due to the focus on Kororā monitoring, additional information regarding GKM is included below in addition to Table 4.

2.3.1 General Kororā Monitoring (GKM)

The GKM is proposed to be undertaken during the day. It is known that the seawall will likely have more kororā present after dusk when foraging birds return for the evening. However, the purpose of the GKM is to determine use of the TBP monitoring area during the day when construction activities are occurring so that any potential and actual effects can be managed. The monitoring method focuses on bird presence/absence and signs (guano, feathers, scratching etc) which does not rely on the birds being present at the time of the monitoring.

The frequency of monitoring will depend on the season, as kororā are more vulnerable on land during the breeding and moulting season where they reside in the same location for weeks at a time (Table 2). Monitoring should be conducted with a higher frequency during the breeding and moulting period.

It is important that at least one breeding and moulting season is captured by the pre-construction monitoring, however it is recommended that more seasons are captured if time allows due to a delayed start to construction to build an understanding of any inter-annual variations.

As a minimum, one round of pre-construction monitoring must occur in the season prior to the construction works. This will enable the number of active burrows within the TBP Construction Area, if any, to be quantified so that the appropriate management response during construction can be determined, including any need for habitat offsetting / enhancement, as detailed in section 4.4.

Post construction monitoring is expected to be like the monitoring approach and conservation objectives that are outlined in the KCMP (Appendix D). There are some key differences between this AMMP and the KCMP including certain monitoring objectives which may not be achievable in a rock wall.

Table 4: Monitoring programme objectives, survey frequency and protocols during each construction phase.

Monitoring Programme	Objective	Location of Monitoring	Pre-Construction	Construction	Post-Construction
General Coastal Bird Monitoring (CBM)	To characterise the use of the monitoring area by coastal birds.	TBP monitoring area and outer breakwater monitoring area (pink and orange in Figure 4)	In the year(s) proceeding the construction undertake the CBM during the breeding season. This includes: ▪ High, mid, and low tides surveys, ▪ One survey per month for three months	Once per breeding season during construction period. This includes: ▪ High, mid, and low tides surveys, ▪ One survey per month for three months If coastal bird breeding locations are found within the active construction area, follow similar protocols to those for kororā (section 4). These protocols will need to be included in a subsequent version of this AMMP if required.	Once in the immediate breeding season post construction. This includes: ▪ High, mid, and low tides surveys, ▪ One survey per month for three months
General Kororā Monitoring (GKM)	To characterise the use of the monitoring area by kororā during the day within the moulting and breeding season.	TBP monitoring area	In the breeding and moulting season before the construction activity commences, monthly surveys of the TBP monitoring area are to be undertaken to: ▪ Characterise the use of the seawall by kororā and the potential number of active burrows within the monitoring area). ▪ It is recommended that at least one conservation dog survey is completed within the breeding and/or moulting season immediately prior to the works commencing (based on availability).	During the moulting and breeding season regular (e.g., at least monthly) surveys of the TBP monitoring area are to be undertaken to: ▪ Characterise the use of the seawall by kororā and the potential number of active burrows within the TBP monitoring area to inform construction management protocols.	Once in the immediate breeding season post construction. It is recommended that the methodology utilised for this survey is a dog survey if availability allows otherwise other methods as per section 2.2 are appropriate.

Monitoring Programme	Objective	Location of Monitoring	Pre-Construction	Construction	Post-Construction
			▪ It is recommended but not essential that more seasons are captured to build an understanding of any inter-annual variations.		
Construction Area Monitoring (CAM)	To determine the presence/absence of active burrows within the active construction area and kororā breeding or moulting status.	Generally, only the TBP construction area. May include 20 m into the buffer seawall if the southern end of the TBP construction area has active works.	N/A	Before any rock moving, concrete cutting or piling on the seawall the following should be undertaken: ▪ Determine the presence or absence of active burrows within 20 m of the construction works and their breeding or moulting status. ▪ Determine the presence/absence of kororā resting within 20 m of the construction works. ▪ Determine the presence or absence of coastal birds within 20 m the construction works. If present, undertake management protocols to manage potential effects.	N/A
Daily monitoring by port staff	To ensure exclusion methods from active construction area is effective.	Only the active construction area	N/A	▪ Once the SQEE has deemed the that the active construction area is unlikely to have suitable habitat or crevices for kororā to hide within, the SQEE is no longer required to undertake a survey at the beginning of each rock removal day. ▪ Implement the exclusion methods and protocols as outlined in the "management of site and storage of materials" as per section 4.1.4.	N/A

Monitoring Programme	Objective	Location of Monitoring	Pre-Construction	Construction	Post-Construction
				▪ Each morning before the start of works, the site will be visually inspected, and/or CCTV footage reviewed to assess if kororā have entered the site overnight. Any observations of kororā sign and/or kororā must be immediately reported to the SQEE. ▪ The site staff will be nominated and will have received training by a SQEE.	

2.4 Data Collection, Reporting and Management Responses

Monitoring data will be stored in a digital monitoring database at the time of collection, or where necessary entered subsequently in a timely manner.

Every kororā survey undertaken by a SQEE should be in ESRI's Fieldmaps or similar software following the data structure in Appendix B, the findings are to be summarised into a memo which will include:

- GPS survey location of the survey points,
- Any signs observed including guano, smell and/or feathers,
- Burrow contents including bird(s), chick(s) and/or egg(s) with photographic evidence (if achievable).

Every coastal bird survey undertaken by a SQEE is to be summarised into a memo which will includes:

- GPS locations of the survey points,
- Count of individuals and species of birds,
- Length of time survey was undertaken and nearest high and low tide times that day.

The management responses and protocols have been outlined in section 4. There may be additional management responses or alterations to the management plan to undertake adaptive management. These changes will be documented and advised to Council.

3 PROPOSED CONSTRUCTION WORKS AND STAGING

The proposed works for TBP relevant to this report include:

- Deconstruction of the northern section of the existing inner and outer seawalls (3.1.2) of the southern logyard,
- Construction of a new reclamation outer seawall with Accropode or X-Bloc units (section 3.1.1),
- Construction of the refurbished outer breakwater
- Reclamation out from the southern log yard (3.1.3),
- On-going operational use of the Twin Berths by vessels in the port.
- Construction related stormwater discharges within the context of sediment impacts on kororā behaviour and habitat (not covered in this report

3.1 Staging of Works and Methodology

The staging of TBP works have yet to be finalised. At this stage it is envisaged likely they will be staged as follows:

- Construction of new outer seawall(X-Bloc Units) to protect the expanded reclamation,
- Deconstruction of northern section of the southern logyard existing seawall,
- Reclamation works.
- Construction of the refurbished outer breakwater

The below sections describe the methodology from Worley Engineering (Worley, July 2022) in detail for each stage. This construction will extend over a period of up to 3 years or more depending on detailed design staging.

The revetment design drawing can be found in Appendix A.

3.1.1 Construction of New Outer seawall(Rock armour and concrete armour units)

The proposed reclamation works will initially require the construction of a new outer revetment/seawall. This sequence is to provide a more sheltered zone in which to deconstruct the existing seawall section and progressively reclaim the area behind this (Figure 6). The construction elements are:

- Stage 1 - Construct revetment working platform with crushed rock fill.
  - This will be completed by land-based equipment working out from the existing seawall and will form the revetment core,
- Stage 2 - Progressively construct the revetment toe and enclose reclamation area (constructed concurrently with Stage 1).
  - This will consist of more crushed rock fill and then larger armour rock boulders over this (0.3-1.0t piece size) and concrete armour units (X-bloc® or similar, Figure 6),
- Stage 3 – Progressively construct revetment.
  - Construct the second stage of the revetment core raising it to full height of 7.0 m Gisborne Port Chart Datum,
  - Complete outer primary armour layer of interlocking concrete armour units.

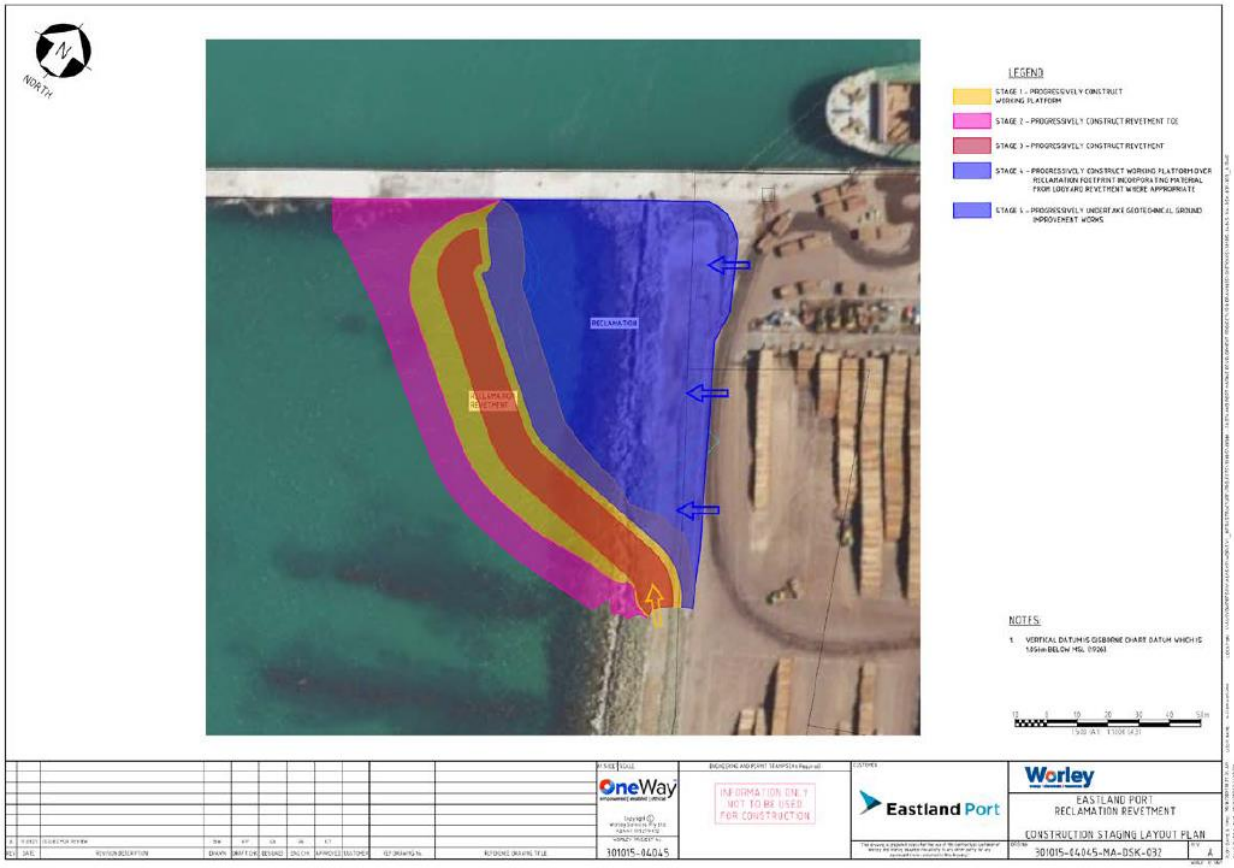

Figure 5: Indicative construction sequence for the reclamation area (Figure 6-2 from Worley, July 2022).

Figure 3-5 – Left – X-bloc® (4 m³/9.6 t, Port Oriel, Ireland). Centre – Accropode units (6.2 m³/14.9 t, Scarborough UK). Right – Core-loc® (15 m³/36 t, Kaumalapau Harbor, Hawaii). (Reedjik & Muttray, 2009)

Figure 3-6 – Examples of typical random placement of X-bloc® units

Figure 6: Examples of the X-bloc units which will form the armouring of the outer seawall (Worley, March 2022).

3.1.2 Deconstruction of existing seawall

The second stage will include the deconstruction of the two existing seawalls (inner, Figure 7 and outer, Figure 8) with placement of the reclaimed material to join the new outer revetment to form the reclamation area.

The construction management controls for this phase of works are covered in section 4.

Figure 7: Outer seawall dominated by large rocks and concrete pieces.

Figure 8: Inner riprap seawall that separates the logyard from the road and the outer seawall that will be deconstructed.

3.1.3 Reclamation Works

Once the reclamation area is completely enclosed by the outer revetment/seawall, the reclamation area will be constructed from the land using a crushed rock platform so that construction activities can occur from the land (Figure 5).

The reclamation will include placement of rocky granular fill held in place by a new southern revetment wall comprising a crushed rock core, a secondary armour layer of 0.3–1 tonne rocks and outer primary armour layer of concrete armour units. The internal top surface will be paved suitable for logging trucks and other vehicles to access the extended Wharf 8. This will include:

- Granular fill topped with a roading surface of DGB20 or similar.
- The pavement will be suitable for log handling equipment to reduce the need for maintenance costs associated with heavy machinery on this surface.
- The revetment surface will be designed to have a 2% grade to accommodate surface drainage, and this will join smoothly to the existing surface of the southern logyard.
- Revetment will be 9 m wide providing surface trafficable by trucks currently used at Eastland Port, comprising crushed rock road base (DGB20 or similar).

3.1.4 Outer Breakwater

The outer breakwater will be re-armoured with concrete block units. The revamped structure will have a higher crest level than the present structure but has been designed to overtop in certain storm and weather events.

The main location of interest for birds is the channel marker at the outer end of the breakwater where small flocks of gulls and terns rest intermittently (refer to section 1.3.1).

4 CONSTRUCTION AND OPERATIONAL MANAGEMENT

The purpose of this section is to outline the management actions to avoid adverse effects on coastal birds including kororā and to minimise, mitigate, or offset the effects on their habitat during the construction and operational phases of the TBP.

Kororā are most sensitive to disturbance when they are breeding and moulting (see active burrow definition in section 1.4) as they become resident on land for extended periods. These seasonal activities typically cover the months of July to March but can be variable year on year and are site specific (Table 2).

This section covers the management controls to be implemented during the construction and operational phases of the TBP.

A flowchart for active burrow management protocols is included as Figure 9. The flowchart indicates hold points for any rock removal, piling or concrete cutting within 20 m of an active burrow until such time as the status is deemed inactive by a SQEE. This flowchart is a visual representation of the management protocols, and the report text should be referred to for more details on the specific actions and requirements of each construction scenario.

4.1 General Construction Management

The following section outlines general construction management in relation to noise, sediment, roosting birds and active nests and/or burrows.

4.1.1 Noise Controls (Piling and Concrete Cutting)

Construction noise particularly from piling and concrete cutting has the potential to cause a disturbance effect to birds, in particular kororā, living within the breakwater. In some cases, noise levels above certain thresholds can also cause permanent hearing loss in kororā (Boffa Miskell, 2022).

The following controls are recommended to manage noise effects on nesting and roosting coastal birds during the construction period especially during piling, jet grouting, excavation, and similar activities:

- Adopt a construction airborne noise limit of 75 dBA LAeq(1s) to be measured at the entrance of an active burrow (or in the unlikely occurrence of an active coastal bird nest) using a Type-2 sound level meter (Marshall Day, 2022). If the construction noise exceeds the 75 dBA limit, then the following mitigation and management measures are to be adopted from the Marshall Day Twin Berths Construction Noise Assessment report (Marshall Day, 2022) until the noise is below the defined limit of 75 dBA. These include but are not limited to:
  - Implementing acoustic screens such as noise matting over the entrance to the active burrow or rock crevice. These must be removed again at the end of the day,
  - Alternative construction methodologies to reduce noise e.g., drilling or vibro-piling, or construction noise mitigation measures, such as source screening.
  - Any other specific construction noise mitigation measures as discussed and approved by the SQEE.

4.1.2 Sediment and Erosion Sediment Control

High suspended sediments in the water column have the potential to affect the foraging ability of kororā as they are visual hunters (4Sight, 2022).

A memorandum from Worley Engineering (April 2023) outlines updated methodology with regards to Sediment and Erosion Control for the proposed TBP. This has been reproduced below:

- The use “of pre-screened “plus-65” core material for the revetment and any working platform; hydrometer testing of any other potential sources to confirm that potential for generation of fines has been minimised to a level within the parameters used for the sediment dispersion modelling. Superintendent approval to be sought for any proposed alternative material to be used for the core of the revetment.”
- Progressive armouring of exposed core material in the vicinity of the boat harbour as soon as practicable to minimise exposure time of unprotected core material and minimise potential for sediment plume generation due to erosion of the core by wave action.

- Accurate positioning of construction works as per the design, including the placement of material in the vicinity of the heritage boat harbour, by use of GPS instrumentation during construction to ensure that no material is placed within the 5 m buffer zone between the Reclamation and the boat harbour.
- Construction and "closure" of the revetment works prior to placement of reclamation material to prevent fines from the reclamation material dispersing into the Port.
- Implementation of the measures in the Earthworks, Erosion and Sediment Control Plan as specified in the Draft Consent Conditions. Note that due to the energetic wave conditions experienced at the site, silt would be unlikely to settle out and remain in the vicinity of the Boat Harbour.
- Implement a water quality monitoring program during construction to assess suspended sediment concentrations at the boat harbour during construction, with specific trigger levels for reporting and cessation of works if trigger is exceeded.
- The use of silt curtains is likely to be deemed unpractical due to the high energy environment.

Based on the above, there are no more sediment mitigation measures recommended or required.

4.1.3 Coastal Bird (Excluding Kororā) Controls

Most of the coastal birds that inhabit the outer breakwater monitoring area including the red-bill gull and white fronted tern, are highly mobile (refer to Table 1). The birds rest on various structures within the port and move between foraging grounds, breeding areas and high-water roosting sites daily. Predicting whether they will utilise or vacate the active construction area, is not possible.

No specific coastal bird controls have been proposed at this stage . This is due to the following factors:

- The lack of suitable breeding locations within the TBP works footprint,
- The flexibility in habitat use and mobile nature,
- The TBP works footprint is a small part of the port and construction will be staged due to the works programme meaning there is habitat availability elsewhere in the port.
- Similar levels of disturbance are common in the port (e.g., dredging, and other large vessel movements).

If pre-construction monitoring determines that coastal bird breeding locations (other than kororā) are present, then controls similar to those recommended for managing effects on kororā may apply to these sites. This may include controls on rock removal, noise mitigation measures and/or a 20 m setback for construction activities from any coastal bird breeding locations. The specific construction management protocols will be determined by the SQEE in a follow up memorandum (if required) which will be approved by council prior to construction phase of the TBP.

4.1.4 Management of Site and Storage of Materials (Kororā)

The construction of the new reclamation outer revetment wall with concrete armour will create a new structure that has the potential to be colonised by coastal birds. Kororā are known to rest within crevices in seawalls, within rock stockpiles and under artificial structures and may colonise the new habitat areas as they are created. The TBP could result in mortalities if kororā remain present in an active construction area, given the use of large machinery and other construction activities such as rock movement.

It is anticipated that the port and construction staff will be responsible for implementing the below management controls during the construction period. Any deviations from the below are required to be discussed and approved by the SQEE.

The following management controls for managing the construction site to **exclude kororā** are:

- The use of exclusion fencing similar to what is used within the Waikahua seawall to exclude kororā from accessing new crevices in the new outer revetment wall or resting within stockpiled material,
- Construction site modification to discourage the use of the **active construction area** by kororā including:
  - Rock storage either below mean highwater spring level or off site beyond kororā access,

- If storage of construction site materials is required within the TBP construction area, these materials including, X-bloc units, riprap and other materials must be covered by bidum cloth or similar when stored overnight,
- Daily checks of the active construction area and repairs of exclusion mechanisms as stated above,
- Daily surveys by site staff using a standardised data sheet to ensure that no kororā or other coastal birds have taken up residence within the active construction area over night.
- If active burrow(s) are found in or within 20 m of the active construction area (i.e., for that day), the SQEE must be informed immediately, and procedures outlined in section 4.2 Rock Removal, are to be undertaken.
- If non-breeding or non-moulting kororā are found within the active construction area (i.e. for that day), construction works are to be halted, the SQEE is to be informed immediately and the protocols under section 4.3 (incidental discovery of kororā within the construction area) are to be followed.
- A regular (e.g., weekly) update via email to the SQEE including the works completed, status of exclusion mechanisms and records of daily surveys.

4.2 Rock Removal Specific Controls

Exclusion zones shall be implemented around active burrows for any rock removal work. The exact timing of breeding and moulting seasons when active burrows can be present can vary between years and so it is important to have up to date monitoring of the works area by a SQEE. Incidental discovery protocols are recommended to manage the presence of non-breeding and moulting kororā that could be found within the construction site during the day.

The use of the construction area by kororā will be established prior to the rock removal works by the l Kororā Monitoring outlined in Tables 2 and 3.

4.2.1 Rock Removal Procedures (Single Day)

The **following rock removal procedures are to be followed** (Figure 9):

- Daily Construction Area Monitoring (see Table 3) surveys to confirm the absence or presence of active burrows within 20 m of rock removal, piling works and concrete cutting above MHWS. The results of this survey will confirm whether the works can proceed.
- No movement of rocks, piling or concrete cutting within 20 m of an active burrow.
- If a non-breeding or non-moulting kororā is found within 20 m of the active construction area, then the protocols outlined in the incidental discovery protocols apply (section 4.3).
- If active burrows are found within the TBP construction area but the active construction area is more than 20 m from an active burrow, the following is be undertaken:
  - Noise mitigation measures as outlined in section 4.1.1.
  - Slow and progressive removal of rocks with a claw attachment until it is likely that the rocks around active burrows are stable.
- If machinery is utilised to undertake rock movement above MHWS, it must be with a claw attachment so that rocks can be lifted individually, progressively, and slowly so their surrounds can be checked by a SQEE to ensure the absence of kororā within 20 m.
- Once the SQEE has established that the active construction area is clear of kororā, other digger attachments including a bucket can be utilised to move rocks.
- All other construction activities must ensure that the noise is minimised to be no more than 75dB outside the entrance/outside the rock crevice of active burrows. See section 4.1.1. Noise for more information on noise reducing management.
- Methodology for movement of rocks is undertaken by a skilled contractor who has been briefed by a SQEE as to requirements.
- Rock removal and piling works below MHWS can be undertaken without any of the rock removal controls specified in this section above.

4.2.2 Rock Removal Over Several Days

When rock removal extends over several days, the following protocols are to be followed to discourage birds from accessing the site overnight. These include:

- Manage the rock removal to minimise the number of CAM surveys required, including:
  - Undertaking a CAM survey and then remove rocks to expose the bare ground in a single day if practicable which leaves no crevices for birds to inhabit.
  - Placement of material such as bidum cloth, plywood or tight mesh fabric over the where the rock removal has occurred and/or,
  - Temporary fencing that is fastened in a way that restricts the movement of kororā through a gap,

Once the SQEE has deemed the active construction area is unlikely to have suitable habitat or crevices for kororā to hide within, the CAM is no longer required at the beginning of each rock removal day. Instead, the daily monitoring by site staff and CCTV cameras can be utilised as a monitoring method.

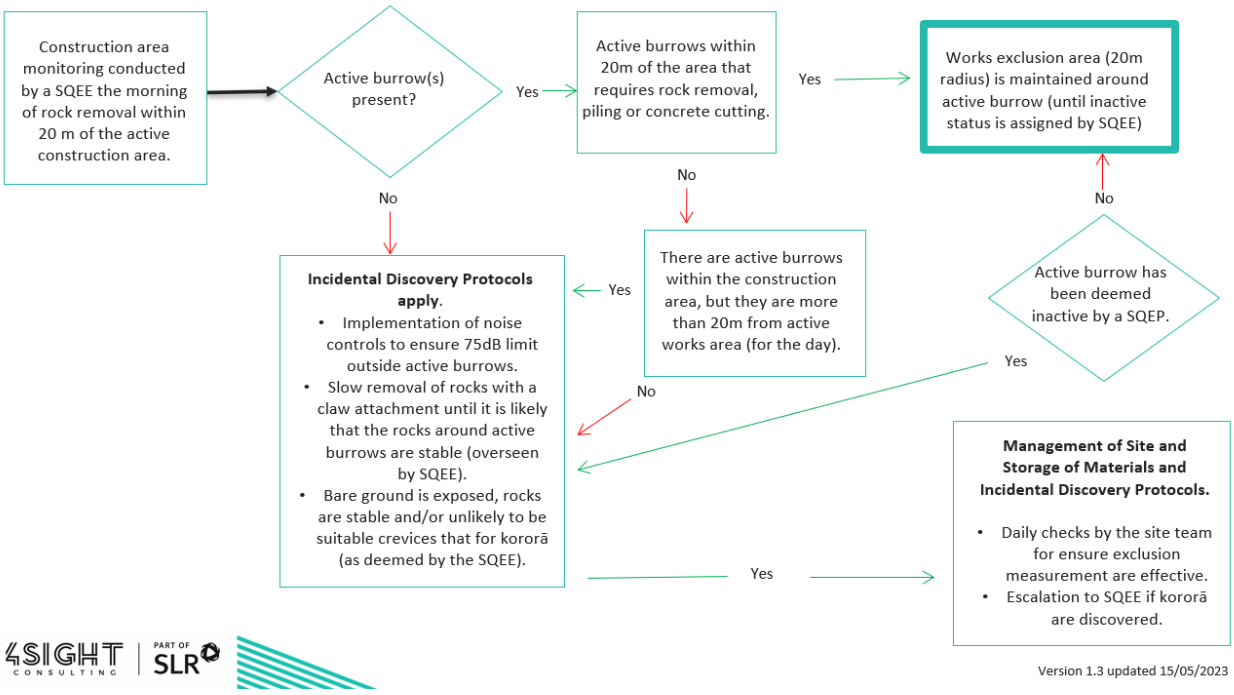

Figure 9: Active burrow management protocols. The dark teal outline indicates a hold point for any rock removal, piling or concrete cutting within 20 m of an active burrow until status deemed inactive by a SQEE. This diagram is a visual representation of the management protocol, refer to the report for more details on the specific actions and requirements of each construction scenario.

4.3 Incidental Discovery of Kororā within the TBP Construction Area

The handling or translocation of birds from active burrows should be avoided. Any intention to handle or move birds at any time requires appropriate authority under the Wildlife Act (1953) from the Department of Conservation.

Despite the management protocols to restrict access to the **active construction area**, it is still possible that non-moulting or non-breeding kororā could be found to be resting within a crevice during the rock removal and/or within the active construction area.

4.3.1 Avoiding Relocation and Handling if Practicable

In some cases, the SQEE might determine that relocation of the non-moulting or breeding kororā from the TBP construction area by active or passive means is likely to cause more disturbance to the individual than if they were to remain in place. In this case, the individuals will be left in place and specific construction measures to reduce the potential disturbance are to be implemented, including:

- Implementing noise controls (acoustic screens),
- Where practicable and feasible ensure that area within 20 m of the kororā is stable and undertake measures to minimise rock movement,
- Alternative construction methodologies e.g., drilling or vibro-piling,
- Any other specific construction measures as discussed and approved by the SQEE.

4.3.2 Handling and Relocation of Kororā

If the options in section 4.3.1 have been exhausted and it has been determined that relocation from the site is preferred by the SQEE and a permit to handle the birds has been obtained, the below protocols apply.

It may be useful to understand whether an individual kororā has been relocated and handled, especially if mortalities occur within or near the port. The tagging method that is proposed to be used if required during the construction period is white correction fluid (e.g., twink).

There is debate in the literature regarding the use of transponders and other invasive tagging methods like banding on penguins (Peterson *et al*., 2006 and Saraux *et al*., 2011). The advantages and benefits of each tagging method and whether the method is likely to be practicable to implement within the project site specific constraints are outlined in Appendix C).

If all attempts to avoid the handling and relocation of kororā have been undertaken (see list in section 4.3.1), then the protocols for the handling and relocation of kororā are:

- Any intention to handle or move birds at any time requires appropriate authority under the Wildlife Act (1953) from the Department of Conservation.
- A SQEE must be present on site,
- Rocks must be lifted with a machine with a claw attachment so that rocks can be lifted individually, progressively and slowly,
- If practicable, all obstructions between the water and bird are to be removed to allow access to the water,
- All personnel not specified on the permit to maintain at least 5 m from the kororā,
- If kororā is required to be handled, it is to be marked with a white marker on the head,
- Works will only recommence once the SQEE has deemed it safe to do so (i.e., if the kororā is no longer in the immediate area).

4.4 Operational Management and Enhancement

This section summarises the implementation of habitat offsetting/compensation and habitat enhancement for kororā if a need for this is identified by the monitoring programmes, for example due to the loss of active burrow(s) within the TBP construction area.

4.4.1 The Buffer Enhancement Area

Kororā have high site fidelity for nesting/moulting, returning to the same crevice or burrow to breed each season (Bull, 2000). The loss of previously utilised active burrows (active in the previous breeding season) within the TBP construction area (as shown in Figure 4) will be identified by the pre-construction and construction monitoring programmes.

The buffer seawall is a section of the seawall that will not be directly affected by the TBP and is outside the area of works (Figure 4). This area can be used to provide offset/compensation for the loss of any active burrows. The below details how the offset and compensation should be calculated if it is deemed required by the SQEE:

- For every previously utilised active burrow[2] that is lost because of the TBP works, two nest boxes are to be installed following completion of the works. These nest boxes will be designed and located as per the guidelines specified by the Department of Conversation (DOC)[3],
- If practicable, plant the upper flat crest of the seawall along the buffer section with salt tolerant vegetation that will appropriately provide kororā shelter from the elements and predators,
- Include the buffer enhancement area in the predator management plan as per the section below.

This ecological offset, if required, should be overseen by a SQEE and its ongoing management and performance integrated into future kororā monitoring around the port.

4.4.2 General Operational and Enhancement

The following is recommended as part of the general operational management if the buffer area is used for the development of additional kororā habitat and/or if the new outer seawall to the reclamation is confirmed also to provide kororā habitat:

- If it is not already present, install public signage at the Port end of Kaiti beach to create awareness for kororā and encourage dogs to be on lead and under control,
- Extend the kororā exclusion fencing from the Waikahua seawall to encompass the entire southern logyard seawall i.e., include the buffer seawall to the TBP construction area,
- Implement predator control and pest management plan for stoats, cats, rats, and other predators to protect kororā and other seabirds within the TBP construction area. This plan is to be developed and implemented before the completion of the construction phase.

[2] previously utilised active burrow which is no longer active – i.e. no longer has nest contents (egg(s) and/or chicks) or the presence of a moulting bird(s) but the location is likely to be important to kororā due to their high site fidelity.

[3] https://www.doc.govt.nz/nature/native-animals/birds/birds-a-z/penguins/little-penguin-korora/

4.5 Recommended Roles and Responsibilities

The roles and responsibilities for the TBP are outlined in Table 5.

Table 5: Roles and Responsibilities for the TBP.

Role Description	Who is Responsible
Pre-construction, construction, and post construction monitoring – regular monitoring as per section 2.3 and Tables 2 and 3.	SQEE
On site ecologist during rock removal and undertaking of Construction Area Monitoring (CAM) e.g., kororā surveys before the works can commence for the day.	SQEE
Confirmation of active burrow status	SQEE
Daily checks for kororā exclusion fencing, management of site and storage of materials.	Eastland Port and/or site contractors
Regular (e.g., weekly) update via email to the SQEE including the works completed, status of exclusion mechanisms and records of daily surveys.	Eastland Port and contractors
Erosion Sediment Control	Eastland Port and contractors
Noise monitoring to ensuring 75 dba noise limit is not exceeded at active burrow entrance	Eastland Port and contractors
Additional noise mitigation protocols and approval as required.	SQEE
Notification and updates to Gisborne District Council	Eastland Port

5 REFERENCES

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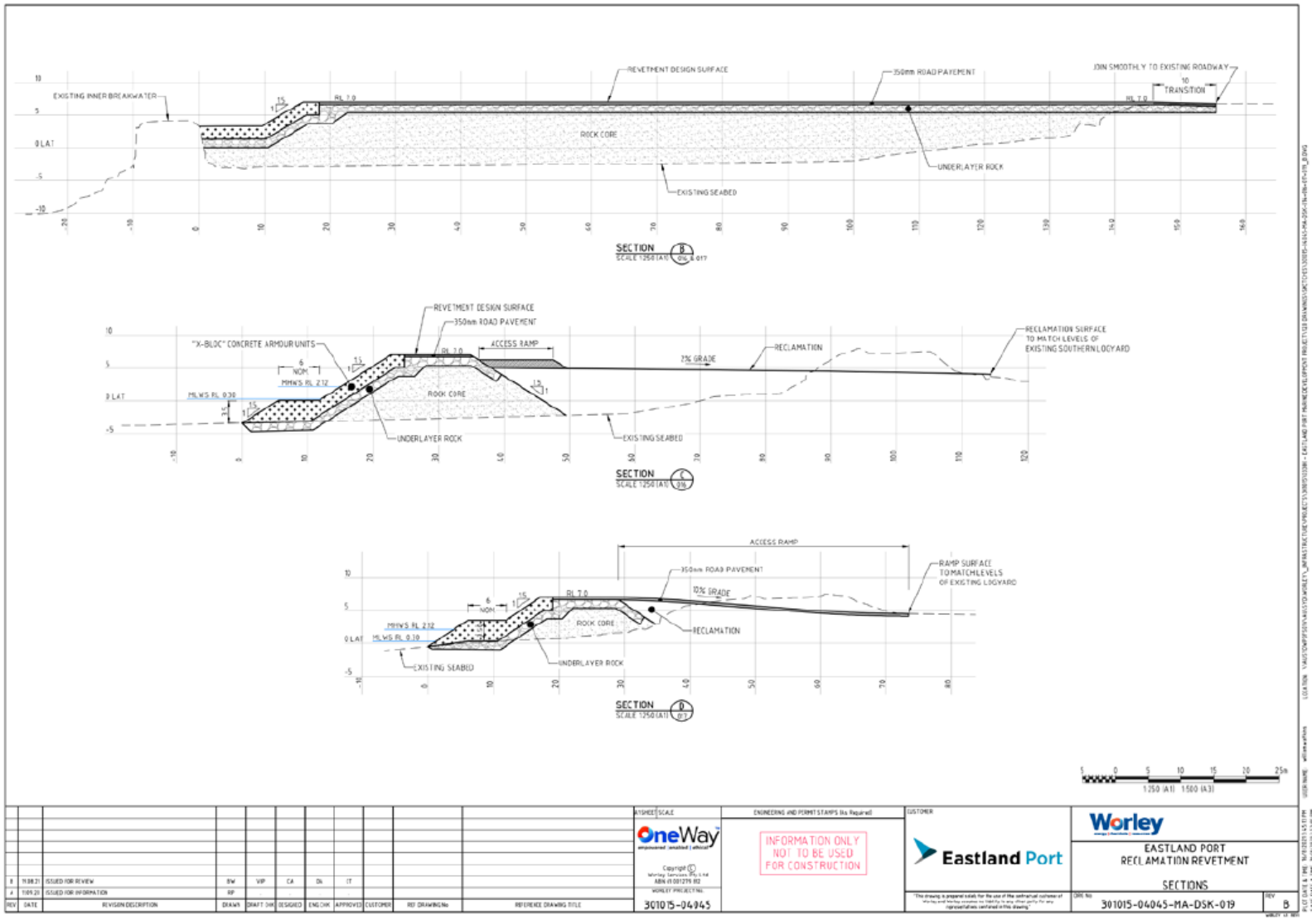
4SIGHT CONSULTING | PART OF SLR

Appendix A

Worley Engineering Eastland Port Revetment Design


REVETMENT DESIGN SURFACE
350mm ROAD PAVEMENT
JOIN SMOOTHLY TO EXISTING ROADWAY
10 TRANSITION
EXISTING INNER BREAKWATER
RL 7.0
ROCK CORE
UNDERLAYER ROCK
EXISTING SEABED
0 LAT
SECTION B
SCALE 1:250 (A1) 1:500 (A3)
"X-BLOC" CONCRETE ARMOUR UNITS
ACCESS RAMP
2% GRADE
RECLAMATION
RECLAMATION SURFACE TO MATCH LEVELS OF EXISTING SOUTHERN LOGYARD
MHWS RL 2.12
MLWS RL 0.30
SECTION C
SCALE 1:250 (A1) 1:500 (A3)
10% GRADE
RAMP SURFACE TO MATCH LEVELS OF EXISTING LOGYARD
SECTION D
SCALE 1:250 (A1) 1:500 (A3)
1:250 (A1) 1:500 (A3)
INFORMATION ONLY NOT TO BE USED FOR CONSTRUCTION
Eastland Port
Worley
EASTLAND PORT
RECLAMATION REVETMENT
SECTIONS
301015-04045-MA-DSK-019
B

Appendix B

Example Monitoring Schema

Description	Type	Domain/Pick List	Comment
Date	Date		Required field
Initials	Text		Required field
Company	Text	4Sight, Ecoworks, DabchickNZ, Other	Required field
Month	Text	January, February, March, April, May, June, July, August, September, October, November, December	Required field
Year	Number	2023,2024, 2025	Required field
Survey Purpose	Text	GKM, CAM, Other	Required field
Monitoring Method	Text	Phone Camera, Burrowscope, Both Methods	Required field
Survey Type	Text	Conservation dog survey, Visual Check by SQEE	Required field
Location ID	Number		Either ID is filled in
Nest Box ID	Number		
Dog Detection	Text	Yes, No	Required field
Location Description	Text	Sign, Dog Indication, Roost, Nest, Other	Required field
Guano Detection	Text	Yes, No	Required field
Feather Detection	Text	Yes, No	Required field
Scratch Detection	Text	Yes, No	Required field
Bird Detection	Text	Yes, No	Required field
Chick Detection	Text	Yes, No	Required field
Egg Detection	Text	Yes, No	Required field
Number of Birds	Number		Leave blank if no birds or chicks are observed
Number of Chicks	Number		
Number of Eggs	Number		
State of Egg	Text	Warm and light-coloured eggs alone in nest, Eggs left alone and not viable (cold and dark), Egg(s) with parent sitting on it.	
State of Birds	Text	In moult, no moult	
State of Chicks	Text	Chick with down feathers, Chick with some adult feathers (<50%), Chick with mostly adult feathers (>50%), Chick or young juvenile, ready to fledge	
Behaviour	Text	Parent bird sitting on egg, Chick with parents, Chick alone in burrow, Fledging or young juvenile, Adult alone in burrow, Pair of Adults, Other	
Monitoring Results	Text	Active Burrow, Korora, Guano, Feathers, Dog Indication, Monitoring Location (No Sign).	Required field
Comments	Text		Comments on all the above.

Appendix C

Tagging and Tracking of Relocated Kororā

Tagging and Tracking Background

It may be useful to mark/tag an individual kororā if the relocation and handling is approved by the SQEE (refer to section 4.3). Knowing if a kororā has been handled is especially important if mortalities of birds occur within or near the port.

The table below discusses the advantages and benefits of each tagging method and whether the method is likely to practicable to implement within the project site specific constraints. The tagging method that is proposed to be used if required during the construction period is white correction fluid (e.g., twink) (see point 3 which is highlighted in teal).

	Tagging Methodology	Description	Advantage	Disadvantage	Applicable to Site (Yes or No)
1	Transponders	A pit tag that is injected under the skin of the bird. Gives a unique ID that can be scanned by a reader.	High accuracy for identifying individual birds. Monitoring of marked birds allows an understanding of adult survival and recruitment into the population. Effective in kororā populations that live in nest boxes or similar (e.g., Omaru Penguin Colony) where the lid of the box can be lifted and the ID tag scanned without handling the bird. High cost	Highly invasive tagging method which is likely to cause stress to the individuals when they are tagged and during each monitoring round. Difficult to understand the effect of handling the birds compared to other external stressors. Transponder readers only work near the bird (within 10 cm).	**No.** Unlikely to be able to scan birds that are deep within crevices in the seawall. In some cases, the transponder readers located at the entrance to a colony, where there is a common access point or ramp up to the burrows. This is not the case within a seawall, where the passage to the burrow is likely to different for each bird and is below and in between rocks to avoid predation.
2	Banding of flippers or feet	Common technique for seabirds where birds are banded with a plastic tag with a unique ID around their flipper or foot.	High accuracy like that of the pit tags. Monitoring of marked birds allows an understanding of adult survival and recruitment into the population. Can be visually sighted and recorded which means that the	Banding of penguin flippers has been found to injure flipper tissues particularly in moult. A long-term study of King Penguin (*Aptenodytes patagonicus*) found that banding decreases the individual birds survival and reproduction rate, which in turn has a negative effect on the population growth rate (Saraux *et al*., 2011). Banded of feet in penguins were the original form of penguin	**No.** Due to negative effects on bird survival, this is not recommended.

	Tagging Methodology	Description	Advantage	Disadvantage	Applicable to Site (Yes or No)
			birds can be a fair distance from the monitoring personnel. Medium cost involved.	tagging (1930) however, DOC reported that leg bands were difficult to read and caused injuries in some cases.[4]	
3	**White correction fluid (e.g., twink)**	A mark of correction fluid on the head of the individual bird.	Can be visually sighted and recorded. Low cost involved. Low disturbance to the bird in the short and long term. Handling is required but it will not cause harm to the individual.	Not permanent as it will wash off over time and doesn't not give a unique identifier.	**Yes** Recommended to be utilised in the circumstances of relocation. If a bird needs to be relocated for its safety (i.e., is found within the active construction area). A mark can be drawn on the head so that it can be identified over the next 48 hours on the site.
4	GPS data loggers	A GPS data logger attached to the tail of an individual to track its movements.	Detailed information of the movement of an individual bird. Useful for understanding diving profile and foraging patterns.	Not useful on land, often data loggers turn off when they are dry. High cost. GPS unlikely to be to transmit a signal from within burrow and it can be low accuracy at the scale required to understand the location of individual burrows.	**No** Useful method monitoring foraging behaviour and not for monitoring within the seawall where the GPS will unlikely be able to transmit a signal.

[4] https://blog.doc.govt.nz/2013/02/20/tagging-yellow-eyed-penguins-otago/

Appendix D

Waikahua Kororā Conservation Management Plan

Kororā Conservation Management Plan 2022 - 2032

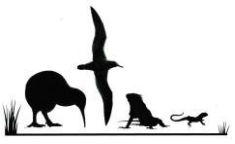
Onepoto, Turanganui a Kiwa - March 2022

Eastland Port

1048 Waimata Valley Road
Private Bag 7438
Gisborne

www.ecoworks.co.nz

Biodiversity Management Services



Contents

Cover Photos – Kororā at Oamaru Penguin Colony (photo supplied), Kororā at Te Kuri a Paoa, Young Nicks Head, Onepoto Beach & Tuamotu, Gisborne.

1.0 Kororā Overview

The Kororā, or little blue penguin (*Eudyptula minor*) is widespread around the New Zealand coastline and is recorded nesting within a wide range of mainland coastal habitats and offshore islands from the northern Three Kings Island group near Cape Reinga to the sub-Antarctic Snares Islands including Rakiura -Stewart and the Chatham Islands group where they appear to be abundant.

Kororā are the smallest of the world's 18 species of penguin, standing at 300-330 millimetres in height and weighing 1000 grammes. They are native to New Zealand and are also found in southern Australia where they are referred to as the fairy penguin.

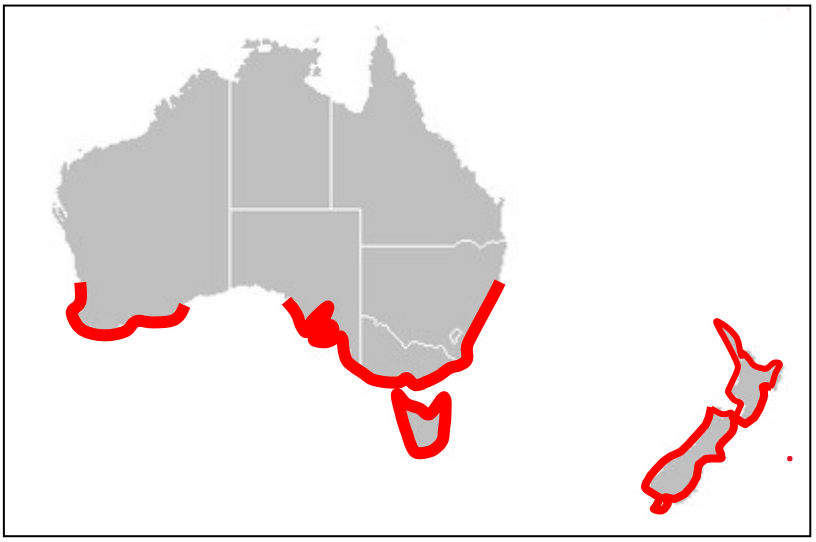


Figure 1: Kororā distribution New Zealand and Australia.

There has been considerable debate regarding the taxonomy of the *Eudyptula* genus across New Zealand. Kinsky and Falla 1976, suggested that up to six sub-species were present within the genus which has been supported by others (Davis & Renner 2003, Taylor 2000). The Ornithological Society of New Zealand checklist for New Zealand birds (2010) recognises just the one species, *Eudyptula minor,* however the DOC Threat Classification system 2016 describes multiple sub-species.

The New Zealand Department of Conservation THREAT CLASSIFICATION SERIES 19 -Conservation Status of New Zealand Birds, 2016, Robertson *et al.* describes the threat status of the Northern (*E.minor iredalei*) and Southern (*E. minor minor*) blue penguin as 'DP' or Data Poor and as category A(1/1). This references a 'moderate to large population' and low ongoing or predicted decline with 5,000–20 ,000 mature individuals, a predicted decline of 10–30% occurring.

Birds on-line describe the current threat status for this species as 'Declining'.

The current world population estimate stands at c.500,000 individuals (Birdlife International 2022). Population estimates appear to vary considerably however between organisations and between decades, robust survey or population trend data is not available for the majority of New Zealand. Most populations are thought to be in decline across New Zealand (K.J Wilson & T. Mattern 2019). Breeding populations which were present within Otago up until 1990 are no longer present (Dann,1994). Blue penguin were common on Banks Peninsula during the late 19th and early 20th centuries however since then have declined markedly (Challies & Burleigh 2004).

Our experience within Tairawhiti to date indicates that kororā mortality; besides natural mortality, has largely been attributed to both domestic dogs and ferret. This has also been recorded at other sites within New Zealand. A study carried out between 1994 -1998 necropsied 213 Otago blue penguin to identify the causes of mortality. A total of 9.4% of deaths were caused by ferret (AG. Hocken, *Cause of death in blue penguins in North Otago,* 2000). No stoat or cat predation was recorded during this study.

Te Kuri a Paoa - Young Nicks Head Eco-Sanctuary recorded the deaths of 3 adult blue penguin during late 2010 to a ferret at Orongo Beach. Ferret guard hairs were found on the plumage of the dead birds which were found outside of their breeding burrows and a classic cervical vertebrae puncture wound was recorded on all three birds consistent with other mustelid predation events seen on brown kiwi and weka (S.C Bull *pers. comm.*). No other predation events have been recorded at Nicks Head on blue penguin chicks or adults between 2005-2022. Stoat and feral cat are regularly recorded at this site on camera traps, however no kororā predation events have been recorded during the last 17 years from either of these two pest species.

Three kororā deaths were confirmed by the Department of Conservation on Onepoto Beach, Kaiti during 2021. All three were necropsied at Massey University and were confirmed to be caused by dog (J. Quirk, Department of Conservation Ranger, *pers. comm.*). Stoat and feral cat prints have also been identified on the high tide mark at this location. No mortality to date has been attributed to either stoat or cat at Onepoto that we are aware of.

Both anecdotal and empirical data suggest that stoat or feral cat are not a significant predator of blue penguin. As with kiwi and weka; stoat and feral cat are not primary predators of these robust flightless birds, however ferrets will kill large adult birds such as blue penguin, kiwi and North Island weka with ease. As will domestic or feral dogs. Flightless, nocturnal New Zealand endemic birds such as Kororā, kiwi, weka and pateke have a strong scent signature which appears to be highly attractive to dogs.

Fortunately for kororā, kiwi and weka the Tairawhiti region does not currently support a large rabbit population. Our climate combined with the uplifted marine mudstone-sandstone and clay soils geology combined with a moderate rainfall (>900-1000 mm mean annual rainfall, NIWA, 2012) does not provide optimal habitat to support a large feral rabbit population. Rabbits effectively get too wet and do not build to high densities as is witnessed within Otago, Wairarapa, Canterbury and Hawkes Bay. High rabbit densities support an abundant ferret population. Other sites such as eastern Hawkes Bay receive <800-900mm mean annual rainfall and with hard packed marine sediment geology provide impermeable and water-proof den sites which keep rabbits dry. This in turn supports high rabbit numbers and therefore ferrets which in turn decimate kororā, kiwi, weka and other species.

During the early 1980's the fitch (ferret) farming industry ended. It became unfashionable to wear authentic fur and the viability of this industry collapsed. Many of the farmed ferrets were literally released into the Gisborne District. Many others over the years had escaped from poorly managed farming operations. "It was not uncommon to lose 90 ferrets in a night and be asked to come and help round them up" – Guy Tomlinson, Matawai (*pers. comm.*).

This also appears to have coincided with the loss of weka in the Motu-Matawai-Rakauroa and greater Turanga area and probably had major consequences for other endemic species such as brown kiwi however at the time were not monitored and were considered relatively abundant.

It is highly likely that blue penguin have suffered the same fate within our region as kiwi, weka and many other flightless endemic bird species. They were likely to have been abundant along the Tairawhiti coast and over the years as we have recorded at various sites such as Te Kuri a Paoa -Young Nicks Head. We have recorded intermittent predation events from ferret and roaming dogs, i.e. Onepoto, which over time removes valuable breeding adults. This can have a significant impact by destroying in-situ eggs and or chicks and subsequently requiring any remaining adults to find another breeding partner. As blue penguin are largely philopatric nesters, both sexes incubate eggs and raise offspring and also maintain a strong pair bond fidelity for many years this is likely to be a challenging task and therefore predation events have a significant impact on small remnant populations. As we witnessed at Young Nicks Head it took years to recover from the loss of just 3 adult blue penguin in 2010. This impacted annual reproductive success significantly for many years post this event occurring (S.C Bull, Young Nicks Head Seabird Project, *pers. comm.*)

2.0 Kororā Ecology

The following information summarises the basic ecology of kororā – Blue Penguin.

-Kororā come ashore just after dusk, generally from 8.30 pm onward depending on the season.

-Kororā breed as individual pairs or in colonies 2-4 metres apart. Nest/roost burrows are either within caves, under boulders, burrows are excavated under flax or hidden under dense coastal vegetation and dense grass sward. Penguin have been found nesting under sheets of corrugated iron and will readily use nest boxes provided or nest under coastal buildings. They can nest up to 300 metres inland and 100 metres vertically above the coastline.

Kororā are monogamous and both sexes share incubation and chick rearing.

Kororā can produce more than one clutch per season. Unique among penguins.

Eggs are generally laid in Gisborne from mid-July through to late November.

Incubation lasts c.36 days.

Chicks are brooded for c.56 days when they fledge (exit) from the burrow.

They are generally a philopatric species returning to the same area to nest as adults.

Breeding begins at 2-3 years of age and lifespan can be over 25 years.

Kororā can be present at any time of the year as they will often come ashore to rest particularly after large swells or storm events.

Moulting generally occurs between February -April. Kororā stay within their nest/roost burrow until moulting is completed.

Table 1: Summary of Kororā Annual Activity

Activity	month											
	J	F	M	A	M	J	J	A	S	O	N	D
Moulting												
Egg Laying												
Chick Rearing												
Potential Burrow Occupancy												

3.0 Kororā Distribution within Turanganui a Kiwa

Several anecdotal reports from Gisborne suggest that blue penguin were once more common than they currently are. During 2004 Ecoworks NZ carried out a blue penguin survey between Te Kuri a Paoa – Young Nicks Head and Tatapouri, Gisborne. Initial plans included working with DOC towards the possible translocation of blue penguin chicks from northern Gisborne beaches to Te Kuri to establish a novel and protected colony site, however survey work during summer 2004-05 carried out by Dr Sarah Boyle -Ecoworks NZ, indicated that so few pairs remained on the mainland that this was not a feasible option. Approximately 10 breeding pairs were identified during the survey and it was decided that the best option for the survival of this remnant population was to protect in-situ pairs and nest sites.

Ecoworks NZ staff carried out maildrops and visited people known to have penguins roosting under their homes between Onepoto – Kaiti Beach and Tatapouri. The majority of the breeding birds were found at Tatapouri. Dean Savage and his team at Tatapouri Dive had built artificial penguin boxes and placed them along the shore to help protect the birds. Two pairs were nesting under the cottage 100m west of the Tatapouri boat launch ramp and 2 pairs were found within the rock wall south of Tatapouri Dive. Another pair had burrowed into the eroding sand wall at the top of the beach between the boat ramp and Savages property. Several pairs were located at Wainui and Makarori nesting under houses. A pair was located at the whale grave at Wainui and another single bird recorded by Jed McKenzie below the pied shag colony at south Makarori Beach.

Fig 3: Dr Colin Miskelly, Te Papa Curator of Birds with a kororā chick found by 'Tui' an Ecoworks NZ detector dog.

Overall blue penguin numbers in these coastal residential and city boundary-farmland sites appears to be low which is not a surprise as domestic dogs owned by Wainui and Makarori residents are found off lead and wandering these beaches at all times of day. This would have had a significant impact on blue penguin accessing moulting roosts or breeding burrows over the years. Anecdotal reports support this also.

During the 2004 survey several Gisborne beachside residents recalled that blue penguin were common under houses 10-20 years ago but are no longer seen or heard. Blue penguin were once common at Tatapouri however during 2004 now appear to be rare (Bevan Waghorn, *pers. comm.*).

During 2004 Kim Dodgshun, Station Manager, Young Nicks Head mentioned that blue penguin were also once found on Young Nicks Head however they had become extirpated (prior to the current penguin recovery and pest control programme commencing). Seabird detector dog and spotlight searches were undertaken on Te Kuri a Paoa with no result during 2004. A likely result of habitat loss, burrow collapse from cattle grazing and predation by ferret.

During 2021 a mail out survey was undertaken by teachers Jodie Saunders and Leah Wilkie and students from Wainui Beach School. Fifty-eight residents between Wainui Beach and Pouawa replied to a series of survey questions to understand how abundant kororā were within the Wainui area and the immediate surrounds. The questions asked included:

-Have you seen a Little Blue Penguin:
-What time of year/ day did you see it?

-Where did you see it?
-What kind of condition was it in?
-Approximately how long ago did you see it?

The results were mixed. Most penguin observations were of dead individuals on Wainui and Makarori Beaches. Comments that 'penguin were once under our house but are no longer heard or seen' were common. Several residents collected penguin and moved pairs to other areas such as Waikanae Beach. One pair was translocated to Mahia! The consistent theme from this survey was that dead penguin were found on beaches regularly and over multiple years. Indications were that roaming pet dogs had killed these individuals. Several have been recorded dead on the road at Tatapouri resulting from vehicle impact.

Fig 4: A kororā on Oneroa Beach on 13/2/22. A juvenile suffering from exhaustion which could easily have been mauled by a dog if not collected. This bird was sent to Napier Aquarium for rehabilitation (Photo Credit–Manu Caddie).

As with the Ecoworks NZ survey during 2004 the Tatapouri Dive site and adjacent area appeared to be the location where blue penguin were most successful however at this stage this is still a very small breeding group of c.7 pairs (resident's comment). The general indication is that blue penguin numbers had reduced between Wainui and Pouawa since 2004 and we believe this is likely due to the number of roaming domestic dogs which are prevalent on Wainui and Makarori Beaches all year. This added to low levels of ferret predation on coastal farmland between Okitu and Pouawa which is not trapped. Some trapping is underway on Turihaua Station which will assist any remnant kororā.

During 2002 John and Amy Griffin of New York purchased Nicks Head Station (Te Kuri a Paoa). Ecoworks NZ was asked to work in coordination with Thomas Woltz (Woltz & Byrd LLC) to design an environmental restoration programme. This included the restoration of over 26 native species including blue penguin which was once present at this historic site.

Coastal beach zones were stock fenced for the first time and planted with eco-sourced indigenous tree species. Extensive predator control for mustelids, feral cat, lagomorphs, possum and rodents was initiated and artificial nest boxes were installed for blue penguin. During 2004 solar powered acoustic playback was installed at Orongo Beach. Up until this date no breeding had been recorded and only occasional penguin presence was recorded during the annual moult phase.

Once the social attraction system had been installed blue penguin remained onsite and began to breed the following season. The development of this world first project has taken 18 years and building blue penguin numbers has been a slow process. We believe at least 20-25 pairs now breed on Te Kuri and with the extensive coastal planting which has included over 600,000 native trees, the protection of over 11 kilometres of coastline, total stock exclusion from coastal beach areas and 1500 hectares of intensive pest control and working alongside our Ngai Tamanuhiri whanau a blue penguin sanctuary has been created which will continue to build in size over time. Dogs are also excluded from these penguin nesting areas.


Figs 5-6: Te Kuri a Paoa – Young Nicks Head Coastline now protected with over 600,000 eco-sourced trees, pest control and predator exclusion fencing holds seven pelagic seabird species including Kororā, sooty shearwater, grey-faced petrel and fairy prion– Ecoworks NZ.

Ngati One One and the Whaia Titirangi Team with support from GDC and DOC have also undertaken fantastic work to protect this taonga species, the kororā. Both habitat restoration on Titirangi and the deployment of predator control and public relations efforts around managing domestic dogs will continue to support kororā recovery.

The local ferret population also appears to have reduced over time which will benefit blue penguin. Ferret capture rates appeared to be higher within mustelid trap sets within the Motu Kiwi Recovery Programme and Turihaua Weka Project during the late 1990-early 2000's. We now see 1-2 ferrets captured per annum at Motu throughout the same 1000- hectare trapping kiwi protection zone. The same trapping area, trap design and baiting regimen as used during the late 1990's. Rabbits are uncommon now and the ferret population appears to have followed suit.

On Nicks Head Station ferrets are an uncommon catch, 486 kill traps currently operate producing 15,000 trap nights per month. Between January 2003 and December 2020, 35 ferrets had been captured, 421 stoats, 482 weasels and 1,008 feral cats. A total of 35, 995 pests in total had been removed from 1500 hectares. This has allowed multiple species to recover within a coastal landscape setting.

These projects combined with the current work undertaken by Ngai Tamanuhiri at Te Wherowhero and Kopua Farm and other projects coming on stream will potentially see an increase in blue penguin numbers within the Muriwai-Kopua coastal zone (right).

3.1 Eastland Port Limited - Onepoto – Current Status.

During November 2021 a canine detector dog survey was undertaken by Eastland Port Limited who contracted experienced conservation dog handler Joanna Simm and her dogs 'Rua' and 'Miro' to search the port revetment wall for penguin sign. Jo has been involved with kororā management and dog searching at Napier Port for many years and has worked on some of the worlds most endangered seabird species at sites such as Great Barrier Island and Maui, Hawaii.

A total of 18 detections were recorded by Jo and Rua. Detections were made across all sections of the revetment wall. Upper and lower tiers and both old and new sections of the wall. Nine individual

kororā were sighted. Jo believes others were onsite, however were well hidden amongst the rock wall.

Fig 8: Locations at EPL southern log yard where kororā were identified by Jo Simm and search dogs Rua and Miro (Map Courtesy of Dabchick NZ -Jo Simm).

It is possible that more kororā were utilising this site prior to the de-construction of the old revetment wall and the associated vegetation cover. It appears that this site had established as an excellent blue penguin habitat due to reclamation debris being deposited many years ago, it was also a site largely protected from human and domestic dog disturbance. It is impossible to tell how many pairs have been disturbed since 2020 as a standard baseline survey was not undertaken prior to the de-construction work occurring. Pelagic seabird species such as kororā and petrel often have considerably larger numbers of individuals utilising a site than is often recognised by site managers. Napier Port is an excellent example of this with many more kororā present than they realised early in the project possibly due to the cryptic nature of visiting nocturnal seabirds. Petrels can be similar, the number of leg banded individuals visiting a site often far exceeds the known number of breeding pairs as differing age cohorts and breeding status individuals are utilising sites alongside resident breeding pairs. Kororā can nest in high densities within optimal rocky coastal sites, as has been recorded at many locations around New Zealand. They can be colonial nesters and pairs will happily nest only metres from each other if nesting cover is suitable, i.e. Motuhora Island and Young Nicks Head.

It appears that the significance of blue penguin at this site was overlooked throughout the resource management consenting process. Eastland Port Limited staff should have had the appropriate conservation management advice and operating procedures provided to them from the outset by experts. This would have ensured that this species was fully protected during the revetment de-construction phase.

By following standardised and well recognised survey methodology which has been in place for many years, and the inclusion of experienced seabird managers from the commencement of the project; the information flow and processes would have been in place to ensure full protection of resident kororā. Particularly as this species is fully protected and categorised as 'Threatened' by the

Department of Conservation and has a status described as 'Declining'. In fact this threat status is in our view, a 'best guess' for our region as we have no population trend data for a very large part of the Tairawhiti and in fact much of the New Zealand coastline. Therefore with this data deficient situation we are currently in; the kororā maybe significantly more threatened than we realise on the East Coast.

When we accumulate the potential threats facing blue penguin; including climate change, natural sea temperature variations and seasonal food availability, ferret predation, domestic dog predation, loss and modification of habitat, human interference, and natural mortality it is obvious that the kororā are threatened and will become increasingly conservation dependent over time.

4.0 Eastland Port Limited Aims and Objectives

This project aims to provide ongoing protection for visiting and nesting kororā as well as other protected species at the EPL -Onepoto site. This may include visiting fur seal, white-fronted and Caspian tern, cormorant spp., black-billed and red-billed gull or other native or endemic protected species.

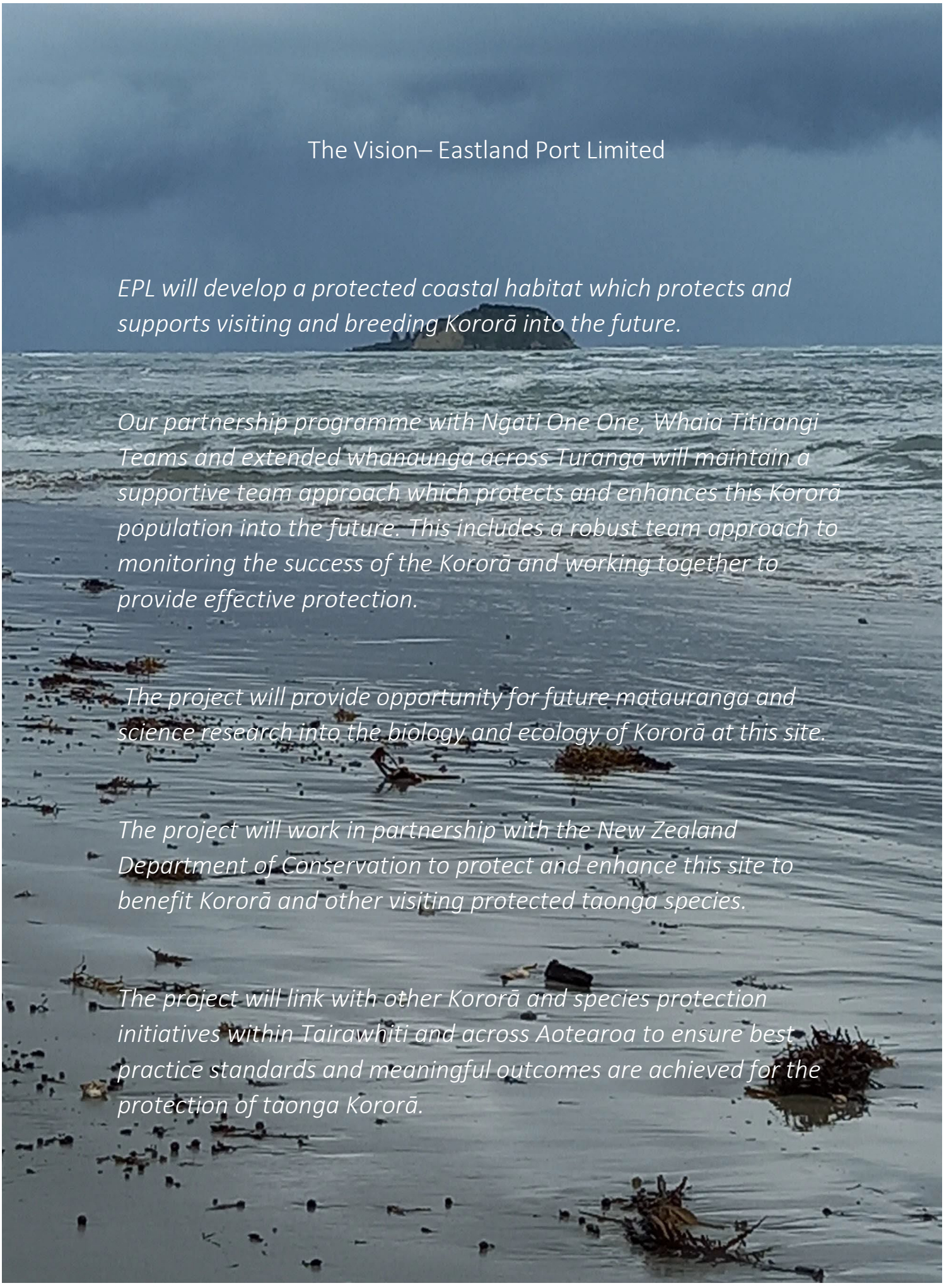
This project aims to contribute to the recovery of kororā within the Tairawhiti region by increasing the extant number of nesting penguin pairs at EPL – Onepoto. This site has the potential to make a significant contribution to Kororā protection and recovery within Turanganui a Kiwa.

The project aims to record a 5-10% increase in the number of nesting pairs per annum and achieve a >90 % fledging success rate for kororā chicks.

This will occur by:

a. Implementing best practice pest control.
b. Implementing best practice seabird management methodology, including experienced seabird specialist's and undertaking the field management and monitoring of this species and passing this experience onto our taiao kaimahi rangatahi teams.
c. Working alongside hapu, whanaunga and community groups across Tairawhiti to ensure information flow continues, matauranga opportunities exist and project inclusion continues within the management of this site. To ensure these key factors are ongoing into the future.
d. Linking with the Department of Conservation to manage wildlife authority permissions guidelines and management processes going forward.
e. Working with Gisborne District Council, DOC and the community to ensure local by-laws pertaining to dog control are strengthened and maintained within the Onepoto area.
f. Linking with seabird management specialists and other projects across New Zealand such as Napier Port Penguin Project and Oamaru Penguin Project to share and contribute to kororā recovery.
g. To work with local communities to promote kororā conservation and their protection at Onepoto and at other sites within Te Tairawhiti.

Fig 9: Kororā Location Summary - Anecdotal and confirmed recent kororā sightings documented by Ecoworks NZ, Wainui School, Jo Simm, Jordan Hawaikirangi-Tibble and Department of Conservation, Gisborne Office within the Turanga-Tatapouri Area.



The Vision– Eastland Port Limited

EPL will develop a protected coastal habitat which protects and supports visiting and breeding Kororā into the future.

Our partnership programme with Ngati One One, Whaia Titirangi Teams and extended whanaunga across Turanga will maintain a supportive team approach which protects and enhances this Kororā population into the future. This includes a robust team approach to monitoring the success of the Kororā and working together to provide effective protection.

The project will provide opportunity for future matauranga and science research into the biology and ecology of Kororā at this site.

The project will work in partnership with the New Zealand Department of Conservation to protect and enhance this site to benefit Kororā and other visiting protected taonga species.

The project will link with other Kororā and species protection initiatives within Tairawhiti and across Aotearoa to ensure best practice standards and meaningful outcomes are achieved for the protection of taonga Kororā.

5.0 Management Action Plan

The ongoing protection and management of kororā at Eastland Port requires a number of key actions. Some of these actions were instigated during 2021. Most of the following action points will be implemented during 2022 and ongoing collaboration will occur with key project partners.

The following table outlines these key actions and the associated timeline which is required to achieve optimal outcomes. These actions are described in further detail on pages 15-40.

Table 2:

Action	Notes	Timeline
1. Community Partnership Programme	Working with Ngati One One, Whaia Titirangi, Department of Conservation, Gisborne District Council, Local Residents, whanaunga across Turanga.	2021 -Underway and Ongoing
2. Kororā Population Survey & Monitoring	Seabird detector dog teams contracted annually to monitor penguin densities along port seawall and Titirangi toe slope. Camera trap monitoring.	September-Oct + if revetment development is occurring
3. Collection and Necropsy of Kororā Mortalities	Any mortalities are collected to be necropsied by Massey Wildlife & Veterinary Hospital to determine cause of death.	Ongoing when and if required
4. Management Plan	To guide the protection and recovery process following national best practice standards.	Completed by 1/4/22
5. Obtain DOC Permissions Authority Permits	Allow translocation of potentially at risk kororā to safe burrows and to allow chick productivity monitoring of Kororā at Eastland Port.	Submitted to DOC Permissions June 2022
6. Penguin Fence Construction	Penguin & ferret proof fence to prevent ingress of kororā into Southern Log yard and possible ferret access to the kororā colony site.	Completed by 15/7/22
7. Penguin Access	Ensure penguin access at low tide is possible at multiple locations.	Completed by 1/7/22
8. Predator Management & Monitoring	Deploy predator management hardware in the field. Ecoworks NZ to assist with operational training, sourcing and deployment with Whaia Titirangi Camera trap monitoring and tracking tunnel indices to record pest densities.	Equipment deployed June 2022
9. Installation of Penguin Nest and Roosting Boxes.	Installation of protected breeding burrows which are insulated against over-heating, vehicle and human interference.	Installed June 2022
10. Future Construction Operations	Managing Kororā pre and post construction, repairs or upgrade.	Ongoing if and when required.
11. Seasonal Kororā Monitoring	Pair distribution, camera trap monitoring, record reproductive success of extant pairs both within wild and artificial nest locations.	Commencing July 2022
12. Annual Reporting	Summary of penguin productivity, community involvement, population monitoring, predator management summaries, penguin chick productivity and survivorship.	Ongoing

5.1 Community Partnership Programme

This programme will be ongoing into the future and will expand and extend multiple relationships and therefore the positive benefit for both the kororā population at Eastland Port and surrounding coastal areas. This programme will have significant benefit for our community including kura within Turanga and the many rangatahi involved within the mahi o te taiao programmes currently underway within Turanga and the wider Tairawhiti Region.

Taonga species such as kororā are significant to our region and contribute to a species ecosystem richness which was once abundant across Tairawhiti prior to the arrival of humans approximately 800 years ago. The majority of indigenous habitats across Tairawhiti are now either functionally extinct or at best highly modified. The introduction of vertebrate pests beginning with the kiore and kuri and followed later by Norway rats, mustelids, feral cat and ungulates has created an alien landscape for most of our native species.

Protected micro-habitats such as the breakwater and rock-wall log yard construction at Eastland Port unintentionally become biodiversity hot-spots or 'Ark's' for species such as Kororā.

This project will protect and enhance this site by implementing operating procedures around Kororā , reducing predator impacts, i.e. ferret and by providing safe roost and nesting habitat for Kororā within the structure of the port. By working closely with Ngati One One, the Department of Conservation, seabird ecologists, local kura, hapu and whanaunga within the region there are multiple opportunities to link our community into meaningful and hands – on marine and biodiversity conservation.

Having a thriving Kororā population linked with the collective mahi undertaken on Titirangi and other nearby sites by our communities we rapidly build pride, ownership, mana and respect for the people, places and the taonga species within them. This exciting project has the ability to achieve this outcome.

A wide range of opportunities will build with this project over time as we have seen with the Napier Port Project. This will include engagement from kura, the opportunity for Ngati One One to oversee the in-situ management of this species, build species management skills and experience and hold wananga which will bring others into the programme. These projects build knowledge around biodiversity management, matauranga values and experience for the wider community and whanau.

Fig 10: Linking communities with the protection and recovery of taonga species such as Kororā, kiwi and tuatara has incredibly positive benefits not only for the species you are protecting but also the people. Tipare Wharepapa with a Tairawhiti kiwi.

How will this happen?

March 2022 – Advice will be sought from Ngati One One representatives regarding kororā management, the history and significance of kororā at Onepoto as well as within Titirangi ngahere and any local knowledge, experiences and future aspirations for this taonga. This input will form a key baseline for direction going forward into the future. The values and expectations from Ngati One One

and other whanaunga across Turanga which will contribute to the development of this kororā programme.
May 2022 – Detector dog monitoring programme during minor excavator works to be completed prior to the installation of new and improved roost and nest boxes.

June 2022- Titirangi Kaimahi for Nature personnel will be involved with the deployment of mustelid and rat control equipment with Ecoworks NZ which links into the current vertebrate pest operation on Titirangi.

June 2022 – Titirangi Kaimahi for Nature personnel will be involved with the installation of 20 kororā nest and roost boxes extending along the upper rock-wall working with Ecoworks New Zealand.

October -November 2022 – Deployment of remote camera monitoring and detector dog search monitoring to identify and record nesting blue penguin pairs. This will add valuable information to the baseline data set and allow us to record population trends over time.

April 2023 onward - Annual Pakeke hui and updates as well as a summary report on Kororā productivity, pest control summaries and general kororā management activities.

Fig 11: Muriwai Kura Kaupapa students install Kororā nest boxes at Te Kuri a Paoa – Nicks Head, Gisborne (*Photo* -Ihipera Whakataka, Principal, Muriwai Kura)

5.2 Kororā Population Survey & Monitoring

Annual population monitoring is vital. This allows us to measure whether the conservation management effort is successful or not. It also allows us to record the rate of population expansion and what we can do to enhance or ensure that what we are doing is as effective and efficient as possible in terms of methodology, labour effort unit and financial investment.

Monitoring will include:

a) Detector Dog Searches
b) Camera Trap Monitoring

5.2.1 Detector Dog Survey and Monitoring

Detector dog monitoring will be undertaken annually during September-October to identify and GPS waypoint (NZTM) nesting pairs and individuals amongst the rock wall structure. Detector dogs are trained to sit or indicate when a target has been located. Over time we should begin to record an increase in the total number of pairs nesting along the seawall.

Pelagic seabirds have a strong scent signature which is easily detected by a dog's nose. Often single or pre-breeding penguins will be located by the dog however further inspection by the handler with a headlight or camera phone can often determine whether a breeding pair is present or not. Trail cameras can also be deployed at a later date to assess the breeding status of individuals in difficult to access locations, burrow-scopes are an additional and effective tool.

Due to this site being a largely dog, vehicle, ferret and human free zone we should record a steady increase in penguin pairs. Pre-breeder survivorship in blue penguins is low (c. 70% mortality, DOC 2010) however over time it is likely we will see an increase in penguin density.

Figs 13-14: Conservation dogs are a highly effective way of determining penguin presence and density without human search bias. Above Left – Tui (Ecoworks NZ) locates a blue penguin burrow in dense grass sward 100 metres above the coast on Mana Island, Jo Simm working in lava fields at 10,000 ft asl on Mt Haleakala, Hawaii searching for Hawaiian Petrels (*Ecoworks NZ Photos*).

5.2.2 Camera Trap Monitoring

Camera monitoring is an effective observation tool for blue penguin and other seabird species. Penguin however do seem to know the cameras are there. Petrels, penguins, shearwaters and prions arrive at their burrows after dark therefore observing behaviour and estimating population densities can be challenging.

Fig 12: A kororā using a communal access track on Young Nicks Head Station, Gisborne.

Often blue penguin will use a primary access route to enter and exit a colony site to and from the tide line. In some areas these tracks are used over many generations, and we have recorded significant tracks cut into hard bedrock formed by many generations of seabird using the same access route.

Camera trap monitoring used at specific times of the year and over a consistent period can provide a relative index of abundance for a variety of species. This is often difficult to gauge over 1-3 years, however consistency over multiple years will start to form an indices of abundance for your selected target species, in this case kororā.

Camera trap monitoring should be carried out at five locations on the sea wall between mid-September and mid-October annually. These sites should be permanently marked so they can be located easily in consecutive years with the photo-point bearing recorded. Setting up remote cameras can be quite an art form! So some advice from an experienced person is advisable so that effort is not wasted.

Another option which allows for excellent observation of pelagic seabirds is to use thermal imagery. This has been used by Ecoworks NZ at a number of sites within Tairawhiti and in Hawaii and has been an effective tool to record grey-faced petrel, sooty shearwater, blue penguin and kiwi activity at remote sights and when no moon is present.

Fig 15: A group of pre-breeding grey-faced petrel (*Pterodroma macroptera*) at Young Nicks Head, Gisborne, July 2021. Observations made using a thermal camera allow us to estimate number of individuals present which is otherwise impossible with fast flying nocturnal procellariiformes.

5.3 Collection and Necropsy of Kororā Mortality

Under the Wildlife Act 1953 the kororā is a protected species. The Wildlife Act is administered by the NZ Department of Conservation. Anyone wishing to handle, catch or hold, release or kill, hold for rehabilitation or hold kororā in captivity is legally required to hold a Wildlife Authority Permit from the Minister of Conservation.

We expect that there will be very few threats to kororā safety once the penguin fence is installed and predator control is deployed. However in the event that a dead kororā is located the project will continue to work closely with staff from the Department of Conservation, Gisborne Area Office to monitor, record and notify within 24 hours any recorded kororā deaths within the scope of the project itself.

The Department of Conservation will forward any recovered kororā for necropsy to Wild-Base Hospital, Massey University.

Kororā Death – what to do?

Contact the Project Manager - Daniel Kingsford at Eastland Port +64 6 868 5129
Cell - +64 27 883 0068
Eastland Port Limited Office - No. 2 Crawford Road, P.O. Box 1048, Gisborne 4040 | eastland.nz

Collect the bird ensuring personal protective equipment (PPE) is used to protect yourself.

Collect and or photograph any evidence in the area which may indicate cause of death. Treat it much like a crime scene. Often dogs, cats and mustelids will leave sign of their presence, i.e. fur balls, hair, footprints in the sand and bite marks to the rear of the cranium etc. which indicate possible cause of death. The softer pelvic bones such as the cranium and sternum will often reveal dentition patterns which can help identify the predator species involved. This can be difficult to do in the field so collect all available evidence at the site.

Fig 16: Kororā killed by roaming dogs. DOC Ranger, Nicky Armstrong, with five dead blue penguins, West Coast, (*Photo Credit – Department of Conservation*).

If the kororā has been killed only recently, swab the area around the wound with a cotton bud and store the cotton bud in a clean plastic bag because the DNA in the saliva of the killer may identify the culprit down to species level. Individual dogs can also be identified (e.g. to determine if one dog or ferret is decimating a population). These saliva swabs can be analysed by Ecogene - ecogene@landcareresearch.co.nz; (09) 574 4225. DNA swab kits are available from Ecogene.

Discuss with DOC staff regarding who will contact Wildbase Veterinary Hospital and arrange shipment of the bird to Massey for necropsy. Also fill out and email a wildlife submission form. This is available at:
www.massey.ac.nz/massey/fms/NZ%20Wildlife%20Health%20Centre/huia_submission_form.pdf

All kororā deaths will be necropsied. This is a tool which can provide valuable information regarding cause of death and whether the project can do anything to prevent this from occurring again in future.

5.4 Management Plan

This management plan will link closely with the DOC Wildlife Act Authority and therefore this plan should be reviewed and updated at ten yearly intervals which is consistent with the term of the wildlife authority.

This should include a review of the project with Ngati One One Iwi, hapu and whanau which includes discussion on the successes and failures recorded and any fine tuning which may be required in future. The Department of Conservation or other seabird specialists should also be included within this process.

5.5 Obtain DOC Permissions Wildlife Act Authority

A key aspect of any species recovery work is information flow to project partners and liaison with iwi and hapu, DOC species management specialists, landowners and community.

During the initial project set-up and permitting process, consultation is undertaken with iwi and hapu, Department of Conservation staff, landowners, project sponsors and a range of other interested or involved community groups and individuals. It is important to remember as the project progresses and time goes on that these key people that were supporting the project initially need regular updates and involvement going forward.

We are basically all after the same result - great conservation outcomes for our biodiversity. By involving community the project will continue to maintain a robust support base, community ownership and support the kaitiakitanga of this and other species.

An 11a Wildlife Authority outline and application will be submitted to DOC Permissions, Hamilton during 2022. This will seek a maximum 10-year permit to ensure that project managers have the ability to work with the Department to re-locate any individual kororā which is potentially at risk, to a safe penguin roost box on the port rock wall. This should be an uncommon occurrence however there maybe instances in future where kororā have transited outside the revetment wall area, around the fence or port area and are found within the log-yard, on Kaiti Beach Road or have been injured by wandering domestic dogs. This translocation authority will give project managers the ability to work with DOC Gisborne and local veterinarians to coordinate the re-location of these individuals into a safe artificial nest box during daylight hours so that they can then exit back out to sea the following night. The key here is good communication between key people and good advice from DOC staff and seabird specialists.

To ensure the project has a continued team approach to managing kororā the project will maintain the following:

1. Annual Summary Report to DOC and Ngati One One– As part of the initial permit sign-off process with the Department of Conservation and Ngati One One it is important that the project produces a summary report for kororā each year. The best time to complete this is April. This is between seasons and a time when nesting and moulting effort is generally completed. The summary report will include all aspects of kororā management and include plans for the following season. This should be a team effort between the project advisor and Whaia Titirangi staff.

2. Annual Planned Kororā Hui with DOC Staff and Ngati One One– This should take place once the annual report is completed and prior to the commencement of the following season. This meeting will take place during the first two weeks of May each year. This is an opportunity to review the annual report, project progress and to discuss the overall direction for the up-coming season and any longer-term future plans.

3. Ongoing Korero with Key Partners - This ensures ideas, aspirations and opportunities all have the ability to link with the project. A team approach to protecting this taonga species is very valuable.

5.6 Penguin Exclusion Fence Construction

One of the key steps to protecting kororā at Eastland Port is the installation of a penguin proof fence to ensure kororā do not access into the southern log yard where heavy machinery is operating or where they have access under stored log piles which are then transported to waiting ships for export.

Two options were considered regarding the alignment of this fence. Figure 17, pg 21 outlines the preferred option. Option 1 considered running the line long the top of the grass bund wall. However there is high risk involved here which would impact the integrity of the fence when logs are being stored or moved within the yard there is potential for logs to damage the fence at this location. There are also access ramps and gates from the log storage yard up onto the wall. Overall this was determined to be an impractical line to establish the fence.

Fig 17: Penguin exclusion fence proposed line at Eastland Port.

The penguin exclusion fence will extend 260 lineal metres, along the top of the rock wall and will be located 1.5 metres out from the top of the revetment rock. This will allow suitable width to install 20 penguin nest boxes in year one positioned on the seaward side of the road at the top of the wall. This fence will run parallel with and along the south-west side of the existing access road (Fig17).

Fig 18: Aerial view of the Southern log yard revetment wall and proposed location of the penguin fence.

This penguin habitat area is largely limited to the 260 lineal metres at the southern end of the Southern Log Yard seawall. Korora have been detected within the northern portion, or remainder of the seawall however this area is not an optimal site to establish permanent penguin habitat due to its susceptibility to storm surge and exposure to increased wave activity from the open sea. The northern portion of the seawall frequently experiences wave overtopping throughout the year. This area is identified as the portion which has protection rock on the log yard side of the wall to prevent scour and sediment erosion from these waves.

The southern portion of the seawall is largely protected from increased wave height due to the buffer effect of the Onepoto wave platform which is exposed at low tides and extends out into the bay approximately 100 metres. This area does not experience large wave activity or over topping and consequently vegetation is able to be established here along with protected korora nesting and roosting habitat.

The full length of the revetment wall will be managed in accordance with the relevant Wildlife Act Authority to ensure full protection is given to blue penguin throughout this site.

The existing road access will be used during the development phase of the new reclamation area at the northern end of the yard throughout 2023. Once completed this access road will be used only for occasional maintenance and access to the kororā colony area for monitoring and maintenance (D. Kingsford, *pers. comm.*)
The penguin fence design will be very similar to the successful design used at Napier Port (right). After discussion with Paul Rose, Napier Port Environmental Advisor, this design has worked very well and is proven to work well for kororā.

The design will include 50mm galvanised capped pipe frame with a 25 mm aperture mesh. This will extend from ground level to c.800mm in height. The fence will also have a UV resistant shade netting attached which acts as a visual barrier for Kororā , similar to the Napier Port design. Paul Rose mentions that the shade netting is very effective and creates a visual barrier therefore eliminating the need for kororā to try and push through the fence. This will contain kororā on the seaward side of the EPL access road. The fence will also have a 400mm wide apron which will be covered with road metal to reduce any potential entry by ferrets and ensure no digging under the fence is possible by kororā. Ferret traps will be run along the outside (southern log yard side) of the fence where penguin can not gain access to trap boxes.

Figs 19-20: Napier Port colony site showing the penguin fence which prevents kororā exiting the colony and entering vehicle access areas (*Photos Supplied – Paul Rose, Napier Port*)

Mustelid double set traps and DOC 250 single sets will be run along the road side of the Gisborne penguin fence in the event that ferret or stoat pass through the predator trap halo outside the port area to the kororā nesting area. Permanent and lockable rodent bait stations will also be run along the seaward side of the fence at 50 -metre spacing to maintain Norway and ship rats at low densities. Feral cat control may be required at times (refer pg 23) and wandering dogs will be excluded as the new perimeter fence is constructed by Eastland Port.

5.7 Penguin Access

Kororā are excellent climbers and jumpers. We have recorded this species accessing very difficult boulder coastline habitats on Motuhora and the Chatham Islands where sea conditions are generally extreme.

We have recorded kororā accessing steep mudstone faces at Orongo Beach on Nicks Head Station (right) and climbing over 100 metres in height to the top of southern Mana Island in Wellington to access nesting burrows. Some nesting colonies have only 1-2 access points and many individual kororā will use the one entry point and then walk several hundred metres to access their burrow.

Fig 21: Kororā prints on an almost vertical face at Orongo Beach, Tairawhiti. Many kororā use only three entry points to the colony site.

Currently kororā appear able to access the upper parts of the Eastland Port rock wall. Approximately seventeen penguin detections were made by Jo Simm and seabird dog 'Rua' during November 2021 along the length of the wall. Nine kororā were seen by Jo, Rua indicated another 9 locations where kororā were either hiding or had been residing recently.

Fig 22: Eruera Ria from Ecoworks NZ measures the front face of the akmon toe blocks at low tide.

Some additional remedial work will be carried out at the base of the Akmon blocks to ensure kororā access is as simple and safe for the birds as possible. This would entail re-positioning boulders at strategic locations and monitoring this as part of the overall project to ensure particularly at low tide that kororā can access from the wave platform up and over the concrete pre-cast akmon blocks. These inter-locking pre-cast concrete blocks have a mean face height of c.500 mm. Between the blocks however there is area for kororā to jump and gain access from the wave platform up onto the rock wall.

Additional remedial work will be undertaken throughout this site to remove some of the old steel. Some of this work will take place during May 2022. This is a safety issue for both staff, detector dog teams and the penguins themselves.

5.8 Predator Management

The last thirty years has seen a major shift in ecosystem and species management. We have a much greater understanding regarding the impacts of vertebrate pests on our endemic biodiversity, how to control these pests and what level of control is required to protect many threatened species and ensure recruitment of progeny into breeding populations.

Conservation managers across Aotearoa lead the world with their pioneering island eradications, endangered species translocations and general ecosystem and species management.

We have a much greater understanding of vertebrate pest ecology, density and dispersal and what level of control or ongoing population management is required to maintain pest densities at specific target levels, i.e. ship rat indices at 10% to increase North Island robin. There have also been major advances in the development of trapping technology, bait design and its presentation to the target pest species. This research and development is ongoing, i.e. Goodnature, SA traps, Spitfire, Pest Free NZ, ZIP Foundation etc. Modern pest control programmes have to be flexible and willing to adapt to changing best practice methodologies being developed worldwide but largely here in New Zealand as we aim for predator free status in 2050.

The following information outlines the current recommended methodology for pest control projects, with site specific controls and targets for kororā at Onepoto managed by Eastland Port Limited in association with Ngati One One.

5.8.1 Feral Cat

Feral cats pose a significant threat to New Zealand's endemic wildlife. They prey on a wide range of species including forest birds, petrels, skinks, geckos, saddleback, weta, native fish and are considered a threat to Kororā chicks (Port Taranaki 2016).

Cats are long lived and can hold a large territorial range. Radio tagged male cats in the Whitikau Valley near Opotiki were recorded to have a territory of c.350 hectares (*Ecoworks NZ Ltd*., 2004). The largest feral cats captured at Motu have been recorded to weigh well over four kilogrammes. One caught at Lake Waikaremoana during 2003 weighed 6 kilogrammes (P.Hodgson *pers. comm.* 2005).

Live Capture Cage Trapping

Cage trapping is an effective tool and optimal where sensitive non target protected species are present. Cage trapping should be undertaken using either a large Havahart 'treadle' trigger design trap or a large standard possum trap with a bait hook. The bait used should include pilchard or an oily fish bait equivalent inside a leg stocking and tuna fishing lure oil applied to the bait. The tuna oil should also be applied to an adjacent high point where the wind will carry scent. Pre-feed using the same fish or cat biscuits should also be used in the area within twenty metres of the cage trap. This pre-feed builds the target cats confidence until it gets to the mouth of the cage where he gets an additional feed and then into the trap.

Cage trapping is preferable at this site due to the number of EPL staff and possibly members of the public present. When feral cats are detected by remote camera or are sighted by EPL staff an SA kill trap on a raised ramp or a live-catch cage trap could be deployed to ensure inquisitive kororā are in no way injured. Some feral cats will not enter a cage trap therefore an SA trap is an effective option.

Fig 23: A feral cat enters a 'Havahart' cage trap with a disguised floor treadle trigger which ensures a humane catch method for feral or domestic cats.

Steve Allen (SA) Trap

Traps are set at the top of a wooden ramp. The ramp is an 800mm length of 150 x 25mm H3 radiata. It runs at a 5-10º angle and extends from the tree with the lower end bugle screwed into the top of a 50 x 50mm tanalised wooden fence batten driven into the ground to a depth of 200mm (Refer photo attached).

Fig 24: A correctly positioned raised feral cat set.

Baits include either finely chopped pilchard, minced chicken pet food; seafood flavoured tinned cat food, or minced rabbit/hare. Another option includes peanut butter and dry cat food such as 'biscats' (Steve Allan, *pers. comm.*). The fish-based baits should have tuna fish oil applied to them. A small quantity of bait is positioned in front of the trap as a pre-feed and lure. The majority of bait is positioned behind the trap trigger.

Pre-feed must also be laid on the ground below or in front of the trap and on the ramp leading up to the raised set itself. These traps are approved for use on feral cat by the DOC Animal Ethics Committee.

Warning Signage

Warning signs must be visible at public access points into the control area to warn visitors regarding the presence of cat control operations.

Trap Catch Recording

All trap catches must be recorded. Preferably on a trap catch Application. The data to be recorded must include:

1) Date Caught

2) Trap No. & Location

3) Sex

4) Any other relevant details, weight, colour, gut content etc.

Monitoring

Cat presence-absence monitoring is a simple task. Camera traps are ideal and will notify by cell phone when a cat is present and triggers a photo capture. Cat interaction frequency recorded via camera traps will be used at this site as a monitoring tool to record feral cat abundance and changes over time.

Outcome measures would include annual reproductive output of penguin pairs and whether feral cat impacts were recorded onsite.

Our experience with kororā suggests that cats are not a major threat, however some locations throughout Aotearoa have recorded cats being a significant issue for kororā.

Figs 25-26: Camera traps at Cape Sanctuary and James Camerons Project, Wairarapa detecting feral cats.

5.8.2 Rodents

Species identification

Four species of rodent are found in New Zealand.

- Norway Rat (*Rattus norvegicus*)
- Ship Rat (*Rattus rattus*)
- Kiore (Pacific) Rat (*Rattus exulans*)
- Mouse (*Mus musculus*)

Ship Rat

The ship rat is the most wide spread and abundant rat species in New Zealand. They are generally arboreal (tree climbers) and will nest above ground in the tree canopy where they prey on birds, invertebrates and reptiles. They also consume large volumes of seeds, berries, fruit and shoots. They are voracious predators and have been recorded attacking mature forest bird species such as kereru and kokako as well as seabirds, reptiles and invertebrates.

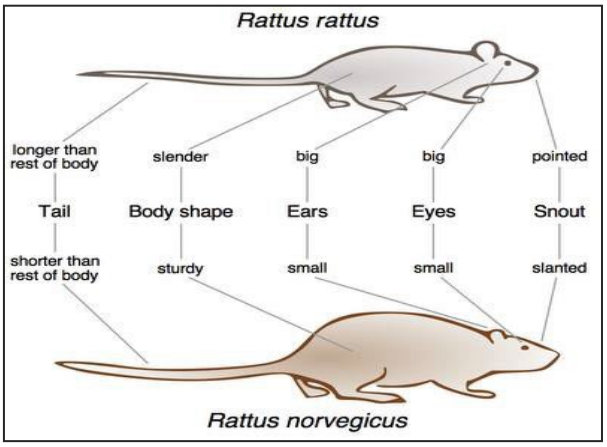
Norway Rat

The Norway rat is also known as the water rat. They are burrowers and can grow to over 500 grammes in weight and will likely be the most prevalent species found at Onepoto. They are predatory and feed on invertebrates, worms, gastropods etc. in or around waterways. They are poor climbers and are most abundant in warmer climates to about 400 metres a.s.l. They are avid consumers of bird's eggs and generally make up a large percentage of mustelid tunnel bi-catch species in coastal areas. They are distinct from ship rats in that they are generally larger and have a brown coat with crème belly fur.

They have small ears which hardly reach the eyes if pulled forward, the blunt nose profile and the thick tail which is less than the length of the rats body.

This species is thought to be one of the main reasons for the loss of many species on mainland New Zealand such as tuatara, saddleback and seabirds.

Fig 27: Norway rat –small ears, blunt nose, thick tail, a burrowing rat species.



House mouse

The mouse is most abundant in rank grassland sites where grass seed and invertebrates are plentiful. Though the mouse is small (c.30 g) it is a major predator of native skinks, weta and other invertebrates. The mouse does not pose a significant threat for Kororā.

Rat Control

Poison Baiting

Bait stations are the optimal control method at Onepoto. Baiting needs to be consistent and varied every 2-3 years with a mixture of bait types, i.e. Diphacinone, cholecalciferol, etc. Targeted control is undertaken to protect key biodiversity sites. The aim at Onepoto is to maintain low rat densities across the site to prevent potential impacts on eggs or young chicks. Cereal based poison blocks would be used within bait stations. No kororā would have access to rat bait directly or would be secondary poisoned. No 1080 (monoflouroacetate) or cyanide would be used.

Trapping

Norway rats (right) are relatively easy to trap and many are captured in mustelid Fenn or DOC traps as they are highly attracted to the holed egg and or meat baits. They also take poison baits extremely readily so they are relatively easy to eradicate from an area.

Ship rats prefer more cereal based baits such as peanut butter and rolled oats. They also take cereal poison baits readily. However as a back-up and to be sure that all resident and transient animals are removed, Victor Professional™ snap traps are also deployed. The most effective trap set design is to position the Victor trap inside a wooden box. This directs the rat more precisely onto the kill plate. The traps should be double spring victors pro traps with a plastic yellow trip tab. These boxes also prevent non target damage, i.e. penguin.

Snap traps should be spaced at 50 metres for rats. Bait stations on a 50 x 50 m grid to ensure <1-2% tracking index. Radio collared ship rats at Maungatautari travelled several hundred metres per night to search for food so they can cover a large area. Ship rats in podocarp forest can reach densities of 20+individuals/ha. High ship rat densities appear to attract stoats to an area so maintaining low rat densities has a number of benefits.

Warning Signs

Warning signs must be visible at public access points into the control area to warn visitors about the presence of toxins, bait and kill traps operating.

5.8.3 Mustelids (ferret, stoat and weasel)

Mustelids have a significant annual impact on wildlife in New Zealand. Their prey includes invertebrates, reptiles, native fish, birds and even our endemic bat species. Stoats in particular are the primary predator of juvenile kiwi and many bird species. They can range considerable distances during their lifetime and stoat populations can grow to high levels following years of beech mast (seed) and subsequent mouse population eruptions.

The ferret (*Mustela furo*) is the most significant mustelid species in regard to impacts on kororā. Stoat and weasel are considerably smaller and prey items therefore are usually smaller also, i.e. passerines, lizards and rodents.

Stoats can swim several kilometres at sea, climb into mature forest canopy and are fast enough to capture a mature rabbit. They are aggressive and determined predators with a high metabolism which means they need a regular food intake. DOC estimates an individual stoat will make over 350 kills per year.

All three species of mustelid are present in Turanganui a Kiwa.

Trap catch rates peak between November and late January when juveniles are dispersing and again during April-May when target prey items are less abundant. Female mustelids in New Zealand breed from September onward. They will give birth to one litter of 4-9 offspring per annum. The females within the litter are impregnated by a male prior to leaving the nest. Therefore mustelid populations (particularly stoats) increase rapidly. During the following autumn and into early winter 90% of the year's offspring will die. Catch rates will generally slow during March with another rise in late May-June with hungry animals more likely to enter traps due to a reduction in invertebrate and rodent availability. Catch rates will slowly tail off over winter and begin to climb again during October the following year.

Trap Type

The most effective control method for use on mustelids at this location is the DOC 200 and DOC 250 kill traps (right). Ferret are the primary target at this site as they potentially have the largest impact on kororā. DOC 250 traps are placed as single sets.

Traps are baited with a single, holed hen's egg, erayz salted rabbit and either fresh rabbit or minced chicken pet food is also added. Single sets have become popular, this is largely because double set DOC traps can set each other off. Many managers have moved to using single sets to avoid this issue.

We believe a double set is more likely to catch the most trap shy mustelids. Particularly in sites containing high value native species such as kororā it is advisable to have the best possible trap design available, well baited and maintained to ensure loss of key adult breeding Kororā does not occur. In this case a combination of single set DOC 250 to control ferret and feral cats and Double set DOC 200's to target stoats and weasels will be deployed at Onepoto.

Wooden Set

The trap set is a wooden tunnel 600mm in length (800mm in weka areas). It is constructed of treated H3 radiata pine. Both 200 x 25mm for the walls and 250 x 25mm rough sawn H3 for the base. The box is screwed together using #2 square drive screws. The lid is made of 17mm plywood and cut 600 x 250mm. A warning sign must be stencilled on the lid with spray paint and in high visitor areas the trap boxes must be painted and presented to a high standard.

A plastic triangular track marker or cattle ear tag must also be screwed to the lid with the trap number on it (above). Cattle tags can be ordered from PGG Wrightsons with the printed number or code required for your traps. The 17mm ply trap box lid is screwed at diagonally opposite corners with a square drive 40mm stainless steel screw to prevent access to anyone other than the trapper. Treated ply is preferred as it does not buckle over time.

Netting Hole Size

In areas where ground nesting species such as kororā are present a double mesh screen is key. These screens also help direct mustelid's onto the 'trip plate'. Twelve- millimetre aviary mesh is stapled to each end of the tunnel using small fence batten staples and another screen is set 150mm inside the tunnel with a second mesh screen. An entrance hole is cut at the bottom corner of the outside screen (right), 5 x 5 squares in size. The inside mesh has a hole 5 x 5 squares also cut into the centre but positioned 3-4 rows high so that mustelids climb through the hole and land directly onto either the fenn or doc200 plate. I would recommend a slightly larger hole size at this site to allow easy access for ferret. It will be impossible for a kororā to access a double mesh screened trap set. An entrance hole aprox 75 x 75mm will allow access to all mustelids (including ferrets) and keep out protected wildlife.

In public areas a warning sign must be posted at entry points to the trapping block and the tunnels themselves should be attached to a tree or fence post with a chain and staple or coach bolt to prevent theft.

Trap and Tunnel Management

(1) Wooden tunnels must be set on a level surface. They must be firmly sitting on the ground and not able to 'wobble', as this discourages wary individuals.

(2) Trap lids must sit flat and firm. Buckled lids must be replaced and lids are screwed with a #2 square drive screw at diagonal corners, stainless steel in coastal areas.

(3) The traps must be set in the centre of the tunnel. They need to be placed on either side of the bait with springs on opposing sides of the tunnel. The traps must be positioned so that trap arms are 20mm away from the bait and sitting square in the box. Correct trap placement in the tunnel is vital when trapping stoats.

(4) A hen's egg is positioned dead centre of the tunnel. The egg sits in a 20mm hole drilled into a small piece of ply or a milk bottle lid and screwed to the floor of the tunnel. A hole must be placed in the top end of the egg before it is placed into the trap tunnel. Eggs should be changed every 2 weeks in summer and monthly in winter. Three bait types must be provided, egg, fresh rabbit and salted dehydrated rabbit (Erayz). Do not use fruit or fish etc. A rotten smelly egg will still catch mustelids.

(5) Trap tunnels need to be scraped clean of rat hair, hedgehog spines and other foreign matter, inside and out. Use a paint scrapper to clean the tunnel floor during each trap check.

(6) If using Fenn Traps the brass 'dog' and the hook must be lightly filed so it is free of corrosion and the trap trips efficiently under the lightest touch, i.e. a weasel.

(7) The galvanised trap plate must also be scraped clean with a wire brush, both top and bottom removing built up grime. The trap plate hinge and underside must be checked and cleared of cobwebs and other debris with a wire brush so that it operates easily. If the trap plate is not sitting flush with the trap arms when set it will require modifying. Even old traps can be maintained and will operate effectively if well managed.

(8) Set all Fenn traps extremely finely and on the very tip of the brass dog so that the lightest touch from a weasel is enough to trigger and catch quickly and smoothly .

(9) Again, the tunnel must be clean and clear of debris including grass at the entrance way, rat hair, hedgehog spines etc. Traps need to be kept clean and free of unwanted debris allowing unrestricted access for mustelids and so that they can see an easy escape route at the opposite end of the tunnel.

(10) Traps will all be painted and presented professionally with a warning stencil.

(11) All kills should be removed from the site. Leaving kills onsite feeds the predators we are trying to trap.

(12) DOC 200 traps do not require screwing to the trap box floor. They should be sitting so that they can be easily removed and cleaned. Wire brushed and reset and tripped to ensure they are catching effectively.

Trap Spacing and Placement

Trap Tunnels need to be spaced at a distance of 50 metres at this location as it is a high intensity management site with at least 15+ penguin detection locations within a 600-metre distance along the sea wall. Use a gps to get this spacing correct.

Traps must be placed in accessible and visible locations. Visual, olfactory and sound senses all play a role in attracting mustelids. Trap tunnels must be positioned on and run parallel with existing access tracks. In this case most sets will be positioned along the access road behind the colony site. Several traps will be placed between kororā nest boxes on the seaward side of the fence. These are natural routes which different animal species in the area will prefer to use.

Trap tunnels must be free of obstacles in and around the tunnel and more importantly the tunnel entrance. Place them where it is easy access for the trapper on a track or beside vehicle access. Walking up or downhill another 30 metres to a single trap is a waste of time and effort.

Also try and keep traps within a 'Trap Site', e.g. at 'Trap site 27' you may have a stoat set, an SA cat trap ramp and a rat bait station. All traps can be maintained by the trapper at one stop. All traps are within 5-6 metres of each other.

It is important to move a stoat trap every few months particularly if it is not catching, moving it just a metre or two can make a difference, strange but it works!

Trap Catch Recording

All trap catches must be recorded. The data to be recorded must include:

1) Species

2) Trap No. & Date

3) Sex & other features, i.e. bait used.

Species Identification

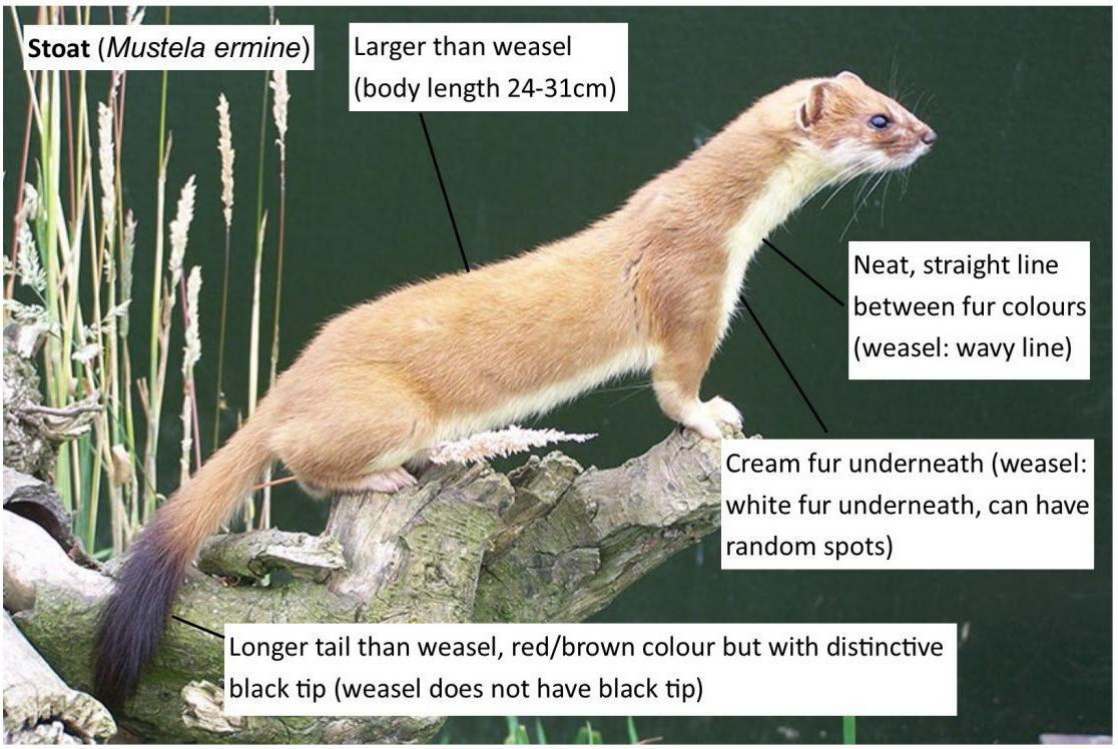
Ensure you can identify the three mustelid species effectively prior to commencing a trapping programme. Ferrets are the largest mustelid reaching lengths of 550 mm and are generally black and cream with a black facial mask.

Stoat (black tail tip)

Ferret

Weasel

Stoats are the next size down, they are chestnut brown with a white-crème belly and have a bushy tail with a black tip. The white belly fur forms a smooth lateral line along the body. Weasels are the smallest mustelid to be introduced to New Zealand they are similar to a stoat but have several discerning features. They are smaller than stoats, the cream-coloured belly fur forms an irregular lateral line along the body, and a weasel does not have a black bushy tail. The ears are also smaller and more rounded in proportion to the head



Mustelid Population Monitoring

Mustelid population indexing has been undertaken with mixed results throughout New Zealand.

Tracking tunnels are used to monitor mustelid presence and abundance. This has been proven to produce variable results (P.Dilkes, DOC, Eglinton Yellow Head Research Project, *pers. comm.*). Currently we measure mustelid control success by outcome monitoring the survival of key species such as our kororā chicks and brown kiwi chicks attaining a 1000 gramme stoat safe weight.

The EPL site is a small management area therefore population indexing is very difficult if not impossible. Camera traps will be used to detect any mustelid incursions. Mustelid traps will run all year, however trap check frequency can be reduced between April and late June each year. Chick productivity rates will provide the outcome monitoring data sets.

Bi-Catch

Several species are captured within mustelid tunnels as bi-catch to any control operation. Hedgehogs are the most common and can be found at a range of altitudes from coastal areas to beech forest, however they should be a rare catch at this location.

Other bi-catch species can include Norway rats, blackbirds, starlings, thrushes, green bell frogs and occasionally young rabbits.

Figs 39-40: Two options using DOC200 sets, the single set box and the double set at right with mesh holes cut to direct the target species onto the trap plate. We believe that single set DOC200's catch less than double set traps (*Photo Courtesy of DOC*).

Right- Occasionally weasels can be caught on peanut butter with Victor pro rat traps.
As a trapper it is vital to look for sign of predators while on the job. The far-right photo is a stoat scat (faeces). Aprox 7 mm wide by 50mm long and jet black. Rat fur is usually present. Hedgehog scat is similar but does not contain rodent fur.



Predator trapping is the foundation of most species protection projects in Aotearoa. The examples above show how a trap should not be set. These traps are not at all effective, will not catch mustelids and therefore a waste of time, labour and resources. Even though the trapper has visited recently (fresh eggs!) no trap maintenance has been done.

Stoats and weasels in particular can be very shy around traps or foreign objects. They will often visit several times prior to becoming confident enough to enter a trap box. It is thought now that some females maybe teaching offspring to avoid trap boxes altogether therefore avoiding capture. Once stoats have been 'spooked' from a trap it is probably very difficult to catch them again. The key is to have well managed and well baited traps running at all times. Even if it means you are able to service less traps on particular days the key is that the traps you have visited are set well. If you as the trapper have done this, then you can sleep easy knowing you have done everything you can to protect endangered species.



Figs 46-48: Cameras are a great tool to monitor mustelid activity. In this case stoats.

Table 5: Vertebrate Pest Management Targets at EPL/Onepoto Kororā Protection Area.

Target Pest Species	Control Method Options	Control or Outcome Target
Mustelids – ferret, stoat and weasel.	DOC 200 and Fenn No.6 Double sets at 200m spacing.	100% survival of juvenile & Adult Kororā at EPL/Onepoto.
Feral Cat	Cage Trap or Steve Allan trap.	100% survival of juvenile & Adult Kororā at EPL/Onepoto.
Ship and Norway rat	Ground based toxin application and Victor Pro snap traps within target areas.	Bi-annual tracking tunnel indexing target rate of <2.5% RTI.

Predator Control Layout – Ferret, Stoat, Weasel and Rat Control

5.9 Installation of Penguin Nest and Roosting Boxes.

Penguin nesting boxes have proven to be a fantastic tool throughout New Zealand to both encourage and protect nesting blue penguin.

The Oamaru Blue Penguin Colony Project is a fantastic example of this and one of the longest running kororā recovery programmes found in New Zealand. The Oamaru site started as a rock quarry and in 1993 a tourism operation and monitoring programme was established. By providing nest boxes, removing and managing vertebrate pests and by reducing disturbance as much as possible to kororā the project has built up a significant blue penguin colony. For example on 21st November 2021, 417 kororā returned to the colony after a day at sea (https://www.penguins.co.nz/). A very successful project indeed.


Oamaru Penguin Project Photo


Napier Penguin Project Photo

The Napier Port Project is another highly successful project which has incorporated habitat development, protection and the provision of nest boxes into the project design. The 2021-22 season fledged 13 penguin chicks after only two years in operation (Paul Rose, Napier Port Environmental Advisor, *personal correspondence*).

The Nicks Head Station Penguin Project has been operating since 2004 and now holds 20-25 nesting pairs at Orongo Beach and started in 2002 with no resident breeding pairs. After several years of monitoring moulting birds an acoustic sounds system was installed and has managed to hold birds onsite where they have stayed and bred successfully. This project has also included pest control, the installation of kororā nest boxes following the Oamuru – DOC recommended design and maintaining a disturbance free site where kororā pairs can breed and moult without interference.


Ecoworks NZ Photo

The Eastland Port-Onepoto site will initially install 20 kororā nest boxes. The specifications for these boxes will be based on current best practice and proven design (400 x 500 x 250 high) Dave Houston, Oamaru.

The EPL boxes will be constructed with 20mm high quality plywood with locked inspection access lids to enable monitoring of chicks to take place. The exterior will be painted with an exterior quality weather-proof coating.

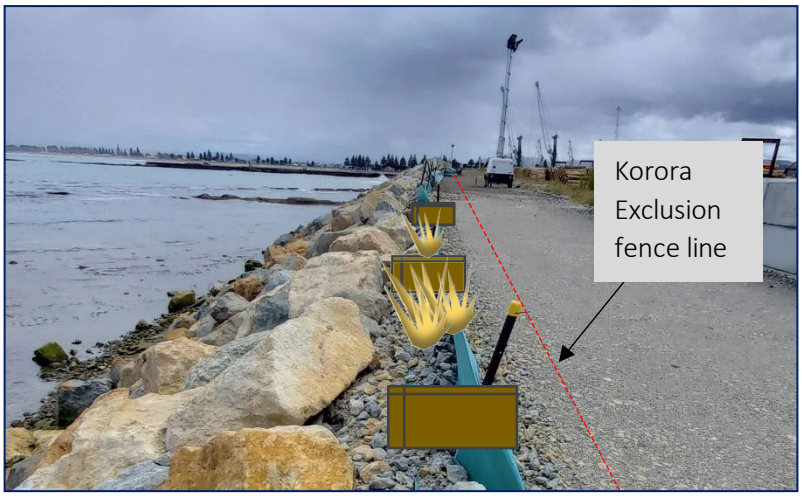
The base course under each nest box will be 75 mm higher than the surrounding ground level and include a free draining fine pea metal over the existing 40-60mm base course. This will then have a 75 mm soil layer and nest material added within each box.

The exterior of each nest box will be layered with 60-100 mm diameter rock cobble which will be mounded around and over each nest box to provide heat protection particularly from the Gisborne summer heat and allow air flow.

Fig 52: General nest box locations above EPL revetment (*Photo Supplied -EPL*).

Approximately 1200-1500 mm will be available between the upper boulders of the revetement wall and the kororā exclusion fence. This will allow ample space to deploy the 400 x 500 mm nest boxes with their corresponding stone/rock protection. There are no guarantees that kororā will readily use these artificial nest boxes and may prefer the rock wall, however we hope over time these will become well used as we have seen at various other locations and will therefore allow the Ngati One One teams to monitor breeding success and the survival of kororā easily at this EPL site.

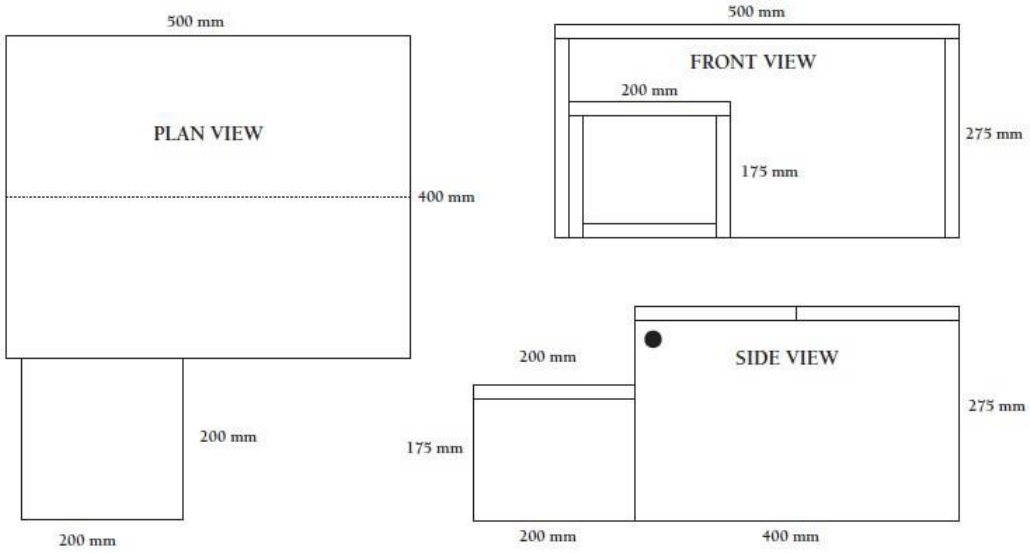
As seen here in Figure 54: the temporary shade netting fence will be removed. The new penguin exclusion fence will be positioned 1.0 metres closer to the centre of the existing access way allowing space to install the foundations and the kororā nest boxes themselves.



An excavator will be provided to supply the appropriate rock, sand and shingle to establish these nest box sites and re-locate any boulders if required to provide additional space for each nest box. A sand tussock or similar low growing coastal plant species will

also be situated between nest boxes to both improve the aesthetics of the site and to provide additional summer shade cover for visiting kororā.

Penguin Nest Box Measurements





https:/ nguin-p

Penguin Nest Box inspection lids made by Ecoworks NZ for petrels, shearwaters, prion, Kororā, kiwi and tuatara. These are waterproof, easy to inspect and can be easily locked if needed. Each burrow is numbered with a cattle tag and GIS mapped. Breeding records relate specifically to that burrow.

5.10 Future Construction Operations at EPL

Any future de-construction, re-design or upgrades undertaken on or around the EPL revetment walls will include a Kororā monitoring plan which aligns with the conditions set out within the term of the Wildlife Act Authority obtained through the Department of Conservation.

As described earlier, Kororā can be resident at any time of the year. Construction action should assume that individuals are present prior to works being undertaken.

Communication with key project partners prior to these operations commencing is paramount.

The following step process will ensure that resident and or visiting kororā will be protected during any construction work being undertaken. The aim of any future site construction works is to ensure that no kororā are injured and that no mortalities are caused to this protected species at this site.

Kororā Management Plan is completed, consents and relevant authorities are obtained to carry out de-construction, structural/storm repairs or remedial works on revetment wall or other sites likely to contain kororā or other protected species

Work to take place between 1st April and 30th June

Note: Kororā may be present at all times of year

Department of Conservation Area Office and Ngati One One informed of intention to commence revetment construction activity

EPL Safety Management Procedures completed and signed off prior to operation involving all staff & contractors

DOC – Gisborne Area Office and Wildlife Veterinarian Jamie Foxley notified at Eastland Veterinary Clinic 48 hours prior to work commencing. Napier Aquarium and or other penguin specialists will be notified if required

Detector dog search undertaken to include the area impacted by construction activities for that day only. Multiple dog searches may be required depending on the size of the construction area

Human search teams present to assist detector dog team to evaluate the presence of kororā using cameras, burrow scopes and experienced seabird personnel -GPS and mark dog detection sites

Ensure human scent or actions do not disrupt the dog team's ability to locate kororā. Work well away from dog team and down-wind. Work quietly do not communicate with dogs

Are Kororā Present?

Yes

Unknown

No

Work continues with an observer

Experienced and DOC permitted operator extracts korara if possible by hand, using PPE and following DOC permit conditions

Individual cannot be extracted

Excavator carefully removes top layer of rock with an observer present. Dog team on standby to locate birds as material is carefully removed maintaining a watch for kororā or other protected species

Kororā are located

Kororā are carefully extracted and placed within a clean wildlife carry box. Individual is scanned for a micro-chip, checked for wing tag. Condition assessment is undertaken and operation is fully documented. PPE is required as korora bite

Kororā is translocated to a secure and permanent artificial nest box within the same project location where it can be protected and depart to sea when ready. Preferably a nest box not currently used by a known breeding pair

Experienced person or DOC species/seabird person and dog handler to work with excavator operator to carefully extract material following all safety precautions, awareness of all identified and potential hazards whilst working around heavy machinery. Take advice from operator

Continued and careful inspection is made during the operation to ensure more kororā are not present as material is removed or installed

New birds may arrive during the following night therefore search and monitoring maybe required each day prior to construction activities occurring

Follow up check is carried out to monitor the health of all transferred individuals the following day

Note: The seawall has been designed and constructed to protect the Port assets from the natural forces of the sea. Whilst this is a durable structure, on rare occasions the impacts from storm events could result in damage that may require immediate repair. In this situation where emergency works are required, best endeavours will be made to follow all steps of the construction operation

5.11 Monitoring

This is an important aspect of the project and would be undertaken from mid -July through until late February. Monitoring the number of pairs, breeding success and chick productivity to fledging allows us to record and measure overall project success.

Korara begin nesting in Gisborne around mid-late July. The incubation period is generally c.36 days therefore the aim is to reduce disturbance to nesting adults as much as possible, particularly through mid- July to mid –November.

Nest monitoring should not be in any way invasive. Particularly through July until mid-November, monitoring should include using entrance stick hazes, using the classic seabird 'sniff' test, quiet and careful burrow inspection lid checks (if needed), trail cameras, detector- indicator dogs and monitoring for penguin sign, i.e. guano, physical sign of burrow/shelter use, careful searching. Throughout the earlier stages of the season birds are establishing nests, egg laying and have eggs in-situ and it is often possible to tell where active birds are located. We can gather productivity data later when birds are well into incubation or have chicks in burrows. We believe a hands-off policy works well, the birds know what they are doing and too much disturbance is detrimental.

Initially all known wild nest sites including those identified by Jo Simm will be monitored for activity. The twenty nest boxes deployed during June 2022 will also be checked for signs of activity commencing early July each year. Nest monitoring checks from mid-September through to mid-November should be undertaken at 2-3 week intervals with extreme care and with as little disturbance as possible. Kororā are a robust species in comparison with others, i.e. brown kiwi, and generally do not tend to abandon eggs or chicks, however nest monitoring should be carried out only when it is necessary. This avoids disturbing nesting adults and any potential damage to eggs in the nest particularly those at an early and more sensitive stage of incubation.

Sub-adult or pre-breeding individuals (c.2-3 years of age) may also be establishing within new burrows so this disturbance needs to be minimal so that kororā are not overly disturbed and potentially abandon nesting locations. We have recorded this occurring with threatened pelagic seabirds previously where monitoring with best intentions has irrevocably disturbed individuals who abandon the burrow altogether.

Once nesting is confirmed a 2-3 weekly and very brief inspection should take place. Aided with trail cameras some valuable data will be collected from Onepoto over time (Kororā Penguin Recording Sheet example – appendix 1).

A database will be created to record the information collected in the field. Many nest sites will likely be well hidden beneath the revetment wall structure and may be difficult to monitor. This is where trail cameras may help once the site is secure from human disturbance. It will probably take some time before the nest boxes are full and a sample set of nesting boxes can easily be monitored by using inspection lids to record nesting success. Combined with vertebrate pest monitoring this will allow the project to gain a comprehensive picture as to the success of this species at Onepoto. Ongoing annual detector dog monitoring will allow the total number of penguin locations to be recorded over time which should indicate project management success.

At the conclusion of each breeding season the key information required includes:

-Total number of active nest sites & breeding pairs and locations recorded

-Number of nesting attempts – inc no. eggs, no. chicks, clutches produced

-Number of chicks successfully fledged.

-Cause of non-fledged chicks.

-Number of eggs, chicks or adults impacted by predators, human disturbance, domestic dogs.

- Number of eggs, chicks or adults impacted by other disturbance factors.

-Predator density and frequency. Tracking tunnel indices, camera trap records and trap catch data.

-Monitoring frequency.

-Monitoring issues, disturbances and how monitoring aligns with DOC permit guidelines.

-Additional monitoring over time could include banding or pitt tagging juvenile kororā bred at the EPL Onepoto site.

5.12 Annual Reporting

Annual Kororā Summary Report to EPL, DOC and Ngati One One– As part of the initial permit sign-off process with the Department of Conservation and Iwi it is important that the project produces a summary report for Kororā and other protected species each year. The best time to complete this is annually during April. The summary report will include all aspects of kororā management and include plans for the following season and how the project relates to and supports DOC Conservation Management Strategic Plans.

Annual Planned Kororā Meeting with DOC Staff – This should take place once the annual report is completed and prior to the commencement of the following season. This meeting will take place during May-June each year. This is an opportunity to review the annual report, project progress and to discuss the overall direction for the up-coming season and any longer-term future plans. This will link area office staff into the overall direction and how the project links with other kororā projects across the region and maintain consistency across projects. This meeting will include the project advisor and project managers.

Regular Updates or Site Visits – It is important that the project advisor and project staff maintain an excellent working relationship with Department of Conservation staff and Iwi or Hapū representatives. Management by 'cup of tea' is a great tool and allows an opportunity to update and discuss project progress. With iconic species such as Kororā it is important that DOC management in particular know about any issues, particularly deaths or anything that could be perceived as a negative issue. By maintaining high standards and following best practice operating procedures it ensures that if a mortality does occur for example and DOC staff in particular know about it they can provide support when and if needed. Informal meetings and updates should take place at least quarterly with key people.


Figs 56-57: Community site visit to the Waikereru harakeke collection and DOC staff at Whinray Reserve reviewing the Kiwi Recovery Project at Motu. Important aspects of these projects is linking key partners with regular information flow.

Regular Updates to Pakeke

This is a great way to keep whanau informed by way of a power-point presentation or a site visit to the project. Presentation to Iwi or hapu Trustees, Pakeke and others who maybe interested in the progress of kororā in this area is extremely valuable and an important part of this project overall. It sets a strong foundation for ongoing support, respect and the mana of the project.

Involvement with Schools

This has significant benefit and is a form of reporting and linking the community into programmes such as this. Schools such as Muriwai Kura Kaupapa, Kaiti and Wainui Schools all have a keen involvement with marine ecology and kororā management particularly at Young Nicks Head and Wainui Beach. Linking projects with schools has significant benefits across the local community.

6.0 Acknowledgements

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Appendix 1 – Nest Monitoring Sheet.

Kororā Nest Site Monitoring Sheet 		
Nest Site ID	NATURAL/NEST BOX	
Date		
Recorder Name (s)		
Date last monitored & frequency	i.e. monthly	
Penguin Presence	(Breeding/Roosting/Moulting)	
No. Penguin Adults Present		
No. eggs Recorded	_____	Egg Status (if Known)
Clutch	First – ☐ Second - ☐	
No. Penguin Chicks Recorded		Chicks Status – (Dead/Alive)
Chick Stage	Guard Period – ☐ Post Guard Period – ☐	
Est Chick Fledge Date		
Est Egg Laying Date	(-90 days from est fledge date)	
Predator Sign		
Notes:		


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