



Te Ara Tupua Alliance
Shifting gear to connect past, present and future

Ngā Ūranga ki Pito-One: Ecology Management Plan

NKP-TAT-000-MPN-GV-NS-000026



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Revision Schedule		
Rev. Number	Date	Description
<i>Internal reviews</i>		
A	1/10/2022	Internal reviews and first issue to Waka Kotahi
B	16/11/2022	Issue to stakeholders
C	2/02/2023	Final draft document for review by Waka Kotahi
<i>Submission for certification</i>		
1	21/03/2023	Final plan for certification
2	19/04/2023	Amended plan based on GWRC feedback

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Table of Contents

NKP-TAT-000-MPN-GV-NS-000026	0
Table of Contents	2
1 Introduction	3
1.1 Project Background.....	3
1.2 Purpose and Objectives.....	4
1.3 Statutory Requirement	5
1.4 Certification, review and amendment processes	5
1.4.1 Certification.....	5
1.4.2 Review of EMP	5
1.4.3 Amendments to the CEMP	6
1.5 Mana Whenua Partnership	6
1.5.1 Kaitiaki Principles	7
1.5.2 Mana Whenua values integration	7
Appendix A – Stakeholder feedback and responses.....	9
Appendix B – Schedule of updates to EMP	10
2 Herpetofauna Management Plan	11
3 Avifauna Management Plan	12
4 Predator Control Plan	13
5 Artificial Marine Habitat Ecological Management Plan.....	14
6 Dune Vegetation Restoration Plan	15



1 Introduction

1.1 Project Background

This Ecological Management Plan (EMP) has been prepared for the Ngā Ūranga ki Pito-One Project (the Project) by the Te Ara Tupua Alliance (the Alliance). The Alliance is comprised of Waka Kotahi NZ Transport Agency (Waka Kotahi), HEB Construction, Downer NZ and Tonkin + Taylor. The Alliance is supported by Boffa Miskell, Isthmus and Holmes Consulting.

The Ngā Ūranga ki Pito-One Project comprises a 4.5 km shared (pedestrian/cycling) pathway between Ngā Ūranga and Pito-One. The Project area is shown on Figure 1.1. The Project will be located on the seaward side of the State Highway 2 (SH2) and the Hutt Valley Line (railway corridor). The Project objectives are to:

- Provide safe walking and cycling infrastructure connecting Ngā Ūranga and Pito-One, that is a catalyst for increased walking and cycling between Te Whanganui-a-Tara and the Hutt Valley; and
- Enhance the resilience of the transport corridor between Ngā Ūranga and Pito-One.



Figure 1.1. Location of Ngā Ūranga ki Pito-One

The Project involves temporary and permanent works in and adjacent to the coastal marine area (CMA) including reclamation, revetments, ūranga, seawalls, offshore habitats, groynes and culvert extensions. Numerous ancillary and supporting activities are also authorised, including temporary construction yard, barge landings, upgrades to Honiana Te Puni Reserve and upgrade works within the highway and rail corridor.

The key elements of the Ngā Ūranga ki Pito-One Project include:

- Shared path: 4.5km shared path with a 5m wide sealed surface on the seaward side of the Hutt Valley railway line.
- Ūranga (resting or landing places): Six ūranga located at key sites along the shared path's length providing areas for cultural placemaking, planting, landscaping, habitat creation, and gathering, resting, and viewing areas.
- Te Wharepōuri bridge at Ngā Ūranga: A new architecturally designed bridge providing shared path access over the railway.
- A revetment: 2.7km of X-bloc and rock embankment protecting the shared path and ūranga. These are designed with the ability to be modified in the future to adapt to sea-level rise.
- Seawalls: Six MSE seawall segments protecting the shared path, totalling 830m in length located and designed to avoid impact on high value habitat areas.
- Offshore habitats: Two small offshore habitats for coastal bird life, constructed of naturalised rock forms, at least 40m horizontal distance from the shoreline.
- Services: Utilities trench to provide ITS, power, CCTV, counting and VMS services. relocation of existing services and provision of a new KiwiRail traction/switching station building and services.
- Drainage: Culvert extensions, path and bridge drainage, and fish passage where required.
- Honiana Te Puni Reserve: Shared path facilities, Permanent Tawharau Pods and canopy, water supply and services connections.
- Landscaping, urban design, street furniture including cultural artworks at bridge, Ūranga and Honiana Te Puni Reserve.

1.2 Purpose and Objectives

The EMP brings together all ecological management plans required under the resource consent and is structured as follows:

- Part A: Introduction
- Part B: Herpetofauna Management Plan;
- Part C: Avifauna Management Plan;
- Part D: Predator Control Management Plan; and
- Part E: Rock Pools and Habitat Enhanced Coastal Armour Units Ecological Management Plan
- Part F: Dune Vegetation Restoration Plan.

These have been compiled into one document for ease of reference by the Alliance. The document can be split into individual management plans as required for specific pieces of work. Each individual management plan specifies the key roles of responsibilities in relation to the specific ecological value.

The overarching objective of the EMP is to manage the potential for adverse effect on ecology during the construction of the Project through monitoring and ensuring effects are adequately avoided, remedied or mitigated as required in accordance with resource consent condition EM.1(b).

In addition, the EMP outlines the monitoring that shall be undertaken for measures of biodiversity compensation, in order to record their performance over time.



1.3 Statutory Requirement

Resource consents¹ for the Project have been obtained as recorded in the decision of the Expert Consenting Panel under clauses 37 and 40 of the Covid-19 Recovery (Fast-Track Consenting) Act 2020. On 4 April 2022, a variation to the existing resource consents was granted by Greater Wellington Regional Council in accordance with section 127 of the Resource Management Act (RMA) 1991.

The conditions relevant to each management plan are identified within each individual management. This also includes a note regarding where they are addressed within each plan.

Resource consent condition EM.2 requires the EMP to be prepared in consultation with:

- The Mana Whenua Steering Group (MWSG);
- Department of Conservation (DOC);
- Greater Wellington Regional Council (GWRC);
- Hutt City Council (HCC), for land in Hutt City;
- Wellington City Council (WCC), for land in Wellington City; and
- KiwiRail.

Draft management plans were sent to the above parties on 16 November 2022. The comments received from the above parties, including an explanation of where any comments or suggestions have, or have not, been incorporated and, if not incorporated the reasons why, are attached in Appendix A.

1.4 Certification, review and amendment processes

The following sections outline the certification, review and amendment process for the EMP.

1.4.1 Certification

The EMP will be submitted to GWRC for certification and HCC and WCC for information at least 20 working days prior to the anticipated start of construction in accordance with Condition PC.5.

If 20 working days have passed since the management plan has been submitted for certification, and no response has been received, the EMP shall be deemed to be certified.

If the Manager, GWRC is unable to certify the Management Plan, the Manager shall provide reasons and recommendations for changes to the management plan. The Consent Holder shall resubmit an amended EMP to be certified. If the Consent Holder has not received a response from the Manager, GWRC, within five working days of the date of resubmission, the EMP will be deemed to be certified.

1.4.2 Review of EMP

The EMP will be reviewed on an as required basis. The EMP may need to be updated at any time in response to incidents, complaints, changes to the construction methodology, the identification of new methods and knowledge obtained from JSEA reviews, site inspections / audits and the monitoring regime.

¹ Consent reference EPA210001



1.4.3 Amendments to the CEMP

The EMP is a living document and will be updated and revised as the construction methodology, regulatory environment and requirements for managing ecological effects change over time.

If the EMP is required to be amended, and relative to the nature of the amendments, the Alliance will discuss and submit the amendments to:

- The Manager, Environmental Regulation, GWRC (the Manager);
- The Manager, Compliance Monitoring, HCC; and
- The Manager, Compliance Monitoring, WCC.

There is no need for the plan to be re-certified (in accordance with condition PC.5(f)) where:

- The amendment(s) will have no, or a de minimis adverse effect on the environment, or is a change that results in an improved environmental outcome; or
- The amendment is an administrative change, including nominating personnel; or
- The revised EMP is provided to the Manager, and the Manager has not advised within 10 working days that the amendment shall not be certified.

If the changes to the plan do not meet the above, amendments to the EMP must be certified prior to any changes being implemented.

Any amendments made to the EMP will be in accordance with the purpose and objectives of the EMP.

The Project team will be informed of any changes to the EMP through regular Project communication processes and the on-site version of the management plan will be updated promptly and prior to any works associated with the amendments being implemented.

A schedule of updates to the EMP will be maintained in Appendix B, as required.

1.5 Mana Whenua Partnership

Te Whanganui-a-Tara has great cultural, historical and spiritual significance for Taranaki Whānui ki te Ūpoko o te Ika and Ngāti Toa. This is reflected in the Statutory Acknowledgements² over the Wellington Harbour contained in the Port Nicholson Block (Taranaki Whānui ki te Ūpoko o te Ika) Deed of Settlement signed in 2008 and the Ngāti Toa Rangatira Deed of Settlement signed in 2012.

The harbour, the land surrounding it and the rivers and streams that feed into it, helped sustain the life of those residing within the two pā (Pito-One and Ngā Ūranga). To this day, the harbour and the surrounding area continue to provide fisheries, food and other resources for mana whenua. Therefore, the health and wellbeing of the harbour is of vital interest to mana whenua to ensure that it and its resources are sustained for many more generations to come. Mana whenua see this project as an opportunity to restore connections with the harbour and share the whakapapa of this space.

The Mana Whenua Steering Group (MWSG) was created in 2019, with agreement from Taranaki Whānui and Ngāti Toa to represent the interests of mana whenua as partners of Waka Kotahi throughout the Project's concept development, consenting, detailed design and construction phases.

Opportunities for iwi and mana whenua to build capacity and capability to engage and be involved the ecological management of the Te Ara Tupua Project have been identified and highlighted throughout this EMP. In addition, a Cultural Monitoring Plan (CMP) is currently being developed, to support the aspirations of mana whenua and outline the cultural monitoring protocols, including mātauranga Māori for this project. Once completed, it is anticipated that the CMP will be incorporated within this EMP.

² There are two Statutory Acknowledgements over Te Whanganui a Tara contained in the Deeds of Settlement with Taranaki Whānui (Port Nicholson Block Deed of Settlement) 2008 and Ngāti Toa Rangatira and Toa Rangatira Trust over Te Whanganui a Tara. These statutory acknowledgments require consultation over resource consent matters in or affecting the Harbour.



1.5.1 Kaitiaki Principles

The MWSG have developed as set of Kaitiaki Principles that underpin and guide mana whenua aspirations and expectations for Te Ara Tupua, create a foundation on which the intangible impacts of the Project can start to be assessed, and provide a mechanism for Taranaki Whānui and Ngāti Toa interests to be provided for. These principles link to the connection to the environment in both a physical and spiritual way which guides our behaviours to protect and care for our environment. It is directly applicable to how we approach the management of ecology for this Project.

Below are the kaitiaki principles for Te Ara Tupua, which are used as a mechanism to frame and contextualise the values of the Project as they relate to mana whenua.

- **Ranginui** - the connection to the various spiritual realms of the great and vast heavens, the source of light and understanding, growth and ultimate link to the celestial family.
- **Mouri** - The mouri of Te Ara Tupua – the living relationship between the ngahere, the cliffs, the water ways, hinemoana and everything that lives within that environment have their own individual and interdependent vitality.
- **Wai Tai, Wai Māori** -Nga wai tuku kiri tai noa atu ki hinemoana – the connection between the springs, streams, aquifers, rivers and all waterways that bring with them their life, mouri and mana which eventually mingles together with Hinemoana.
- **Ahua** - The character of Te Ara Tupua is seen, the beauty, the mystique, the wonder, the wild and rawness – the identity of Te Ara Tupua endures beyond the present through capturing and captivating the hearts and minds of the few and the many.
- **Tātai Whakapapa** - The history, the connections, the relationships and friendships – they shape the land and the people.
- **Whānau** - The care of manuhiri and people is embedded in the identity of Te Ara Tupua seeking to ensure a strong sense of connection imbuing a strong sense of responsibility towards Te Ara Tupua.
- **Mana Whenua** -Te Ara Tupua is seen as a living piece of the identity of Mana Whenua who take pride in this space, taking on the obligation of care, responsibility and giving life to its history and story.
- **Papatūānuku** - The mountains, the cliffs, the landforms, the geology, ngahere, trees, birds – they all need each other to exist.
-

1.5.2 Mana Whenua values integration

This section outlines how the ecological management integrate with the Mana Whenua values. The values have been developed in partnership between the MWSG and the Alliance and are intended to guide the Alliance in its construction and delivery of the Project. Further details and background on the Values are set out in the Mana Whenua Values Plan.



Table 1.1: Ecology integration with Mana Whenua Values

Value	Description	Design Alignment
Ahi kā	To uphold the unique and fundamental role that mana whenua maintain across Te Whanganui-a-Tara	The MWSG is supportive of the proposed scope of the ecological monitoring and have expressed their desire for potential opportunities particular to ensure there is more Māori involvement and a greater application of matauranga in ecological monitoring and management, which would generate broader outcomes for mana whenua. The ecological monitoring seeks to protect the environment over the long term. Mana whenua involvement in the design of ecological enhancement features within the revetment to incorporate the cultural narrative, as well as involvement in the ongoing monitoring and management of the ecology at Te Ara Tupua will re-establish mana whenua presence and prominence on the natural landscape and enhance the connection for mana whenua to Te Whanganui-a-Tara and its history.
Muka Tangata	To recognise people as unique strands of interwoven fabric	The ecological monitoring and management ensures that the ecosystem can withstand the construction and over the long term, the operation of the project thereby provide for a resilient ecosystem alongside the shared pathway and State Highway 2 which is a key connection route for the region. Considerations around minimising and mitigating impacts on the environment ensures that disturbances on the natural ecosystem and the important species inhabit the environment are minimised.
Pūmanawa	To use skills and knowledge for the benefit of the collective	The use of an innovative eco enhanced armour unit solution is a novel approach that will provide habitat for a higher biodiversity to the revetment. This innovation arose through a collaborative approach bringing together a team of experts with diverse and varied experience and expertise to ensure the best approach and ecological design is being proposed. Providing opportunities for mana whenua to be involved could add matauranga and local knowledge, enhancing ecological management and outcomes.
Whakatauirā	To lead by example	The Project is likely to employ the first use of XblocPlus in New Zealand to reduce footprint, and therefore the impact on the marine environment. The units are to be modified to include ecological enhancement and additional tide pools units included to enhance ecological outcomes.
Tiaki Taiao	To recognise the role of people as an essential piece of the environment that we have an obligation to protect	The revetment design will the environment through mitigation measures that aim to protect important bird life. The footprint of works is minimised as far as possible which reduces the encroachment into Te Whanganui-a-Tara and ecological enhancements built into various aspects of the revetment design and the XblocPlus units to increase ecological biodiversity.

Appendix A – Stakeholder feedback and responses



Stakeholder	Comment	Addressed
MWSG	<p>Overall, the plans are very light on any references to iwi mana whenua and no references to the connection that mana whenua have in relation to ecology and the broader environment nor do the plans highlight any possible opportunities for iwi mana whenua. Both the Mana Whenua Values Plan and the Cultural Impact Assessment articulates this in a very succinct way and could be used to help with that content.</p>	<p>Have included a section on mana whenua partnership and kaitkai principals in the introduction of the EMP.</p>
	<p>In addition, the plans don't highlight any possible opportunities for iwi mana whenua to be involved in the work outlined in these plans. After reading the plans, I can see a nice package here for iwi mana whenua to be involved, be exposed and/or upskill Māori in ecological management e.g. working alongside ecologists to take part dune restoration, predator control, species relocation, monitoring etc. Unsure whether this is relevant for the management plans but keen to start work on framing up these opportunities with the ecologists. I haven't done much work to date but I know that has been something on the MWSG's radar. Will be interested in understanding from Boffa whether there are any examples of iwi and ecologists working together to achieve the best ecological outcomes in these works and what these opportunities could look like e.g. opportunities for work experience, internships, training etc.</p>	<p>Have also included mana whenua opportunities section in each subplan.</p>



Appendix B – Schedule of updates to EMP

Date	Person responsible for amendments	Reason for amendments	Summary of amendments
19/04/2023	Various	Amendments made in response to GWRC comments on V1 of EMP.	Amendments summarised in memorandum (NKP-TAT-MEM-PP-NS-000001)





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Herpetofauna Management Plan

NKP-TAT-APW-MPN-GV-NS-000056



Quality Assurance Statement		
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Revision Schedule		
Rev. Number	Date	Description
<i>Internal reviews</i>		
A	3/10/2022	Draft document for information & internal reviews
B	16/10/2022	Draft document for stakeholder reviews
C	1/02/023	Final draft document for review by Waka Kotahi
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Table of Contents

1	Introduction	5
1.1	Project background	5
1.2	Mana whenua	6
1.3	Statutory framework	6
1.4	Management approach	7
1.5	Roles & Responsibilities	7
2	Ngārara/lizard values	8
2.1	Desktop investigation	8
2.2	Site-specific surveys	9
2.3	Ngārara/lizard habitats	9
2.4	Lizard values summary	10
3	Effects on lizards	12
3.1	Injury/death	12
3.2	Disturbance	12
3.3	Habitat loss and displacement	12
3.4	Habitat fragmentation	12
4	Lizard management	13
4.1	Habitat avoidance and reduction of clearance areas	13
4.2	Salvage as a management action	13
4.2.1	Pitfall and funnel trapping	14
4.2.2	Destructive habitat searches	14
4.2.3	Transportation	14
4.3	Release site and habitat enhancement	14
4.3.1	Post-works habitat construction	17
4.3.2	Predator control at the release site	17
5	Contingency actions	20
5.1	Threatened species discovery	20
5.2	Higher densities of ngārara/lizards than expected	20
5.3	Incidental ngārara/lizard discoveries during works	20





6	Post-release monitoring and reporting	21
6.1	Post-release monitoring	21
6.2	Reporting	21
7	References	22
	Appendix 1: Habitat map	
	Appendix 2: Duneland Restoration Planting Area	
	Appendix 3: Predator Monitoring Map	
	Appendix 4: Predator Control Map	
	Appendix 5: Wildlife Act Authority 91847-FAU	
	Appendix 6: Stakeholder Responses and Feedback	



1 Introduction

Waka Kotahi NZ Transport Agency are constructing the Nga Ūranga ki Pito-One section of Te Ara Tupua (the Project). This involves construction of a 4.5 km-long shared coastal path from the Ngauranga interchange (Nga Ūranga) to just south of the Petone Railway Station in the north (Pito-One).

A condition of consent is the preparation of an Ecology Management Plan (EMP; conditions EM.1-EM.23). Condition EM.2 and EM.3 relates specifically to the management of herpetofauna, and states:

Condition ref	Condition	Location where addressed
EM.2	a. Where reasonably practicable, clearance of areas of lizard habitat as identified on the map in Attachment A of these conditions shall be avoided. b. Where the removal of lizard habitat in (a) cannot be avoided, the methods to salvage and relocate lizards immediately prior to vegetation/habitat clearance will be undertaken in accordance with Condition EM.3(d).	Section 4
EM.3	The EMP shall include the following information in relation to herpetofauna: a. A description of the lizard habitats present within the project footprint; b. Lizard species potentially present; c. Roles and responsibilities for lizard management; d. Measures proposed to avoid, remedy, and mitigate adverse effects on resident lizard populations, including; i. Vegetation clearance and construction protocols; ii. methodology for lizard capture; iii. details for release sites; iv. details for post-release monitoring; and v. timetable for implementation. e. Procedures for incidental discovery of lizards during works. f. Details of planting that provides habitat and food resources for native lizards.	a. Section 2 b. Section 2 c. Section 1.5 d. Section 4 e. Section 5 f. Section 4 and Planting Plan Schedules

This management plan addresses the requirements under condition EM.2 and EM.3 and is a component of the wider EMP for the Project.

1.1 Project background

The Project will provide a 4.5 km-long shared path between Nga Ūranga and Pito-One featuring the following key elements:

- a) *A rail overbridge (the shared path bridge) across the Hutt Valley Railway Line, connecting the shared path from Nga Ūranga to the coastal edge;*
- b) *A path with a 5 m surface width on existing and newly created land and coastal structures, on the seaward side of the Hutt Valley Railway Line;*
- c) *A varied coastal edge which incorporates ūranga (landings), a rocky revetment and the intermittent use of strategically placed seawalls along the path edge. The coastal edge treatment provides resilience, reflects the natural landscape, avoids sensitive habitat areas, provides for cultural expression and enhances amenity;*
- d) *Construction of new offshore habitat for coastal avifauna;*
- e) *Connections to the Pito-One to Melling (P2M) path and Pito-One Esplanade;*
- f) *Construction of a new integrated clubs building at the eastern end of Honiana Te Puni reserve.*

Construction of the Project will result in the loss of several isolated patches of potential lizard habitat. This LMP has been prepared to mitigate for potential adverse effects, with the goal of “no net loss” to native ngārara/lizards and their habitat.



1.2 Mana whenua

Taranaki Whānui ki Te Upoko o Te Ika/Port Nicholson Settlement Trust (the Trust) is the post settlement governance entity for descendants of Taranaki Whānui ki Te Upoko o Te Ika, and is the representative body ensuring Taranaki Whānui rights and interests, as Mana Whenua, are acknowledged within Te Whanganui-a-Tara. These interests include cultural, economic, social, and environmental. Te Rūnanga o Toa Rangatira is the mandated iwi authority for Ngāti Toa Rangatira. Te Rūnanga o Toa Rangatira manages political and public interests on behalf of Ngāti Toa Rangatira including Tiriti claims and settlements, commercial and customary fisheries, health services, social services, central and local government relationships, and resource and environmental management.

Mana Whenua representation through the Te Ara Tupua Mana Whenua Steering Group (MWSG), a Mana Whenua / Waka Kotahi collaboration, drives the core values, guiding principles and cultural narrative and gives effect to the shared responsibility of the whenua and great harbour of Te Whanganui-a-Tara through a Mana Whenua lens.

1.3 Statutory framework

All native ngārara/lizard species are 'absolutely protected' under the Wildlife Act (1953, s63 (1) (c)), and ngārara/lizard habitats are protected by the Resource Management Act (1991) and administered by the Department of Conservation (DOC) and local authorities (Greater Wellington Regional Council; GWRC) respectively.

The Resource Management Act also acknowledges the relationship of Mana Whenua and their culture and traditions with their ancestral lands, water, sites, wāhi tapu and other taonga, which includes all species of native lizard. This relationship is recognised and provided through establishing a collaborative partnership with Taranaki Whānui and Ngāti Toa, that has been formalised through the Te Ara Tupua MWSG.

Native ngārara/lizards often occupy habitats of otherwise low ecological value that are not otherwise protected (i.e., weedy vegetation, vegetation margins), and guidelines have been developed to identify and address ngārara/lizard habitat loss through land development (Anderson et al., 2012). These guidelines identify the procedures involved to meet the legislative requirements for lizard fauna in an Assessment of Environmental Effects (AEE). These matters are also addressed throughout this LMP and include:

- Obtaining a Wildlife Act Authority (permit) from the Department of Conservation to survey, capture and transfer ngārara/lizard. Iwi consultation also forms part of permit approval.
- Undertaking ngārara/lizard and/or habitat surveys.
- Development of a ngārara/lizard management plan.
- Description of actions to mitigate adverse effects on ngārara/lizards.



1.4 Management approach

Any ngārara/lizard management must be carried out in consultation with DOC, GWRC, mana whenua and the appropriate Territorial Authority (Hutt City Council and/or Wellington City Council). We consider salvage and release a viable option for this site given the surrounding landscape, likelihood of ngārara/lizards persisting/thriving and long-term management. This LMP has been developed to follow the principles provided in “Key principles for lizard salvage and transfer in New Zealand” (hereafter “Lizard Salvage Guidelines”) (Department of Conservation, 2019).

1.5 Roles & Responsibilities

As per Condition EM.3(c) this section outlines the roles and responsibilities for lizard management:

- The Suitably Qualified Herpetologist (SQH) is responsible for:
 - Providing advice and support in respect to the establishment all aspects of any salvage operation.
 - Undertake or supervise the handling of lizards in accordance with WAA 91847-FAU.
 - Undertake the reporting requirements in accordance with WAA 91847-FAU.
 - Undertake the lizard monitoring requirements in accordance with WAA 91847-FAU.
- The Environmental Advisor (EA), PEP-C Manager or another delegate is responsible for:
 - liaising with the SQH on the timing of enabling and construction works when lizard surveys / salvage operations are required.

In addition, the key contacts list for these and other roles will be maintained in accordance with the CEMP.



2 Ngārara/lizard values

2.1 Desktop investigation

The DOC BioWeb Herpetofauna Database was accessed to find lizard records within 10 km of the site, to develop a list of species potentially present within the Project footprint. Data older than 20 years, and from predator-free islands, were excluded from analysis because they are not considered representative of the likely ngārara/lizard fauna within the Project footprint.

Seven species of ngārara/lizard are known to exist within the wider area, including four skink species and three gecko species. These are summarised Table 2.1 below.

Table 2.1: Native ngārara/lizard species recorded within 10 km of the study site (DOC BioWeb Database). Conservation status and nomenclature follows Hitchmough et al., 2021.

Common Name	Scientific Name	National Conservation Status	Regional Conservation status ¹	Habitat Preferences	Functional group
Northern grass skink	<i>Oligosoma polychroma</i>	Not Threatened	Not Threatened	Dry open areas with low vegetation or debris such as logs or stones for cover.	Terrestrial skink
Copper skink	<i>O. aeneum</i>	At Risk – Declining	At Risk - Declining	Open and shaded areas where sufficient cover is available (e.g., rock piles, logs, dense vegetation).	Terrestrial skink
Glossy brown skink	<i>O. zelandicum</i>	At Risk – Declining	At Risk - Declining	Forest or densely vegetated and damp areas in forest, scrub, grassland, gardens, and coastlines.	Terrestrial skink
Ornate skink	<i>O. ornatum</i>	At Risk – Declining	At Risk - Declining	Open and shaded areas where sufficient cover is available (e.g., rock piles, logs, dense vegetation).	Terrestrial skink
Raukawa gecko	<i>Woodworthia maculata</i>	Not Threatened	Not Threatened	Forest, scrub, grassland, and coastal areas.	Terrestrial/ arboreal gecko
Ngahere gecko	<i>Mokopirirakau</i> sp. 'Southern North Island'	At Risk – Declining	At Risk - Declining	Forest and scrub, especially kānuka / mānuka, and creviced clay banks	Arboreal gecko
Barking gecko	<i>Naultinus punctatus</i>	At Risk – Declining	– Regionally Vulnerable	Forest and scrub, especially kānuka / mānuka.	Arboreal gecko

¹ (Crisp et al., 2023)



2.2 Site-specific surveys

The proximity of the rail lines to the site created environmental and Health & Safety constraints which limited the ability to carry out ngārara/lizard surveys over much of the Project footprint. As such, it will not be possible to confirm what species are present until the salvage phase of the Project, when the site becomes accessible. For this reason, habitat availability/suitability (in combination with the desktop results) has been used as a proxy for ngārara/lizard presence.

2.3 Ngārara/lizard habitats

Potential ngārara/lizard habitats within or near the alignment are shown in Appendix 1. Not all habitats identified are expected to be directly and/or indirectly affected by works. These have identified through a combination of site investigations and aerial imagery in areas that could not be accessed. In total, approximately 0.6 ha of potential lizard habitat fall within the Project footprint.

Along the coastal section of the Project, the majority of the footprint affects current intertidal areas, or areas of riprap embedded in concrete. The ngārara/lizard habitat there is limited to areas of vegetation (including exotic vegetation) which provides cover (Photo 1) and artificial and natural rock and wood debris above the high-water mark (Photo 2).



Photo 1: Area of flax-dominated vegetation² near the existing KiwiRail signal station, which may provide ngārara/lizard habitat.



Photo 2: Driftwood debris fields adjacent to the areas of flax, which could provide suitable habitat.

Within the Honiana Te Puni Reserve (HTPR), the large areas of mown grass do not provide habitat for native ngārara/lizard. Potential habitat within the Reserve includes areas of vegetation which provide cover (Photo 3), constructed rock boulderfields (Photo 4), and debris piles above the high-water mark. During a site visit in January 2020, a northern grass skink was observed in boulderfield by the boardwalk on the eastern side of the Korokoro Stream (Photo 4); while this specific habitat will not be affected by works, this does prove that ngārara/lizards are present within the HTPR.

² Efforts will be made to minimise the extent of vegetation lost during construction.



Photo 3: Low vegetation patches, which may potentially provide habitat for a low number of terrestrial ngārara/lizards.



Photo 4: Boulderfield habitat alongside the Korokoro Stream (not to be affected by works). A northern grass skink has been observed utilising this habitat.

The potential ngārara/lizard habitat within the Project footprint occurs in highly scattered, isolated patches. Those that run alongside the Railway are separated from potential source populations by the rail lines themselves as well as State Highway 2 (SH2) – this decreases the likelihood of ngārara/lizards in those areas.

Given the nature of these habitats, it is expected that ngārara/lizards may be present but are likely to be in low numbers. The highest densities of lizards are expected to be in the HTPR, based on habitat availability, connectivity, and the known presence of northern grass skink. There is also reasonable quality habitat in the flax lands adjacent to the KiwiRail signal station (shown in Photo 1).

The habitats present are only suitable for terrestrial ngārara/lizards; therefore, the two arboreal gecko species listed in Table 2.1 are not expected to be present within the site.

2.4 Lizard values summary

Potential ngārara/lizard species present in the site are summarised in Table 2.2. The northern grass skink is considered the most likely lizard to be present throughout the site (and has been observed at the eastern end), based on habitat availability and preferences, and the known distribution of ngārara/lizards in the wider landscape. Also, potentially present are the copper skink and the Raukawa gecko, both of which are known to inhabit boulder/debris field habitats and coastal vegetation. It is considered less likely (though still possible) that ornate skink or glossy brown skink will be present. Given the lack of arboreal habitat, the Ngahere gecko and barking gecko are very unlikely to be present.

Table 2.2: Values assessment of ngārara/lizards present and potentially present based on the criteria in Table 5 of Roper-Lindsay et al. (2018). Likelihood of presence within the site is based on known species distributions, habitat preferences, and rarity.

Common name	Scientific Name	National Conservation Status	Regional Conservation Status	Likelihood of presence	Ecological Value
Northern grass skink	<i>Oligosoma polychroma</i>	Not Threatened	Not Threatened	Very High (observed in the HTPR)	Low
Raukawa gecko	<i>Woodworthia maculata</i>	Not Threatened	Not Threatened	Moderate	Low
Copper skink	<i>O. aeneum</i>	At Risk – Declining	At Risk - Declining	Low-Moderate	High
Glossy brown skink	<i>O. zelandicum</i>	At Risk – Declining	At Risk - Declining	Low	High
Ornate skink	<i>O. ornatum</i>	At Risk – Declining	At Risk - Declining	Low	High



3 Effects on lizards

Effects on ngārara/lizards have been assessed at a **local population scale**. Actual and potential effects resulting from the proposed development are detailed below.

3.1 Injury/death

Ngārara/lizard fauna are mobile over short distances but may not be able to escape during site enabling and construction works, particularly if that work is carried out during colder months when they are less active. Activities that may result in injury or death to ngārara/lizards include vegetation/habitat clearance and earthworks. Ngārara/lizards are particularly susceptible to injury and mortality during vegetation clearance because they hide under cover when disturbed (i.e. do not escape), have low mobility and are inactive for parts of the year.

3.2 Disturbance

Disturbance and sub-lethal stress to ngārara/lizards is difficult to quantify, but is likely that noise, dust, and vibration during construction may impact some individuals. However, given the proximity of the Project footprint to the railway and SH2, it is already a high disturbance area and any additional disturbance from these works would be relatively minor.

3.3 Habitat loss and displacement

The majority of the development is located away from indigenous or exotic vegetation and habitats known to be occupied by native ngārara/lizards. Where ngārara/lizards are present, works associated with the development may result in direct habitat loss within the construction footprint and temporary occupation areas (e.g., lay down areas).

Clearance of vegetation and other ngārara/lizard habitat (including feeding and refuge habitats, such as debris piles and boulderfields) may result in significant negative effects to ngārara/lizards by the following mechanisms:

- Displacement into unsuitable neighbouring habitat;
- Increased competition for resources and consequent reduction in breeding success;
- High stress resulting from the loss of refuge habitats and increased exposure to predators.

We consider that the existing ngārara/lizard population size is likely already constrained by predation pressure and availability of suitable refuges and food. As such, displacement of ngārara/lizards into surrounding habitat, if present, may have a moderate adverse population-level effect where ngārara/lizards are unable to survive or breed.

3.4 Habitat fragmentation

Habitat fragmentation disproportionately affects animals with low dispersal ability by effectively constraining the extent of available habitat. This may result in breeding suppression as a result of limited habitat and reduced mate choice. The key area where habitat fragmentation may result from the Project is the Honiana Te Puni Reserve, where boulderfields and debris piles may be fragmented by the works.



4 Lizard management

A number of management tool will be employed to mitigate for the effects to lizards within the proposed footprint including:

- Habitat avoidance and minimising vegetation/habitat clearance
- Lizard salvage, including pitfall trapping, funnel trapping, and destructive habitat searches
- Habitat enhancement and construction, including enhancement of the release site, post works habitat construction along the footprint, and pest control.

Wildlife Act Authorisation (WAA 91847-FAU) has been obtained for Te Ara Tupua to enable the management of lizards through the Project's construction. A copy of that Authority is provided in Appendix 5. The management measures outlined in this current plan are consistent with the requirements of the Authority.

As specified in Schedule 3 Clause 12 of the WAA 91847-FAU, lizards must only be handled by Authorised Personnel listed in Schedule 1 Clause 3 of the authority, or those operating under the direct supervision of the Authorised Personnel listed in Schedule 1 Clause 3.

4.1 Habitat avoidance and reduction of clearance areas

During the design phase, efforts were made to reduce the amount of lizard habitat to be cleared, or avoid areas of habitat entirely. For example in the flaxland areas alongside the existing signal station, the footprint has been reduced to maintain as much of the vegetation as possible. There was also a reduction in the amount of lizard habitat to be affected in the Honiana Te Puni Reserve. Where habitats cannot be avoided, lizard salvage will be carried out instead.

Any areas to be avoided are to be clearly delineated (with flagging tape or fencing) to reduce the chance of accidental clearance or earthworks outside of the designated footprint.

4.2 Salvage as a management action

The salvage of ngārara/lizards from disturbed habitat is the primary management method. We recognise that there are inherent risks associated with ngārara/lizard capture and salvage as a management tool for mitigation purposes. In particular, there is high risk of poor capture rates for ngārara/lizards during capture and salvage activities. This will be managed by maximising lead-in time for pre-clearance capture and using a range of tools suitable to the species in question. We further recognise that there are risks of injury, death, competition, displacement, overheating and overcrowding. These effects will be minimised by using experienced handlers supervised by a suitably qualified herpetologist (i.e. those persons listed in Schedule 1 Clause 3 of WAA 91847-FAU), and a suitable release site(s).

Salvage will be carried out in all areas identified as potential ngārara/lizard habitat, within the footprint of works. Salvage will be conducted under the supervision of a suitably qualified, experienced, and permitted herpetologist. Salvage methods are described below.



4.2.1 Pitfall and funnel trapping

Baited pitfall traps and “gee minnow” funnel traps will be installed in an approximate 10 m x 10 m grid³, across all areas of potential habitat:

- Pitfall traps covered with Onduline tiles will be installed for one week before opening, to bed in. Once opened they will be checked every 24 hours, to limit adverse effects on lizards (stress, desiccation etc.). Each trap will be baited with fruit and will contain a wetted sponge to reduce risk of desiccation.
- Gee minnow traps will be installed in areas where substrate/terrain do not allow for pitfall trapping. They will be placed in shaded areas, and also will be checked daily, to limit adverse effects on lizards (stress, desiccation etc.).

Trapping will discontinue after:

- a) A minimum of five days of trapping overall; and
- b) A minimum of three consecutive, fine-weather⁴ days with no captures or observations.

4.2.2 Destructive habitat searches

After funnel trapping is complete, destructive habitat searches will be carried out. Destructive searches will include the sensitive dismantling of any rock or debris piles, the overturning of any larger debris, and the hand-searching of any vegetation. Where practicable, rocks and debris will be removed from the site following dismantling, to reduce the likelihood of recolonization prior to earthworks.

Searches will be carried out by at least two suitably qualified ecologists, including and under the supervision of a qualified herpetologist.

4.2.3 Transportation

Ngārara/lizards will be held individually in cloth bags in a secure, vented container out of the sun.

Ngārara/lizards will be transported to the release site as soon as possible, but at most within 24 hours of capture.

4.3 Release site and habitat enhancement

Discussions were had with mana whenua and Hutt City Council to identify a suitable release site for any ngārara/lizards salvaged from the alignment. Based on these discussions, it was decided that the best option would be the restored areas of vegetated sand dune along the Petone foreshore; specifically, the more mature areas east of the Wharf (see Figure 1, Photos 5-8 below). This release site was approved through the Wildlife Act Authorisation process.

³ As the potential habitats present within and around the site are typically small and fragmented, a standard 10x10 m grid for pitfall/gee minnow trapping may not be feasible at all sites (e.g. some of the sites are smaller than 10x10 m, in which case only a single pitfall/gee minnow would be installed). So, to ensure sufficient salvage effort, a minimum of four pitfalls/gee minnows will be installed at each potential habitat.

⁴ In this context a “fine-weather” day is a warm day without rain or high wind.





Figure 1: The proposed release site for salvaged ngārara/lizards, east of the wharf on Petone beach.



Photo 5



Photo 6



Photo 7



Photo 8

The reasons this site was chosen are:

- Proximity: This site is close to the alignment (approximately 1 km east of the upper boundary), so the conditions will be comparable (habitat types, climate) and the salvaged ngārara/lizards will be genetically similar to any resident lizards.
- Habitat quality: This area of more mature dunelands has been restored over the last 15 years, and is densely vegetated with plantings which provide good-quality ngārara/lizard habitat. These include grasses (spinifex, pingao), flaxes, and small leaved shrubs (e.g. *Coprosma propinqua*). There is also debris present throughout the site (driftwood, flax leaf piles) to provide additional refugia.
- Opportunity for enhancement: This site is already very good quality ngārara/lizard habitat; however only low levels of pest control are in place across the beach currently, and Hutt City Council believes it to be insufficient⁵. By increasing the intensity of pest control at the site, the carrying capacity will also be increased, ensuring sufficient habitat availability for both the salvaged lizards and any resident lizards. Other enhancements at the site will also occur to increase habitat availability, such as the addition of more habitat components in any open areas (e.g. driftwood, rockpiles, infill planting).
- Opportunity for expansion: Ongoing duneland restoration is occurring along the Petone foreshore; this includes 0.8 ha of enhancement planting works that will be undertaken by NZTA following the construction of the pathway (see Appendix 2). These enhancements will continue to increase the habitat availability along the beach, allowing lizard populations to expand and disperse.

If acceptable to Hutt City Council⁶, it is intended that a lizard-proof fence is installed around the release site, to discourage the released lizards from dispersing out of the area. This would likely be comprised of an enclosed silt fence, with the lower margin buried into the sand. The fence would be in place for the duration of the lizard salvage, and for a period of time no longer than 1 year following the completion of the salvage (timeframes to be confirmed with HCC), after which it will be removed from the site.

⁵ Janet Lawson, pers. comms.

⁶ If HCC do not wish for a fence to be installed around the release site, a hard release would still be satisfactory here, as the site is already constrained by the beach/ocean on one side and the path and road on the other.

4.3.1 Post-works habitat construction

Additional suitable habitat will be constructed after works are completed. This will include the planting of low growing, ngārara/lizard-friendly species in areas around the Honiana Te Puni Reserve, the Petone dunelands, and along the revetment.

Specifically, an area of over 0.2 ha at the Piki Wahine Point ūranga, along the proposed revetment, has been designed to include the planting of wharariki (flax), thick-leaved māhoe, and pōhuehue (*Muehlenbeckia*), with woody debris distributed throughout to provide additional lizard habitat.

Additionally, 0.8 ha of duneland restoration planting will be undertaken along the Petone foreshore (Appendix 2), which is expected to resemble the planting already undertaken along the dunes.

The habitat planting has been discussed with the project landscape architects and will align with the Cultural and Environmental Master Plan (CEDMP) and consent condition LV.4 (regarding planting specifications).

4.3.2 Predator control at the release site

Predator control across the release site will be imperative to the successful establishment and subsequent population survival of salvaged ngārara/lizards. Consent condition EM.9 stipulates that rodents and mustelids shall be controlled across the Project site. It should be noted that hedgehogs are known predators of ngārara/lizards and thus, control tools specified below will also control hedgehogs.

Please refer to the **Predator Control Plan** for information on trap and toxin types, and monitoring tools that will be used within the release site and referenced below (Predator Control Plan Table 3-2, 3-3 and 3-4 respectively).

4.3.2.1 Predator monitoring

As described in Table 3-4 of the Predator Control Plan, tracking tunnels are effective management tools for assessing the abundance of rodents in a system / site. The presence and relative abundance of mice and rats will be used to guide predator control activities at the release site.

Two lines of 10 tunnels each will be used to inform control activities at this site (Appendix 3). One monitoring line will run through the release site where predator control activity is being undertaken. The second line should run through the adjacent dune system where no control is being undertaken in order to provide valuable information on predator populations feeding into the release site. Establishment of the second line will rely on landowner access permission and has been mapped as a reference only. Each line will consist of 10 tunnels, 50m apart, with each monitoring bout being run for one night with a peanut butter lure (see Table 3-4 in the Predator Control Plan). There will be four monitoring bouts run annually – February, May, August and November.

A site survey pre-deployment will be essential. If tracking tunnels are deemed too difficult to install within this landscape, alternate monitoring regimes should be explored.

Tracking tunnel indices of $\leq 10\%$ for rats and $\leq 20\%$ for mice should be reached over the site to ensure ngārara/lizards have the best chance at establishment. Both monitoring and control activities should be in place prior to ngārara/lizards being released.

All monitoring results must be entered into the project on Trap.NZ (see section 3.3.1 in the Predator Control Plan).



4.3.2.1.1 Rodent monitoring thresholds

To ensure the successful establishment of ngārara/lizards at the release site, rats and mice should be kept $\leq 10\%$ and $\leq 20\%$ respectively, tracking tunnel index over the site. This rate should be monitored very closely in the first three years of the Project and altered, if need be. Monitoring from the line outside the release site (i.e., not in the area not receiving control) will provide base line indices for both rats and mice which will enable this threshold to be amended if applicable. If rats or mice increase above this threshold during the first three years of the Project, extra predator control effort must be implemented to reduce populations (see section 4.3.2.3 below). Following the three-year mark, ngārara/lizard populations should be well established and spikes over this threshold will not impact the populations as severely as the first three years of the Project. Following the three-year mark of the Project, if tracking tunnel thresholds for mice or rats spike above 20% or 10% respectively, and are sustained for more than three months, a change in predator control activity must occur (section 4.3.2.3).

Predator control should be able to keep predators below this threshold except in times of rodent population explosion events, which will be unlikely given the urban, coastal environment.

4.3.2.2 Predator control

The following predator control plan for the release site has been developed to protect ngārara/lizards while taking into consideration the public nature of the site and its proximity to the urban environment. Due to the proximity of the release site to the neighbouring public 'dog-walking area' kill traps will be the only control tool utilised at the site. Toxin use could be considered an option in the future if the 'dog-walking area' is closed or shifted from the neighbouring site.

To ensure ngārara/lizards have the best chance at establishment and subsequent population survival at the release site, a buffer of predator control will be implemented around the actual release site location. The buffer will extend 50 m east, 80 m west of the site and 25 m north of the site; while the southern area will have no buffer as it encompasses the foreshore and unfortunately, traps are likely to be washed away from this area.

As discussed above, control activities will need to be in place prior to ngārara/lizards being released at the site. Monitoring thresholds will guide the amount of time trapping will need to occur prior to ngārara/lizards being released, i.e., however long it takes to reach a tracking tunnel index for both rats and mice. Trap check regimes may need to be amended during this initial set up phase to reach the desired monitoring index for rats and mice.

All trap check results must be entered into the project on Trap.NZ (see section 3.3.1 in the Predator Control Plan).

4.3.2.2.1 Mice

Mice will be targeted using a 20 m x 10 m grid of Ranger Mouse Bait Stations (Appendix 4). Each station will consist of two Victor Easy Set Mouse Traps (see Table 3-2 in the Predator Control Plan). Stations shall be placed in areas where mice interaction is likely, i.e., near natural bottlenecks or near native vegetation. Trap maintenance regimes must be followed to ensure proper functioning of trap mechanisms in this coastal environment. If traps begin to fault despite regular maintenance, they should be replaced.

Each trap should be baited with a peanut butter lure. The grid must be checked and rebaited fortnightly from September to April and monthly from May to August to coincide with ngārara/lizard activity and mouse breeding patterns. Stations must be secured in place to reduce sympathetic spring-off and to prevent them from being washed away or stolen.



4.3.2.2.2 Rats, weasels and stoats

A network of DOC200 double-set trap boxes will be used to protect ngārara/lizards from rat, weasel and stoat predation (Note – will also protect against hedgehogs; Appendix 4; see also, Table 3-2 in Predator Control Plan). DOC200 double-set traps will be set c. 25m apart, along one line through the middle of the release site. This spacing will cover the home ranges of all target animals. Similar to the mice trapping grid, traps shall be placed in areas where rat, weasel or stoat interaction is likely, i.e., near natural bottlenecks / pathways or near native vegetation.

As the release site is within a public area, lure choice will need to accommodate this. A dry lure (such as raw chicken egg) or long-lasting lure (such as the Connovation Poa Uku) could be used over a meat-based lure to prevent any unwanted smells emanating from traps during the summer months. Lure type must be alternated every four months and if the same contractor is delivering this work as the Shared Path work, then lure should match that being used in the same trapbox type throughout the seasons. Each trap must be checked and rebaited fortnightly from September to April and monthly from May to August to coincide with ngārara/lizard activity patterns. Trap-boxes must be secured in place to reduce sympathetic spring-off and to prevent them from being washed away or stolen.

If ferrets are detected in the system a single DOC250 single-set trap box will be placed at every third DOC200 double-set location. DOC250 single-set trap boxes must be placed in areas where children and small cats and dogs are unable to gain access to the trap box (given the slightly larger aperture than the DOC200 series boxes), and where the public has limited or no access – this may be impossible given the sites location and if this is the case, ferret predation behaviour on lizards should be assessed. Trap check frequency and lure will follow the same regime as the DOC200 double-set network above.

4.3.2.3 Thresholds

As discussed in section 4.3.2.1.1, rat and mice tracking tunnel indices should be $\leq 10\%$ and $\leq 20\%$ respectively. If mice or rats increase above this threshold over the site in the first three years of the Project OR following the three-year mark of the Project, thresholds are sustained above 10% or 20% for three months or more, an increase in the number of trap checks could be implemented (e.g., from fortnightly to weekly or from monthly to fortnightly). However, this will be costly to the project. The mice and rat trap boxes that have been selected for the project offer the opportunity to place toxic bait within them. Depending on the public access to site and the dog-walking area proximity, a toxic bait operation could be considered as a more cost-effective means to reducing mice or rat population numbers across the site. As the site is relatively small, an exclusion fence could be erected to enable a toxin operation to occur. This will need to be evaluated at the time with all relevant stakeholders and public users of the area.

Regardless of the activity chosen to reduce the thresholds, monitoring should occur within four weeks post-change of control activity, to ensure it is known whether the change in activity is successful at reducing mice and rat populations below the target index

4.3.2.4 Maintenance

Please refer to the Predator Control Plan for information on the preparation, deployment and maintenance of traps described above.



5 Contingency actions

5.1 Threatened species discovery

Should a Regionally Threatened species of ngārara/lizard be observed or captured at any time within the Project footprint, works will be immediately halted and consultation with DOC will be undertaken to discuss next steps.

5.2 Higher densities of ngārara/lizards than expected

While it is considered unlikely that there will be high densities of ngārara/lizards within the Project footprint, it is a possibility. During salvage, if the Project herpetologist deems salvage numbers to be too high for the release site to sustain, an additional release site/s will be determined upon consultation with DOC. If necessary, works will be halted to allow an additional release site to be found or built.

5.3 Incidental ngārara/lizard discoveries during works

Should incidental finds of ngārara/lizards occur outside of the proposed salvage programme, the project herpetologist should be notified as soon as possible. If the ngārara/lizards is not at immediate risk, works in the area will halt until the herpetologist can arrive and salvage the ngārara/lizard. If the ngārara/lizard is at immediate risk of injury or death due to on-site activities, it will be salvaged by the construction team and placed in a container (with air holes, vegetation and food) until the herpetologist can arrive. Guidance will be provided to the construction team on this process by the herpetologist.



6 Post-release monitoring and reporting

6.1 Post-release monitoring

It is acknowledged that monitoring in the release sites is unlikely to detect all individuals, and for very low ngārara/lizard numbers monitoring will likely be unsuccessful. Therefore, post-release monitoring will only be conducted if a significant population (>20 individuals) are captured and released.

Monitoring will likely include the following:

- Artificial retreats: Onduline retreats will be installed in the release site, one month prior to monitoring. After one month, the retreats will be checked daily for a week.
- Tracking tunnels: Baited tracking tunnels will be installed throughout the habitat during the first ACO check, left out for four nights, and then pulled in at the end of the monitoring week.
- Visual searches: The release site will be visually surveyed for ngārara/lizards during each visit, to search for moving or basking lizards.

Post-release monitoring (where it is viable) will be carried out annually for five years in late spring / early summer, starting the first season following the completion of ngārara/lizard salvage. The results of the surveys will be used to estimate a minimum population size (determined by the maximum number caught or observed in a day) and population viability (determined by the presence of juveniles and gravid females).

Post-release monitoring will be carried out in consultation with stakeholders/treaty partners, including mana whenua, DOC, GWRC, and HCC. Mana whenua will also be invited to be actively involved in the monitoring and to lead any required processes (tikanga) prior to and/or during monitoring.

6.2 Reporting

Salvage results and/or post-release monitoring will be reported to GWRC, mana whenua, DOC, and the relevant Territorial Authority (HCC and/or WCC).



7 References

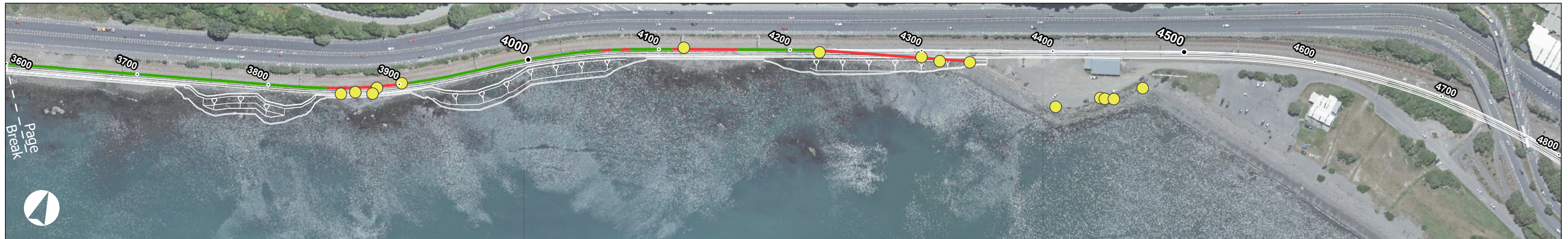
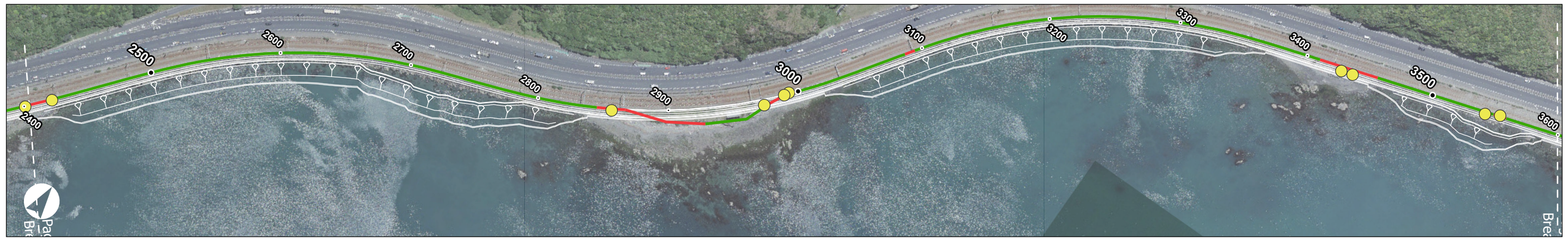
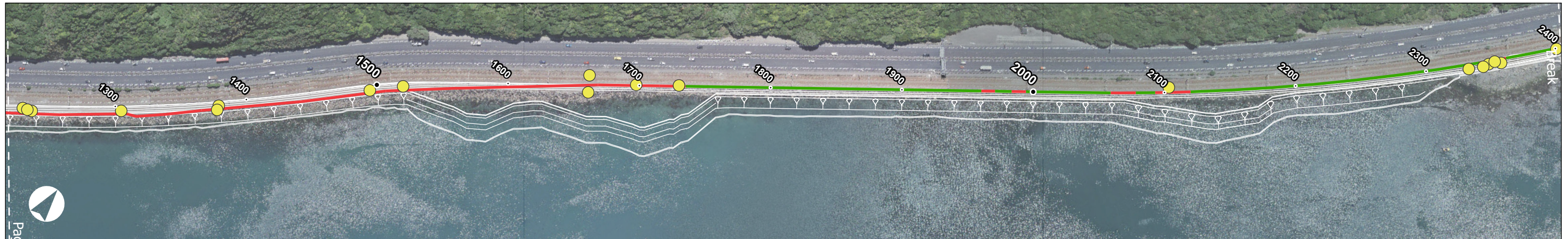
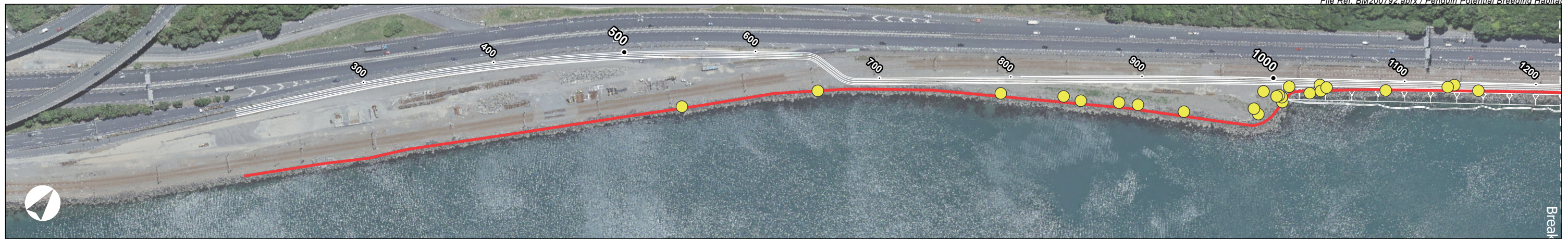
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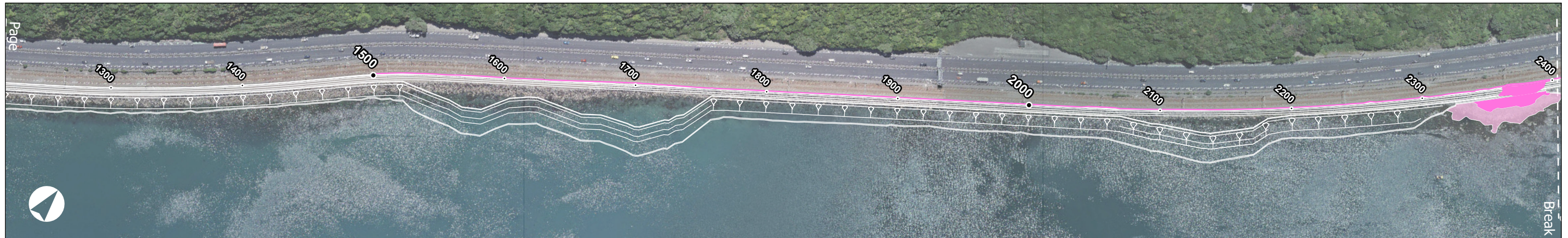




Appendix 1: Habitat map









Appendix 2: Duneland Restoration Planting Area







Appendix 3: Predator Monitoring Map

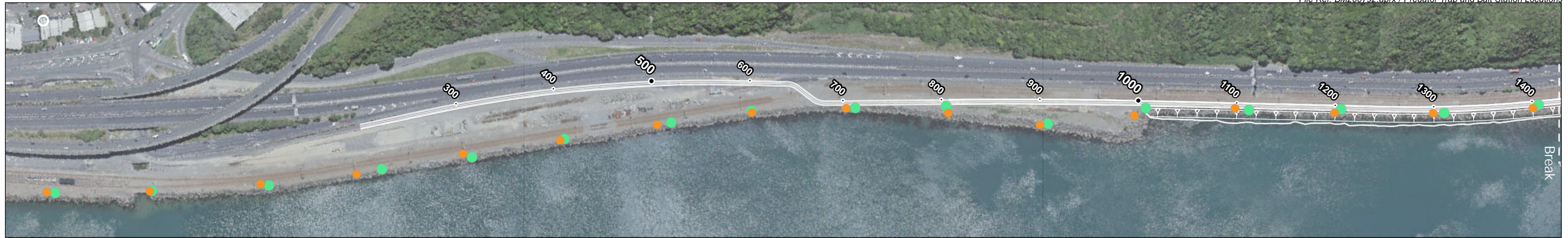






Appendix 4: Predator Control Map







Appendix 5: Wildlife Act Authority 91847-FAU





Wildlife Act Authority for wildlife on non-public conservation land

Authorisation Number: 91847-FAU

THIS AUTHORITY is made this 15th April 2021

PARTIES:

The Director-General of Conservation and where required the **Minister of Conservation** (the Grantor)

AND

Waka Kotahi NZ Transport Agency (NZTA) (the Authority Holder)

BACKGROUND

- A. The Director-General of Conservation is empowered to issue authorisations under the Wildlife Act 1953.
- B. The Authority Holder wishes to exercise the authorisation issued under the Wildlife Act 1953 subject to the terms and conditions of this Authority.

OPERATIVE PARTS

In exercise of the Grantor's powers the Grantor **AUTHORISES** the Authority Holder under Section 53 (taking or killing of wildlife for certain purposes) of the Wildlife Act 1953 subject to the terms and conditions contained in this Authority and its Schedules.

SIGNED on behalf of the Grantor by **Angus Hulme-Muir (Operations Manager – Wellington)** acting under delegated authority

in the presence of:

Witness Signature

Witness Name: Bryn Sheppard

Witness Occupation: Senior Permissions Advisor

Witness Address: DOC Hamilton Office (Rostrevor Street)

A copy of the Instrument of Delegation may be inspected at the Director-General's office at 18-32 Manners Street, Wellington.

SCHEDULE 1

<p>1.</p>	<p>Authorised activity (including the species, any approved quantities and collection methods). (Schedule 2, clause 2)</p>	<p>Activity</p> <p>(a) To catch, handle and release the following species: <u>Bird(s)</u></p> <p>i. Little Blue Penguin/ Kororā (<i>Eudyptula minor</i>)</p> <p><u>Reptile</u></p> <p>ii. Northern Grass Skink (<i>Oligosoma polychroma</i>) iii. Copper Skink (<i>Oligosoma aenuem</i>) iv. Glossy Brown Skink (<i>Oligosoma zelandicum</i>) v. Ornate Skink (<i>Oligosoma ornatum</i>) vi. Raukawa Gecko (<i>Woodworthia maculata</i>) vii. Ngahere Gecko (<i>Mokopirirakau</i>) viii. Barking Gecko (<i>Naultinus punctatus</i>)</p> <p>(b) To kill (euthanize) for animal welfare purposes (if required)</p> <p>Quantity</p> <p>(a) As required.</p> <p>Methodology</p> <p><u>Bird(s)</u></p> <p>(a) Capture by hand</p> <p><u>Reptile(s)</u></p> <p>(b) Capture by Funnel Traps (c) Capture by Pitfall Traps</p>
<p>(a)</p>	<p>The Land (Schedule 2, clause 2)</p>	<p>Capture Site</p> <p>(a) Construction Footprint for Te Ara Tupua Cycleway Project Section ‘Ngā Ūranga to Pito-One’</p> <p>Release Site – Bird(s)</p> <p>(b) Beachfront located between Kawiwharawhara and Ngauranga, 2km west of the construction site</p> <p>Release Site – Reptiles</p> <p>(c) Petone Beach/Foreshore – Sand Dunes</p>
<p>(b)</p>	<p>Personnel authorised to undertake the Authorised Activity (Schedule 2, clause 3)</p>	<p>(a) Karin Sievwright (b) Leigh Bull (c) Amanda Healy (d) Any other suitably qualified ecologist</p>

(c)	Term (Schedule 2, clause 4)	10 years (commencing on 15 April 2021 and ending on 14 April 2031)
(d)	Authority Holder's address for notices (Schedule 2, clause 8)	The Authority Holders address in New Zealand is: Level 7 Majestic Centre 100 Willis Street Wellington 6140 New Zealand Email: consentsandapprovals@nzta.govt.nz
(e)	Grantor's address for notices	The Grantor's address for all correspondence is: Department of Conservation Permissions Team 73 Rostrevor Street Hamilton, 3204 Email: permissionshamilton@doc.govt.nz

SCHEDULE 2

STANDARD TERMS AND CONDITIONS OF THE AUTHORITY

1. Interpretation

- 1.1 The Authority Holder is responsible for the acts and omissions of its employees, contractors or, agents. The Authority Holder is liable under this Authority for any breach of the terms of the Authority by its employees, contractors or agents as if the breach had been committed by the Authority Holder.
- 1.2 Where obligations bind more than one person, those obligations bind those persons jointly and separately.

2. What is being authorised?

- 2.1 The Authority Holder is only allowed to carry out the Authorised Activity in the Land described in Schedule 1, Item 2.
- 2.2 The Authority Holder must advise the Department of Conservation's local Operations Manager(s) one week prior to carrying out the Authorised Activity in the District, when the Authority Holder intends to carry out the Authorised Activity.
- 2.3 Any arrangements necessary for access over private land or leased land are the responsibility of the Authority Holder. In granting this authorisation the Grantor does not warrant that such access can be obtained.
- 2.4 The Authority Holder and Authorised Personnel must carry a copy of this Authority with them at all times while carrying out the Authorised Activity.
- 2.5 The Authority Holder may publish authorised research results.
- 2.6 The Authority Holder must immediately notify the Grantor of any taxa found which are new to science. In addition, the Authority Holder must lodge holotype specimens and a voucher specimen of any new taxa with a recognised national collection.

3. Who is authorised?

- 3.1 Only the Authority Holder and the Authorised Personnel described in Schedule 1, Item 3 are authorised to carry out the Authorised Activity, unless otherwise agreed in writing by the Grantor.

4. How long is the Authority for - the Term?

- 4.1 This Authority commences and ends on the dates set out in Schedule 1, Item 4.

5. What are the liabilities?

- 5.1 The Authority Holder agrees to exercise the Authority at the Authority Holder's own risk and releases to the full extent permitted by law the Grantor and the Grantor's employees and agents from all claims and demands of any kind and from all liability which may arise in respect of any accident, damage or injury occurring to any person or property arising from the Authority Holder's exercise of the Authorised Activity.

5.2 The Authority Holder must indemnify the Grantor against all claims, actions, losses and expenses of any nature which the Grantor may suffer or incur or for which the Grantor may become liable arising from the Authority Holder's exercise of the Authorised Activity.

5.3 This indemnity is to continue after the expiry or termination of this Authority in respect of any acts or omissions occurring or arising before its expiry or termination.

6. What about compliance with legislation and Grantor's notices and directions?

6.1 The Authority Holder must comply with all statutes, bylaws and regulations, and all notices, directions and requisitions of the Grantor and any competent Authority relating to the conduct of the Authorised Activity. Without limitation, this includes the Conservation Act 1987 and the Acts listed in the First Schedule of that Act and all applicable health and safety legislation and regulation.

7. When can the Authority be terminated?

7.1 The Grantor may terminate this Authority at any time in respect of the whole or any part of Authorised Activity if:

- (a) the Authority Holder breaches any of the conditions of this Authority; or
- (b) in the Grantor's opinion, the carrying out of the Authorised Activity causes or is likely to cause any unforeseen or unacceptable effects.

7.2 If the Grantor intends to terminate this Authority in whole or in part, the Grantor must give the Authority Holder such prior notice as, in the sole opinion of the Grantor, appears reasonable and necessary in the circumstances.

8. How are notices sent and when are they received?

8.1 Any notice to be given under this Authority by the Grantor is to be in writing and made by personal delivery, by pre-paid post or email to the Authority Holder at the address, fax number or email address specified in Schedule 1, Item 5. Any such notice is to be deemed to have been received:

- (a) in the case of personal delivery, on the date of delivery;
- (b) in the case of post, on the 3rd working day after posting;
- (c) in the case of email, on the date receipt of the email is acknowledged by the addressee by return email or otherwise in writing.

8.2 If the Authority Holder's details specified in Schedule 1, Item 5 change then the Authority Holder must notify the Grantor within 5 working days of such change.

9. What about the payment of costs?

9.1 The Authority Holder must pay the standard Department of Conservation charge-out rates for any staff time and mileage required to monitor compliance with this Authority and to investigate any alleged breaches of the terms and conditions of it.

10. Are there any Special Conditions?

10.1 Special conditions are specified in Schedule 3. If there is a conflict between this Schedule 2 and the Special Conditions in Schedule 3, the Special Conditions will prevail.

11. Can the Authority be varied?

11.1 The Authority Holder may apply to the Grantor for variations to this Authority.

SCHEDULE 3

SPECIAL CONDITIONS

Conditions for all wildlife covered under this authority

1. This Authorisation gives the Authority Holder the right to hold absolutely protected wildlife in accordance with the terms and conditions of the Authorisation, but the wildlife remains the property of the Crown. This includes any dead wildlife, live wildlife, any parts thereof, any eggs or progeny of the wildlife, genetic material and any replicated genetic material.
2. Unless expressly authorised by the Grantor in writing, the Authority Holder must not donate, sell or otherwise transfer to any third party any wildlife, material, including any genetic material, or any material propagated or cloned from such material, collected under this Authority.
3. The Authority Holder is permitted to kill wildlife provided reasonable efforts have been made to meet all of the terms and conditions expressed and implied in this Authority.

Penguins

4. The activity of capturing, handling, and relocating penguins must be undertaken in accordance with the Authority Holder's Penguin Management Plan (dated 04 February 2021) which is attached in Appendix 1.

Capture and Handling of Penguins

5. Penguins must only be handled by Authorised Personnel listed in Schedule 1 Clause 3 or those operating under the direct supervision of the Authorised Personnel listed in Schedule 1 Clause 3.
6. Penguins can only be captured, handled, and relocated if they are not nesting and/or moulting. Any penguin that is nesting and/or moulting must not be captured, handled, and relocated until the nesting and/or moulting is complete. If any nesting and/or moulting penguin is located during construction, the area around the penguin's nest must be cordoned off. Temporary signs must also be established information that a penguin is present and not to be disturbed.
7. The Authority Holder must keep a record of all penguins encountered, captured and or relocated before or during construction. These records are to be provided to the Grantor on an annual basis every 1st May. Records must be emailed to permissionshamilton@doc.govt.nz and include the Authority Number and Authority Holder's name.

Injury and/or Death of penguins

8. If any penguins are injured as part of the Authorised Activity, the Authority Holder shall contact Authorized Personnel listed under Schedule 1 Clause 3 to get advice on the management of the penguin.
9. The Authority holder is authorised to euthanise any injured penguin on recommendation of the Authorised Personnel listed under Schedule 1 Clause 3 and/or a veterinarian.

10. If any penguin should die during the authorised activities of catching, handling and releasing, the Authority Holder must:
 - (a) Inform the Grantor within 72 hours. The body must be chilled (if it can be delivered within 72 hours) or frozen (if delivery of the body will take longer than 72 hours).
 - (b) Send the body to Massey University Wildlife Post-Mortem Service for necropsy. The Authority Holder must also provide the animal's history (i.e where it was captured).
 - (c) Pay for any costs incurred in investigation of the death of any penguins; and
 - (d) If required by the Grantor, ceased the Authorised Activity for a period determined by the Grantor.

Lizards

11. The activity of capturing, handling, and relocating lizards must be undertaken in accordance with the Authority Holder's Lizard Management Plan (dated 30 March 2021) which is attached in Appendix 2.
12. Lizards must only be handled by Authorised Personnel listed in Schedule 1 Clause 3 or those operating under the direct supervision of the Authorised Personnel listed in Schedule 1 Clause 3.
13. The Authority Holder must sterilise any instruments that come into contact with the lizards and/or are used to collect and measure lizards between each location.

Lizard Salvage (before and during construction)

14. Prior to construction commencing, the Authority Holder must undertake lizard salvage using the following methods:
 - (a) Installation of baited pit fall traps
 - (b) Installation of baited funnel traps
 - (c) Destructive searches and/or checking of existing lizard habitat by hand
15. The Authority Holder must ensure all live capture traps are covered to protect lizards from exposure and to minimise stress. Damp leaf litter or other material must be provided to reduce desiccation risk and the bottom of the trap must be perforated to allow drainage of water.
16. The Authority Holder must ensure all live capture traps are checked every 24 hours.
17. The Authority Holder must ensure lizards are individually held in a suitable container (i.e breathable cloth bag). Any lizards held in containers must be kept out of direct sunlight to minimise overheating, stress and death.
18. If, before or during construction, any lizard species which is Threatened, At Risk, or Data Deficient and not already listed in Schedule 1 Clause 1 of this Authority is encountered at the construction site, the Authority Holder must contact DOC District Office within 24 hours. All construction must cease until the DOC District Office and Authority Holder establish how to respond to this species and whether it can be:
 - (a) relocated to the existing release site; and/or
 - (b) put in a captive holding facility until the Grantor and Authority Holder have confirmed if an alternative release site is required. If this option is selected the cost of care and subsequent release of the species is the responsibility of the Authority Holder.

19. Completed Amphibian and Reptile Distribution System (ARDS) cards for all herpetofauna sightings and captures (<http://www.doc.govt.nz/conservation/native-animals/reptiles-and-frogs/species-information/herpetofauna-data-collection/ards-card/>) must be sent to Herpetofauna, Department of Conservation, National Office, PO Box 10420 Wellington 6143 or herpetofauna@doc.govt.nz.
20. Post-salvage the Authority Holder must remove all traps, track markers, flagging tape or other material used whilst undertaking the Authorised Activity to capture lizards.
21. For every year that lizard salvage is completed, the Authority Holder must provide a annual report to permissionshamilton@doc.govt.nz summarising outcomes in accordance with the Lizard Management Plan. Each report must include:
 - the permission number; and
 - the species and number of any animals collected and released; and
 - the GPS location (or a detailed map) of the collection point(s) and release point(s); and
 - results of all surveys, monitoring or research; and
 - description of how the Lizard Management Plan was implemented including any difficulties encountered with capture and handling, how release sites were assessed, post release monitoring and what contingency actions were required.

Injury and/or Death of Lizards

22. If any lizards are found injured as part of the Authorised Activity, the Authority Holder shall contact Authorized Personnel listed under Schedule 1 Clause 3 to get advice on the management of the lizard.
23. The Authority holder is authorised to euthanise the injured lizard(s) on recommendation of the Authorised Personnel listed under Schedule 1 Clause 3 or a veterinarian.
24. If any lizards should die during the authorise activities of catching, handling and releasing, the Authority Holder must:
 - (e) Inform the Grantor within 72 hours. The body must be chilled (if it can be delivered within 72 hours) or frozen if delivery of the body will take longer than 72 hours.
 - (f) Send the body to Massey University Wildlife Post-Morten Service for necropsy. The Authority Holder must also provide the animal's history (i.e where it was captured).
 - (g) Pay for any costs incurred in investigation of the death of any lizards; and
 - (h) If required by the Grantor, ceased the Authorised Activity for a period determined by the Grantor.

Monitoring of wildlife post-relocation

Penguins

25. No monitoring of penguins is required once they have been relocated from the construction site.

Lizards

26. Monitoring of lizards once they have been relocated from the construction site is only required if more than >20 lizards are captured pre-construction and/or during construction. If the Authority Holder exceeds the number of lizards captured the Authority Holder must inform the Grantor (via the DOC District Office) that post-monitoring will be undertaken.
27. If post-monitoring of lizards is required, the Authority Holder must carry out the following on an annual basis during late spring/early summer:
 - (a) Installation of artificial retreats on the Land one month to monitoring occurring. Retreats to be checked daily for a week before being removed from the site.
 - (b) Installing of baited tracking tunnels. Tunnels to be left on the Land for 2 nights before being inspected and removed from the site.
28. The Authority Holder must keep a record of lizards encountered during post-monitoring. These records are to be provided to the Grantor on an annual basis every 1st June. Records must be emailed to permissionshamilton@doc.govt.nz and include the Authority Number and Authority Holder's name.

SCHEDULE 4

Appendix 1 – Penguin Management Plan (04 February 2021), see [DOC-6620746](#)

Appendix 2 – Lizard Management Plan (30 March 2021), see [DOC-6620744](#)

Appendix 6: Stakeholder Responses and Feedback



Stakeholder	Comment	Addressed
GWRC	Recent work on arboreal gecko releases on Mana Island (see attached) suggests that they do better using a soft-release approach putting them into a pen to familiarise them with the new site. Admittedly we're not talking about tree dwelling species in this context, but releasing them into a fenced area in the dunes where they can acclimatise, might help them establish. This could take the form of some y-droppers and silt fencing dug into the sand to create a soft-release area."	I agree that generally penning is preferable to a hard release, and I have added this to the Plan, on the proviso that HCC are OK with a fence being installed there. If HCC would rather not have a fence in the dunes, I think a hard release will still be sufficient here as the site is constrained already, with the ocean on one side and the pathway/road on the other, so I think it is likely that they will remain reasonably close to the release site (dispersing laterally into the other dune vegetation over time).

Stakeholder	Comment	Addressed
DOC	<p>The description of the lizard habitats present is considered adequate, and the species and values present have been correctly identified. However, the most intact 'natural' habitat within the project footprint/temporary occupation areas that may have lizards appears to be the flax lands around the KiwiRail signal station, despite this area having been heavily modified in the past. Disappointingly, this was not physically surveyed for lizards. The stated reason for not accessing most of the coast was: "The proximity of the rail lines to the site created environmental and Health & Safety constraints which limited the ability to carry out ngārara/lizard surveys over much of the Project footprint." (2.2 Site Specific Surveys). In that case an effort could have been made to access at least the KiwiRail signal station site from the sea. Visual and hand searches, tracking tunnels and Onduline artificial cover objects (ACOs) could have been used to detect lizard presence; but not pit traps or Gee's minnow traps as they would require daily checks. that might not have been possible because sea conditions may have precluded the required daily landings to check traps.</p>	<p>I agree that it would have been preferable to be able to carry out surveys, particularly within the flax lands. At the time, we were told that we would not be able to access the site due to its proximity to the rail line and the health and safety concerns around that. Contingency actions have been included in the report for potential outcomes resulting from the lack of survey (e.g. higher densities of lizards than expected, Threatened species discovery).</p>
	<p>The suggested methodology for predator control at the release site, Petone foreshore is considered appropriate. However, DoC consider more detail is required to outline how the proposed predator control will remain in place for the 35-year term of consent. For instance, by who and how will the predator control be carried out and enforced?</p>	<p>The pest control section has since been expanded by a biosecurity specialist to provide more detail, and a separate Predator Control Plan has been prepared which provides detail on the preparation, deployment and maintenance of the trap networks.</p>

Stakeholder	Comment	Addressed
WCC	Section 4.1 [regarding areas of habitat avoidance / clearance minimisation: Will these areas be marked out for contractors?	Yes they will be, I have updated this section to include this.
	Section 4.3 [regarding the release site in Petone]: Just for clarity, does it mean that all lizards found in the project site will be relocated to the Petone site? Will there be an opportunity to move them back into the area once suitable habitat to support lizards have been created in the project site?	Yes, all lizards will be relocated to the Petone site, unless salvage numbers are too high in which case an additional release site may be required (outlined in Section 5.2). It is not intended that these specific lizards will be re-salvaged and moved back to the pathway, though there may be opportunities in future salvages near the site to use the revegetated areas along the path as a release site.
	Page 13: What is happening with the area near or surrounding the footpath. Is that a possible opportunity to create some habitat as close to the site as possible?	There will be areas of revegetation / habitat creation along the pathway, details of which are provided in the Cultural and Environmental Master Plan. XXXX
	Section 6.2 [re. who shall receive salvage and monitoring reports]: I suggest releasing it to the relevant Territorial Authority as well	Agreed, and have updated to include.
HCC	<p>Section 1.2 [regarding the need for a Wildlife Act Authority]: And also to be mindful that workers who may find a lizard should not attempt to capture themselves, but to alert a permitted person immediately.</p> <p>Workers/developers on the site should receive printed ID guide/habitat info to help ID incidental discoveries</p>	I generally agree, and Section 5.3 outlines what measures should be taken if a lizard is incidentally discovered. The exception is where there is an immediate risk of injury or death for a lizard, in which case it may be necessary for the construction team to salvage the lizard. Guidance will be provided to the team on these methods in advance of construction commencing.

Stakeholder	Comment	Addressed
	<p>Section 2.1 [regarding the threat status of lizards potentially present on the site]: It's important to note that although NT species may not be nationally threatened, they are in decline in GWR, as their habitat continues to be threatened from anthropogenic sources, including climate change</p>	<p>The current regional statuses (Crisp, 2020) for the Not Threatened species listed (northern grass skink, raukawa gecko) are regionally Not Threatened; however the At Risk - Declining copper skink does have a regional status of Threatened - Regionally Critical. I have updated the report to include this.</p>
	<p>Section 2.2 [regarding lack of site-specific surveys]: Although terrestrial lizards are cryptic in nature, surveying needs to be done prior, as summer is prime time for monitoring, as they go into torpor during cooler weather. Passive monitoring, as Deb mentioned below may be able to mitigate health and safety risk</p>	<p>Surveys haven't been carried out because large portions of the site have been inaccessible. Survey-to-salvage is considered to be a suitable approach here, where surveys will be carried out in all potential habitat areas, and where lizards are discovered, they will be captured and relocated. This will be done during the appropriate survey/salvage season</p>
	<p>Section 2.2 [as above]: Have you specifically designed tracking tunnel tubes that measure lizard tracks (like the rodent tracking tunnels) as an option? Tracking cards, you want the ones from Gotcha Traps as they have special ink that last longer.</p>	<p>The difficulties with carrying out surveys weren't so much for the methods that we would use, but the accessibility of the site. The close proximity to the rail line and to the sea meant that at the time we were unable to gain access.</p>
	<p>Section 3.3 [regarding lizard habitats onsite]: Has there been some engagement/consultation with the Wellington Regional Lizard Group ?</p>	<p>Not the group specifically, though there has been with a number of the organisations within the group.</p>
	<p>Section 3.3 [regarding the suitability of mown grass as lizard habitat]: Although not suitable, skinks have been found in mowed grass before if nearby a food source</p>	<p>Agreed that lizards will occasionally venture from their primary habitat into mown grass for basking or foraging, and have updated to include this. The point here is that mown grass is not typically occupied by lizards, and with any disturbance (e.g. the presence of people or operating machinery) they would not be found here.</p>
	<p>Section 3.1.4 [regarding potential breeding suppression as a result of habitat fragmentation: Yes, so gravid females should be noted and recorded for DOC</p>	<p>Agreed, have updated within the salvage section of the report.</p>

Stakeholder	Comment	Addressed
	Section 4.1 [regarding habitat avoidance / clearance minimisation]: Re-vegetation to be proposed, a suggestion is creating enrichment areas where vegetation is lacking or where planted species may not be fully mature. DOC has guides for creating enrichment sites	Yes, revegetation will be carried out in areas along the revetment, as well as dune restoration planting along the Petone foreshore. Both will include a variety of appropriate habitat species.
	Section 4.1 [as above]: How many permits will be given?	I assume this is referring to the Wildlife Act authority - only one authority has been issued / will be required. There are several ecologists named on this permit, and other suitably qualified or experienced ecologists can also carry out the work under a named ecologist's supervision.
	Section 4.2 [referring to risk of injury, death or other adverse effects throughout the salvage and construction process]: This should all be recorded and sent to DOC	Any observed death or injury to lizards will be recorded and relayed to DOC, which is a requirement of the Wildlife Act authority.
	Section 4.2 [regarding the phrase "suitably qualified herpetologist"]: What's the qualification for this?	An appropriate qualification in ecology/biology and appropriate experience in herpetology. I have updated the report to include "suitably experienced".
	Section 4.2 [regarding where salvage will be carried out]: Must be away from human and dog traffic	Salvage areas will be separated from public access by fencing.
	Section 4.2.1 [regarding pitfall traps]: And re-baited with pear if necessary and hydrated with water within pitfall. Once lizards are captured, will they be toe clipped or marked for re-capture data?	Have updated to clarify use of bait and wet sponge. Lizards will not be permanently marked as the benefits for post release monitoring do not outweigh the injury / potential stress from toe-clipping. It is our understanding that mana whenua are also against permanent marking of lizards.
	Section 4.2.1 [re. the need for "fine-weather days"]: Even if there are heavier cloud coverage, warmer temperatures may still yield results	Agreed, have clarified wording

Stakeholder	Comment	Addressed
	<p>Section 4.3 [re. release site on Petone foreshore]: CONCERNS: This site has the most foot traffic from the path and buildings; café, rowing club, toilets to the beach. The wall opening is wide for trolleys, kayaks and canoes. I would suggest however that wherever the lizards are relocated to, needs to have pest control appropriate to the protection of lizards.</p> <p>The Petone wharf rebuild is due to start which means equipment and machinery - more noise, more lights, more disturbance.</p> <p>Your identified release site is an area that the coastal care</p>	<p>Yes, this site does have a reasonably high level of disturbance; however, with the provision of appropriate cover (which is available within these plantings) we believe that it is still suitable to support a population of terrestrial, coastal lizards. Populations are regularly found in high disturbance areas throughout the region, e.g. the approx. 400 lizards found along the Cobham Drive berm during the cycleway redevelopment in Wellington.</p> <p>The release site was chosen based on conversations with mana whenua, DOC, and Greater Wellington. Initially we had a number of different sites in mind; however, they were vetoed based on distance from the site (eastern bays were considered but the release site should be kept as close as possible to limit the risk of relocating into a genetically distinct population) existing high numbers of lizards, or potential for future development which would put lizards at further risk (e.g. we favoured the creation of new habitat at Honiana Te Puni, but mana whenua are uncertain as to the future of the reserve and so the protection of a release site there cannot be guaranteed).</p>
	<p>group manage weeding, cut & paste control, pest removal and planting every Wednesday morning.</p> <p>There may be a better site, with elevation, wider beach area, with small woodland areas at the eastern end away of the foreshore, closer to the Hutt River.</p>	<p>The release site was confirmed by email with Janet Lawson, a representative from HCC. We initially asked about an area of duneland further east along the beach and this area by the wharf was recommended by her instead, based on the more established vegetation and cover.</p>

Stakeholder	Comment	Addressed
	Section 4.3 [as above]: There are concerns for this release area. Heavy food traffic, including off-lead dogs. Rubbish gets blown in or haphazardly strewn here from recreational activity.	See above. Rubbish removal will also be included in site restoration works
	Section 4.3 [re. lizard dispersal from release site into adjacent vegetated dune areas]: Are there opportunities for a population of lizards to expand into new areas? These lizards have to run on open sand between planted sections, predators, human foot traffic, domestic animals and storm surges.	The areas of open sand between the vegetated areas are generally narrow (3-8 m) and will be further reduced as restoration occurs across the beach, either by FOPB or as part of the mitigations for these works. The species that we expect to salvage (e.g. northern grass skink) should be able to disperse across these areas reasonably easily.
	Section 4.3.1 [re. post-construction revegetation]: List out species? E.g. taupata, etc. Mixture of wind resistant species, low growing shrubs	
	Section 4.3.2 [re. predator control at release site]: What about Post translocation monitoring of the population? For how long? I'd say 3-5yrs. It is too easy to dump the lizards somewhere and not monitor whether the individuals or the population stick around and successfully establish. Need very good predator control at release site for DOC permission.	Post release monitoring is summarised in section 6. Predator control section has also been updated to provide more detail
	Section 5.1 [re. threatened species contingencies]: Especially gravid females. Gravid females of NT should also be highly noted.	All gravid females captured will be noted and details provided to DOC
	Section 5.2 [re. need for additional release site if high numbers are salvaged]: Doc already have a release site at Camp Bay, past Burdon's Gate.	Could be considered, though is quite far from the salvage site which was a key consideration in finding the primary release site.
	Section 6.1 [re. post release monitoring]: Opportunity for public engagement here to raise awareness	Agreed - we will consult with HCC prior to commencing monitoring to confirm public engagement opportunities

Stakeholder	Comment	Addressed
	Section 6.1 [as above]: Conducted by Boffa Miskell? Wildlands?	The post-release monitoring will be carried out by a qualified and DOC-authorized ecologist. This will very likely be done by Boffa Miskell, but given the extended timeframes this is not guaranteed.
	Section 6.2 [re. who shall receive salvage and monitoring reports]: And HCC is the landowner - we would require reports sent to our ecologist for review and consultation.	Have updated to include TAs.
Mana Whenua	Overall, the plans are very light on any references to iwi mana whenua and no references to the connection that mana whenua have in relation to ecology and the broader environment nor do the plans highlight any possible opportunities for iwi mana whenua. Both the Mana Whenua Values Plan and the Cultural Impact Assessment articulates this in a very succinct way and could be used to help with that content.	The Lizard Management Plan has been updated to include a section on mana whenua (Section 1.2) and further references mana whenua in Sections 1.3 and 6.1.

Stakeholder	Comment	Addressed
	<p>In addition, the plans don't highlight any possible opportunities for iwi mana whenua to be involved in the work outlined in these plans. After reading the plans, I can see a nice package here for iwi mana whenua to be involved, be exposed and/or upskill Māori in ecological management e.g. working alongside ecologists to take part dune restoration, predator control, species relocation, monitoring etc. Unsure whether this is relevant for the management plans but keen to start work on framing up these opportunities with the ecologists. I haven't done much work to date but I know that has been something on the MWSG's radar. Will be interested in understanding from Boffa whether there are any examples of iwi and ecologists working together to achieve the best ecological outcomes in these works and what these opportunities could look like e.g. opportunities for work experience, internships, training etc.</p>	<p>The post-release monitoring section has been updated to include opportunities for mana whenua involvement.</p>



Te Ara Tupua Alliance
Shifting gear to connect past, present and future

3

Avifauna Management Plan

NKP-TAT-000-MPN-GV-NS-000026



Quality Assurance Statement		
Prepared by:	Karin Sievwright Dr Leigh Bull	
Reviewed by:	Dr Leigh Bull	

Revision Schedule		
Rev. Number	Date	Description
<i>Internal reviews</i>		
A	3/10/2022	Draft document for information and internal reviews
B	16/10/2022	Draft document for stakeholder reviews
C	19/01/2023	Final draft document for review by Waka Kotahi
<i>Submission for certification</i>		
1	21/03/2023	Final plan for certification
2	19/04/2023	Amended based on GWRC feedback

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Glossary

ACRONYM / TERM	DEFINITION
Active burrow / nest	A kororā burrow containing, or suspected to contain, a nesting bird, viable nest contents (egg(s) and / or chick (s)), or moulting bird based on the time of the year and other evidence observed at the burrow location by a Suitably Qualified Person (SQP).
BNMP	Beach Nourishment Management Plan
CEDMP	Cultural and Environmental Design Master Plan
CEMP	Construction & Environmental Management Plan
Certify, certification and certified	Confirmation from a council that a management plan meets the requirements of the conditions of the consents or designation that relate to it.
CMA	Coastal marine area
CNVMP	Construction Noise & Vibration Management Plan
Construction works	Activities undertaken to construct the Project under the designations / resource consents, excluding Enabling Works.
Direct impact	An outcome resulting in changes to an ecological feature that is directly attributable to a defined action.
DOC-permitted korora handler	A person who is listed Schedule 1 clause b of the Wildlife Act Authority 91847-FAU (provided in Appendix 1).
Department of Conservation / DOC	The agency responsible for issuing Wildlife Act Authorities (WAA)
Effects zone	The zone around an active kororā burrow (defined above) in which effects need to be managed when undertaking construction works. For any rock removal and piling works this zone is 10 m (consent condition EM.6C b)i.). For other construction activities this zone is where 75 dB $L_{Aeq(15min)}$ is achieved outside of the entrance of an active penguin burrow (consent condition EM.6C b)iii.). However in the case of kororā found nesting or moulting on the surface (i.e. under vegetation), methods will be investigated to try and achieve sustained airborne noise levels generated from construction to 70 dB $L_{Aeq(15 min)}$.
Enabling works	Includes the following and similar activities: <ul style="list-style-type: none"> • Geotechnical investigations (including in the CMA) and land investigations, including formation of access on land for investigations; • Modification of potential penguin habitat; • Establishing site yards, site offices, site entrances and fencing; • Constructing site access roads; • Demolition and removal of buildings and structures; • Relocation of services; and • Establishing mitigation and ecology offset or compensation measures (such as erosion and sediment control measures, earth bunds and planting).
Environmental Advisor / EA	Conduit between the ecology and construction team to ensure the appropriate environmental and ecological procedures / practices are implemented on the Nga Ūranga ki Pito-One project site.
Exclusion zone	A demarcated area around an active kororā burrow or nesting tōrea pango in which no works are to occur.
GWRC	Greater Wellington Regional Council
HCC	Hutt City Council
Indirect impact	An outcome resulting in changes to an ecological feature that is at some distance from the source.
Kororā detection	Includes at least one of the following: <ul style="list-style-type: none"> • positive indication by the penguin detector dog; • sign (e.g. kororā feathers and / or guano); • visual confirmation of an adult bird or chick.
Manager	The Manager – Resource Consents, of the relevant council, or authorised delegate.
MHWS	Mean high water springs



ACRONYM / TERM	DEFINITION
MLWS	Mean low water springs
MWSG	Mana Whenua Steering Group
Offshore habitat	A man-made offshore habitat created for the purpose of providing separated roosting habitat for coastal birds.
Penguin detector dog	A dog that has been certified by DOC to detect kororā.
PEP-C Manager	Partnerships, Environment, Planning and Communications Manager
Project	The construction, operation and maintenance of the Ngā Ūranga ki Pito-One Shared Path section of Te Ara Tupua, and associated works.
RMA	Resource Management Act (1991)
Shared path	A shared use path for pedestrians, cyclists and other active modes between the Ngauranga Interchange (Ngā Ūranga at the junction of State Highway 1 (SH1) and State Highway 2 (SH2)) and just south of the Pito-One Railway Station.
Suitably qualified person / SQP	A person with a tertiary ecology (or similar) qualification and experience working with kororā (or if a tertiary qualification is lacking, a person with kororā experience that is approved by DOC). They will be responsible for supervising and advising on kororā management actions for the project as required.
Ūranga	Six areas along the Nga Ūranga ki Pito-One alignment where the design incorporates landings.
WCC	Wellington City Council
Wildlife Act Authority / WAA	Authorisation obtained from to DOC to undertake specific tasks associated with specific wildlife, by named persons at specific sites. For the purpose of this project, Authorisation 91847-FAU (provided in Appendix 1) has been obtained from DOC for the purpose of handling kororā during the construction of Nga Ūranga ki Pito-One.
Working day	Has the same meaning as in Section 2 of the RMA



Key kororā management points

- In all instances of habitat modification and rock removal works, and any other works that will have a direct impact on kororā, a pre-works survey in kororā habitat must be conducted irrespective of the time of year (i.e. must occur in the non-breeding and non-moulting period too).
- In all instances, the SQP will make the final call in regard to when areas are clear of kororā or active burrows, and therefore when the works can commence.
- No works will occur within established exclusion zones until it has been determined by the SQP that the burrow is no longer active.
- Only those persons named in Schedule 1 of the WAA are authorised to handle kororā.
- Under no circumstances will breeding or moulting birds be handled or relocated.
- The SQP will be contacted immediately upon the incidental discovery of any injured or dead kororā.
- The SQP will be contacted immediately upon the incidental discovery of a kororā within the works area. While awaiting the arrival of the SQP on site, an unobstructed pathway shall be maintained between the bird and the water.
- Noise mitigation measures will be implemented to ensure that sustained airborne noise levels generated from construction are below 75 dB LAeq(15 min) as measured outside of the entrance of an active penguin burrow or moulting penguin roost. However in the case of kororā found nesting or moulting on the surface (i.e. under vegetation), methods will be investigated to try and achieve sustained airborne noise levels generated from construction to 70 dB LAeq(15 min).

Key tōrea pango management points

- Surveys for breeding tōrea pango will be undertaken prior to works occur in areas identified as potential habitat.
- Exclusion zones will be established around breeding birds.
- No works are to occur within 20 m of a nest.
- No works will occur within established exclusion zones until it has been determined by the SQP that the breeding activity is completed
- In the case of an injury or death of a tōrea pango associated with the Project works, or the discovery of a nest, the SQP must be contacted.
- At no time will tōrea pango or nest contents be handled or relocated; this Project does not have authority under the Wildlife Act (1953) to do so.



Table of Contents

1	Introduction.....	5
1.1	Plan structure.....	5
1.2	Roles & responsibilities.....	7
1.3	Constructor training	8
1.4	Iwi mana whenua opportunities	8
2	Kororā / Little Penguin.....	9
2.1	Kororā habitat along Nga Ūranga ki Pito-One	10
2.2	Kororā distribution along Nga Ūranga ki Pito-One	11
2.3	Kororā management.....	12
2.3.1	Kororā surveys.....	12
2.3.2	Exclusion zones around active burrows	13
2.3.3	Habitat modification	13
2.3.4	Rock removal	15
2.3.5	Piling	17
2.3.6	All other enabling and construction works	19
2.3.7	Protocols if kororā are incidentally discovered during works.....	22
2.3.8	Kororā relocation records	23
2.3.9	Injury and /or death of kororā.....	23
2.4	Reporting	23
3	Tōrea Pango / Variable Oystercatcher.....	24
3.1	Tōrea pango habitat & distribution along Nga Ūranga ki Pito-One	25
3.2	Tōrea pango management	25
3.2.1	Tōrea pango surveys	27
3.2.2	Exclusion fencing / demarcation & signage.....	27
3.2.3	Protocols if nesting tōrea pango are incidentally discovered during works	28
3.2.4	Injury or death of tōrea pango.....	28
4	Measures to Enhance and Protect Coastal Avifauna.....	29
4.1	Kororā nesting	29
4.2	Coastal avifauna roosting	29
4.3	Visual screening	30
4.4	Fencing	30
4.5	Plugging of “chimneys” in armour units	30
5	References	31
	Appendix 1: Wildlife Act Authority 91847-FAU	32
	Appendix 2: DOC kororā nest box design	33
	Appendix 3: Habitat Maps.....	38
	Appendix 4:Stakeholder Responses and Feedback	39



1 Introduction

Te Ara Tupua Alliance are constructing the Nga Ūranga ki Pito-One section (the Project) of Te Ara Tupua shared path in Wellington. This involves construction of a 4.5 km-long shared path from the Ngauranga interchange (Nga Ūranga) to just south of the Petone Railway Station in the north (Pito-One). The ecological assessment for the project identified the presence of breeding kororā/little penguin (*Eudyptula minor*) and tōrea pango/variable oystercatcher (*Haematopus unicolor*) along the alignment (Boffa Miskell Ltd, 2020), both of which are classified as *At Risk* (H. A. Robertson et al., 2021).

As such, a number of resource consent conditions for the project relate to coastal avifauna, specifically kororā and tōrea pango (listed in Table 1.1). This Avifauna Management Plan (AMP) forms part of the Ecological Management Plan (EMP), and outlines the measures required to manage these species during the enabling and construction work phases of the Nga Ūranga ki Pito-One project.

As part of the Wildlife Act Authority process for Nga Ūranga ki Pito-One, a kororā construction management plan (Boffa Miskell Ltd, 2021) was prepared and provided to DOC as part of the WAA application; details pertaining to the method for capture, handling and transport of non-breeding or non-moulting kororā to an approved relocation site as part of the Nga Ūranga ki Pito-One enabling and construction works are provided in that plan, and as such are not repeated here.

1.1 Plan structure

This AMP has been structured around the requirements that are outlined in the relevant consent conditions. Table 1.1 lists each of the relevant consent conditions and provides a hyperlink to the sections in this plan that describe the measures that give effect to each consent condition, or to the alternative relevant Plan.

Table 1.1: List of consent conditions relevant to this Avifauna Management Plan and the corresponding sections of the plan that give effect to each condition.

RESOURCE CONSENT CONDITION		LOCATION IN THIS PLAN
EM.5	Project works in the CMA shall be designed to achieve the following in relation to coastal avifauna:	
	a) Encourage long-term retention of shingle beaches by placing salvaged shingle beach material during construction, constructing six seawalls with rip rap along the coastal edge of the Shared Path and groynes at locations where they would support long-term survival of the retained beaches; and	Refer to the BNMP
	b) Minimise the effects of disturbance on birds at shingle beaches by providing habitat screens at each seawall alongside shingle beaches.	Section 4.3 (page 29) CEDMP
EM.6A	If modification of the potential penguin habitat identified on the map in Attachment E is undertaken to discourage penguins from nesting within the Project area, the following shall apply;	
	a) Within the 24 hours prior to any penguin habitat modification works, a penguin detector dog shall confirm the presence or absence of active nests or moulting penguins; and	Section 2.3.1 (page 12) Figure 2 (page 14)
	b) The modification of potential penguin habitat shall be undertaken during the period 1 March to 15 June (i.e. the non-breeding and non-moulting season); or	
	c) Outside of the period in (b), habitat modification works can be undertaken where nesting or moulting penguins are confirmed to not be present.	Section 2.3.3 (page 13)
	<i>Advice note: The penguin habitat modification works could include infilling and/or netting of potential nesting habitat.</i>	
EM.6B	The EMP shall contain the following in relation to coastal avifauna:	



RESOURCE CONSENT CONDITION	LOCATION IN THIS PLAN
a) Measures proposed to avoid potential adverse effects of enabling works and construction works on penguin, including:	Section 2.3.6 (page 19)
i. Details of potential penguin habitat including the location of that potential habitat as identified on the map in Attachment E and a description of the characteristics of the potential habitat;	Section 2.1 (page 10)
ii. Results of a field survey of the Project footprint undertaken by a Suitably Qualified Person to confirm the location of the potential habitat area(s);	Section 2.2 (page 11)
iii. A pre-construction survey of rocky infauna at shingle beaches under the Project footprint as per Condition EM.23;	Refer to the Smeagol Management Plan
iv. The frequency of on-going checks for nesting or moulting birds;	Section 2.3.1 (page 12)
v. Details of the 20 nesting boxes incorporated into the Piki Wahine Point Ūranga for nesting penguins and the natural boulders for the revetment material.	Section 4.1 (page 29)
b) Measures proposed to avoid potential adverse effects of enabling works and construction works on variable oystercatchers, including:	
i. Details of potential variable oystercatcher habitat including the location as identified on the map in Attachment E and a map or description of the characteristics of potential habitat;	Section 3.1 (page 24)
ii. Results of a field survey undertaken by a Suitably Qualified Person to confirm the identified area(s);	Section 3.1 (page 24)
iii. If works are to occur within 20 metres of an area identified as potential variable oystercatcher nesting habitat during the breeding season (being the period from 1 September to 30 March), a Suitably Qualified Person shall check for the presence of active nests immediately prior to the works; and	Section 3.2 Figure 8 (page 26)
iv. If an active nest is discovered in an area within 20 metres of the work site(s), works within this 20 metre buffer shall be delayed and no person or machinery shall enter the buffer area until nesting is complete.	Section 3.2 Figure 8 (page 26)
c) Details of the number and design of tall structures such as wooden poles incorporated into the Ūranga designs to provide safe roosting habitat for species such as shags and gulls.	Section 4.2 (page 29) CEDMP
d) Methods to place salvaged beach material during construction including placing material at the back of the beach and the toe of the seawall, and by placing material by hand to minimise habitat disturbance; and	Refer to CEMP and BNMP
e) Roles and responsibilities for coastal avifauna management. <i>Advice note: The breeding and moulting season for penguin is 16 June to 28 / 29 February and the breeding season for variable oystercatcher is 1 September to 30 March.</i>	Section 1.2 (page 7)
EM.6C a) Within the 24 hours prior to each Enabling Works or each Construction Works activity undertaken between 16 June to 28 / 29 February, a penguin detector dog shall confirm the presence of absence of active nests or moulting penguins;	Section 2.3.1 (page 12)
b) If an active nest or moulting penguin is discovered under clause (a), until such time that nesting or moulting is complete the following applies:	
i. No rock removal or piling activities shall be undertaken within 10 metres of the active nest or moulting penguin; and	Section 2.3.4 (page 15) Figure 3 (page 16)

RESOURCE CONSENT CONDITION		LOCATION IN THIS PLAN
	ii. People and plant are able to move past the active nest or moulting penguin to access other works sites across the Project, subject to the movement occurring as quickly as practicable and avoiding unreasonable noise; and	Section 2.3.2 (page 13)
	iii. Except as provided for by clauses (i) and (ii), no other activity may occur in proximity to an active nest or moulting penguin unless that activity can achieve a maximum sound level of 75 dB LAeq(15min) as measured outside of the entrance of an active penguin nest or moulting penguin roost.	Section 2.3.6.1 (page 21) Figure 5 (page 20)
	c) If an active nest or moulting penguin is discovered in an area within 20 metres of the work site(s), fortnightly monitoring shall be undertaken to confirm whether nesting or moulting is ongoing at the site until nesting or moulting is complete.	Section 2.3.1 (page 12)
EM.6D	During construction of the revetment, a Suitably Qualified Person shall provide ecological input into seawall construction and placement of those boulders and concrete armour units for the purpose of providing suitable penguin habitat, and in particular burrows.	Refer to Costal Works CEMP

1.2 Roles & responsibilities

As per Condition EM.6B(e) this section outlines the roles and responsibilities for coastal avifauna management:

- The Suitably Qualified Person (SQP) is responsible for:
 - training the Alliance’s construction team to identify signs of kororā habitation, secure work sites and what to do if a kororā is incidentally discovered during works (as outlined in Section 1.3, page 8).
 - conducting pre-work surveys (as outlined in Section 2.3.1, page 12).
 - determining if kororā burrows within the project area identified during pre-work surveys are active (as defined in the Glossary) or not.
 - advising on the establishment and removal of exclusion zones around active kororā burrows (Section 2.3.2, page 13) and tōrea pango nests (Section 3.2.2, page 27).
 - supervising revetment rock removal (Section 2.3.4, page 15) and habitat modification works (Section 2.3.3, page 13).
 - supervising and advising on the reinstatement of rock revetment post-works.
 - making the final call in regard to when areas are clear of kororā and enabling or construction works can commence.
 - providing general kororā advice during enabling and construction works.
 - advising on locations for nest box placement and supervising nest box installation.
 - collection of kororā data pertaining to pre-work surveys and relocation of birds (Section 2.3.8, page 22).
- The Environmental Advisor (EA), PEP-C Manager or another delegate is responsible for:
 - liaising with the SQP on the timing of enabling and construction works and when avifauna surveys are required.
 - liaising with the Alliance’s construction team to implement the installation of exclusion zones around active kororā burrows (Section 2.3.2, page 13) and tōrea pango nests (Section 3.2.2, page 27) as advised by the SQP.
 - liaising with the acoustics specialist as required.
 - Undertake the necessary inspections of exclusion zones to ensure they are functioning as intended, and reinstate as needed (Sections 2.3.2 and 3.2.2).
 - contacting a SQP upon incidental discovery of kororā, including injured or dead birds (as outlined in Section 2.3.7, page 22).
 - maintaining the airborne noise register (as outlined in Section 2.3.6.1, page 21).



In addition, the key contacts list for these and other roles will be maintained in accordance with the CEMP.

1.3 Constructor training

As part of the Project site induction, the SQP will provide training to the Alliance’s construction team to:

- identify signs of penguin habitation (e.g. moult feathers and guano (penguin poo));
- discuss actions required to secure work sites, construction materials and equipment to prevent kororā access; and
- brief staff on the process to be followed should a kororā be found during enabling or construction works (outlined in Section 2.3.7, page 22), including separate processes for dealing with injured, uninjured and dead penguins (outlined in Section 2.3.9, page 23).

Note, the training will not include advice on how to handle kororā, as this will only be done by those people listed in Schedule 1 Clause 3 of WAA 91847-FAU.

1.4 Iwi mana whenua opportunities

The Mana Whenua Values Plan (Taranaki Whānui, Ngāti Toa Rangatira and Te Ara Tupua Alliance, 2022) outlines the key values and priorities for Te Ara Tupua from the perspective of mana whenua Taranaki Whānui ki te Ūpoko o te Ika (Taranaki Whānui) and Ngāti Toa Rangatira (Ngāti Toa), developed in partnership with Te Ara Tupua Alliance. As outlined in the MWVP, opportunities for iwi mana whenua on Te Ara Tupua project include providing kaitiaki services as follows:

<p>Kaitiaki: Members of iwi with strong commitment to be actively and regularly involved in kaitiakitanga and environmental activities.</p>	<ul style="list-style-type: none"> ▪ Provide kaitiaki services to Te Ara Tupua project including but not limited to: ▪ environmental monitoring; ▪ river and stream water quality monitoring; ▪ harbour water quality monitoring; ▪ Kūtai/Mussel bed restoration programme; ▪ Wildlife species protection and ecological programmes; ▪ Penguin and Lizard translocation and monitoring programmes; ▪ Planting and site rehabilitation programmes;
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With respect to avifauna species, the opportunities for iwi and project ecologists to work together will enable the mutual transfer of knowledge and skills. Such opportunities on site could include, but are not limited to:

- Working together to undertake the monitoring and management of kororā and tōrea pango during construction, as outlined respectively in Sections 2 and 3 of this plan;
- Working together to establish the kororā nesting habitat along the project alignment as outlined in Section 4.1.



2 Kororā / Little Penguin

Kororā / (*Eudyptula minor*) (Photo 1) are protected under the Wildlife Act (1953). They are native to New Zealand and Australia and are the smallest of all the 17 penguin species. In New Zealand they are widely distributed along the coastlines of the main and offshore islands (Heather & Robertson, 2015; Marchant et al., 1990), with the national population estimated to be c. 50,000-100,000 (C. J. R. Robertson & Bell, 1984; Taylor, 2000). They breed in loose colonies and in Wellington they breed around much of the Wellington Harbour coastline. The largest colony in Wellington is on Matiu-Somes Island, which has an estimated c. 300 pairs / 700+ adults (de Lisle 2014, Rumble 2018b, Taylor 2018 *in* Overmars (2019)).



Photo 1. Adult kororā / little penguin.

Kororā are nocturnal on land, typically coming ashore after dusk and leaving before dawn. Adults are present at colonies throughout the year, though numbers are lowest between completion of moult (April) and start of breeding (July) (Marchant et al., 1990). Bullen (1997) reported very few birds on Matiu/Somes Island from March-June.

For most colonies in New Zealand the breeding season begins around August and continues until January when chicks fledge (Davis & Renner, 2010). The yearly cycle of kororā on Matiu/Somes Island has three overlapping stages (Figure 1): (1) occupation of burrows and pair formation; (2) breeding (eggs and chicks); and (3) moulting. Egg laying (one or two eggs) generally occurs from late July through to mid-November, with a peak period from late August to late September (Bull, 2000; Kinsky, 1959, 1960). Chicks generally fledge the nest between December and February. Moulting occurs post-breeding between January and March. Kororā are confined to land during the annual moult (mainly between January and March), during which all feathers are replaced simultaneously over the period of 2-3 weeks (Gales et al., 1988; Kinsky, 1960; Reilly & Cullen, 1983). Moulting birds fast for the entire moult period as they are unable to swim without getting water-logged (Heather & Robertson, 2005).

As noted in the consent conditions, for the purposes of Nga Ūranga ki Pito-One project, **the breeding and moulting season for kororā is 16 June to 28 /29 February.** We note that the current dates for the breeding and moult period are specific and kororā monitoring in the effects zone during this period will ultimately inform when construction works can commence.

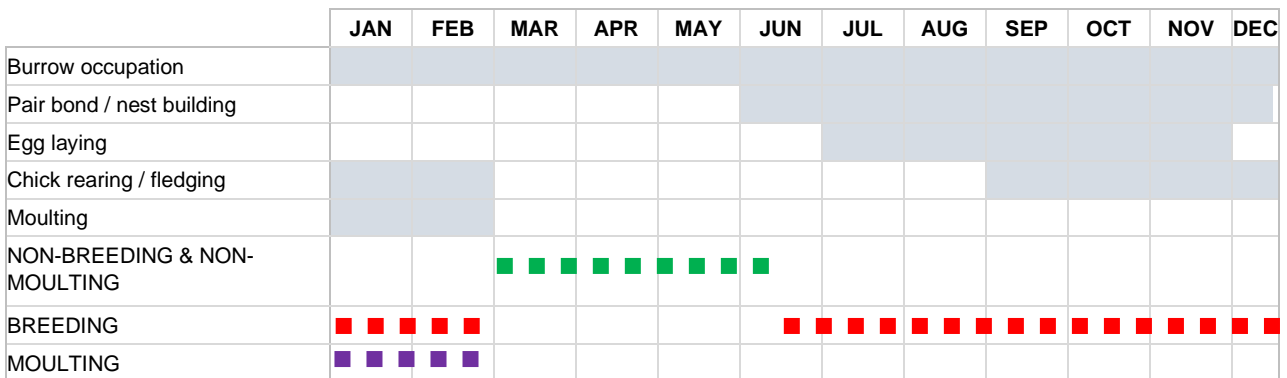



Figure 1: Indicative¹ breeding cycle of kororā in Wellington Harbour (shaded cells indicate that activity could be occurring)

2.1 Kororā habitat along Nga Ūranga ki Pito-One



Along the coastal margin of the Nga Ūranga ki Pito-One alignment, crevices in the loose rip-rap above mean high water springs (MWHS) provide potential nesting (and moulting) habitat for kororā. Areas of rock-embedded concrete do not provide nesting or moulting habitat for kororā as it does not contain any crevices or voids for the birds to occupy.

As per Condition EM.6B(a)(ii), a survey has been undertaken (31 March 2021) along the Nga Ūranga ki Pito-One alignment by a SQP to characterise and map kororā habitat along the alignment. Based on the information gathered during that site visit, two kororā habitat categories (potential habitat and no habitat) were identified (refer to Table 2.1). The distribution of these kororā habitat categories along the Nga Ūranga ki Pito-One alignment are shown on Map 1; the coastal edge comprises approximately 2.02 km of ‘potential habitat’ and 2.13 km of ‘no habitat’. This delineation of kororā habitat along the alignment is available as a layer on the Te Ara Tupua GIS platform.

Table 2.1: Kororā habitat categories identified along Nga Ūranga ki Pito-One alignment (shown on Map 1).

CATEGORY	CHARACTERISTICS ABOVE MHWS	EXAMPLE PHOTOS
Potential kororā habitat	<p>Mix of large boulders / material and smaller rocks with numerous interstitial spaces.</p> <p>The interstitial spaces are of sufficient size to allow a kororā to nest or moult in.</p>	

¹ Based on information in the following sources: Bullen (1997), Kinsky (1959, 1960).

CATEGORY	CHARACTERISTICS ABOVE MHWS	EXAMPLE PHOTOS
		
No kororā habitat	Concrete-embedded riprap above MHWS which has no interstitial spaces and therefore no opportunities for nesting or moulting.	

2.2 Kororā distribution along Nga Ūranga ki Pito-One

To date, a number of kororā surveys have been undertaken along the Nga Ūranga ki Pito-One alignment using a penguin detector dog. The details of each kororā survey (including date and location / chainage) is saved in an excel spreadsheet.

During each survey, potential burrows that are identified (either by a dog indication or by kororā sign observed) are given an individual number. The results at each burrow are recorded as a GIS layer on a mobile device (e.g. tablet or phone) which is accessible via the Te Ara Tupua GIS platform.

Map 1 shows the distribution of penguin detections that have been identified to date along the Nga Ūranga ki Pito-One alignment; with the exception of one burrow, all of the dog detections were located in the areas identified as potential kororā habitat (refer to Section 2.1 above). The one exception was at a location where a bird had accessed a crack in the concrete-embedded rip-rap. Nevertheless, this survey confirmed that the areas of kororā habitat along Nga Ūranga ki Pito-One alignment have been accurately identified.

As such, the habitat characterisation and survey work undertaken to date has provided the project with a basis for identifying likely locations that will be utilised by kororā, and has been used to inform the kororā management approach to surveying for enabling and construction works (refer to Section 2.3.6 below).

2.3 Kororā management

Under no circumstances will breeding² or moulting birds be handled or relocated.

2.3.1 Kororā surveys

Note that for habitat modification (Section 2.3.3) and rock removal works (Section 2.3.4), and any other works that will have a direct impact on kororā, a pre-works survey in kororā habitat must be conducted irrespective of the time of year (i.e. must occur in the non-breeding and non-moulting period too).

Schedule 2 Clause 2.2 of the approved WAA (91847-FAU) for the Project (Appendix 1) requires the Authority Holder to advise DOC's local Operations Manager(s) one week prior to carrying out the Authorised Activity in the District. As such, prior to conducting pre-works surveys, the PEP Manager or a designated person on behalf of Waka Kotahi, will contact DOC to make them aware that surveys will be conducted within the project area and associated capture, handling and relocation of non-breeding and non-moulting kororā may be required.

While consent condition EM.6C(a) requires a penguin detector dog survey within 24 hours prior to each enabling works or construction works activity undertaken between 16 June to 28/29 February, the condition makes no mention of the extent over which this survey needs to be conducted (i.e. within the vicinity of the proposed works or along the entire alignment). As such, we have interpreted this condition as pertaining to locations of known kororā habitat (refer to Map 1). Pre-work surveys are not required at locations where works will occur in areas that contain no kororā habitat (refer to Map 1), nor where works will occur adjacent to known kororā habitat in which known burrows are located beyond the effects zone.

If a penguin is detected during the survey, a burrowscope or camera will be used to assist with identifying the burrow contents. Some burrows are very convoluted and even with a burrowscope or camera, it may not be possible to determine burrow contents. In such situations, the SQP assisting with the survey will make an educated decision based on presence of penguin sign around the entrance of the burrow and the strength of the indication from the penguin detector dog. The following information will be recorded for each kororā detection:

- Date and time of detection;
- Location of kororā detection/s;
- Whether the detection/s were made by a dog or person;
- Presence of any sign (e.g. guano / feathers);
- Presence and number of any birds (moulting or non-moulting); and
- Presence and number of any eggs or chicks.

The location of each detection will be assigned a number which will serve as an individual identifier to enable burrows to be monitored over time. The rock where the detection was made will be marked with the assigned number using dazzle paint (or an effective alternative). The location/s will also be recorded and uploaded into the Te Ara Tupua GIS platform.

If active burrows are identified through the pre-work surveys in locations where works are proposed, subsequent management actions will be implemented (as outlined in Sections 2.3.2 -2.3.6).

No works will occur within established exclusions zones (Section 2.3.2) until it has been determined by the SQP that the burrow is no longer active; this will be done through fortnightly surveys by a SQP using the methodology outlined above.

Schedule 3 Clause 7 of WAA 91847-FAU (Appendix 1) requires that records be kept of all penguins encountered, captured and or relocated before or during construction.

² Includes nesting adults and nest contents (i.e. eggs and / or chicks).



2.3.2 Exclusion zones around active burrows

An exclusion zone will be established / demarcated around any active burrow (as defined in the Glossary) that is detected, and temporary signs established informing the presence of the active burrow. The exclusion zone distance around the active burrow will be:

- 10 m from rock removal (as required by consent condition EM.6C(b)i); or
- Calculated based on the construction activity being undertaken, such that the noise threshold outlined in consent condition EM.6C(b)iii will be achieved (i.e. less than 75 dB $L_{Aeq(15\ min)}$ as measured outside of the entrance of the burrow).
- Consent condition EM.6C(b)ii does allow for people and plant to move past the active nest or moulting penguin to access other works sites across the Project, subject to the movement occurring as quickly as practicable and avoiding unreasonable noise.

In all cases, at no time will the exclusion zone and its demarcation impede access for kororā between the active burrow and the ocean.

A SQP will undertake fortnightly surveys (as per Section 2.3.1) to determine when a burrow is no longer active; at which time, the exclusion zone demarcation and signage will be removed.

The EA will undertake twice weekly inspection of any exclusion zones; if any are found to be damaged, the EA will ensure the exclusion zones are reinstated within 24 hours of the inspection unless it is unreasonable given weather conditions in which case they must be reinstated as soon as reasonably practicable.

2.3.3 Habitat modification

Modification works within potential kororā habitat identified on Map 1 (Section 2.1 above) may occur to discourage penguins from nesting and/or moulting within the Project area. Modification methods may include infilling and / or netting of potential nesting or moulting habitat. The method of habitat modification that will be implemented will depend on the intricacies of the individual site and will be advised and supervised by a SQP with penguin expertise.

The process for managing kororā to enable the habitat modification works is outlined in Figure 2 below:

- As per condition EM.6Aa), 24 hours prior to the commencement of any penguin habitat modification, a SQP with a penguin detector dog will survey (as outlined in Section 2.3.1, page 12) the area (i.e. effects zone) to check for the presence or absence of kororā. Given kororā come on to land during the night, the process of surveying for the presence of kororā during the habitat modification works will occur each day the works occur.
- If no kororā are detected, habitat modification will occur immediately under the guidance of a SQP.
- If non-nesting and/or non-moulting kororā are detected, habitat modification will not occur until the kororā have been captured and relocated to the release site approved in WAA 91847-FAU (see Appendix 1)
- Records will be kept of all relocated kororā (refer to Section 2.3.8 below).
- If nesting and/or moulting kororā are detected, an exclusion zone will be established around the active burrow (as per Section 2.3.2 above) and habitat modification will not occur until nesting or moulting activities are completed (as determined by the SQP through subsequent fortnightly surveys as per Section 2.3.1).

In all instances, the SQP will make the final call in regard to when areas are clear of kororā or active burrows, and therefore when the works can commence.

Under no circumstances will breeding² or moulting birds be handled or relocated.

All locations where kororā are removed from will need to be modified accordingly on that day in such a way as to prevent birds potentially re-gaining access to this area. The SQP will inform the construction team on the need for such modification, which may include:

- removing as much rock as possible, so a bare ground surface is exposed thereby leaving no crevices for kororā to occupy;
- fencing off the site with a penguin proof material / fence.



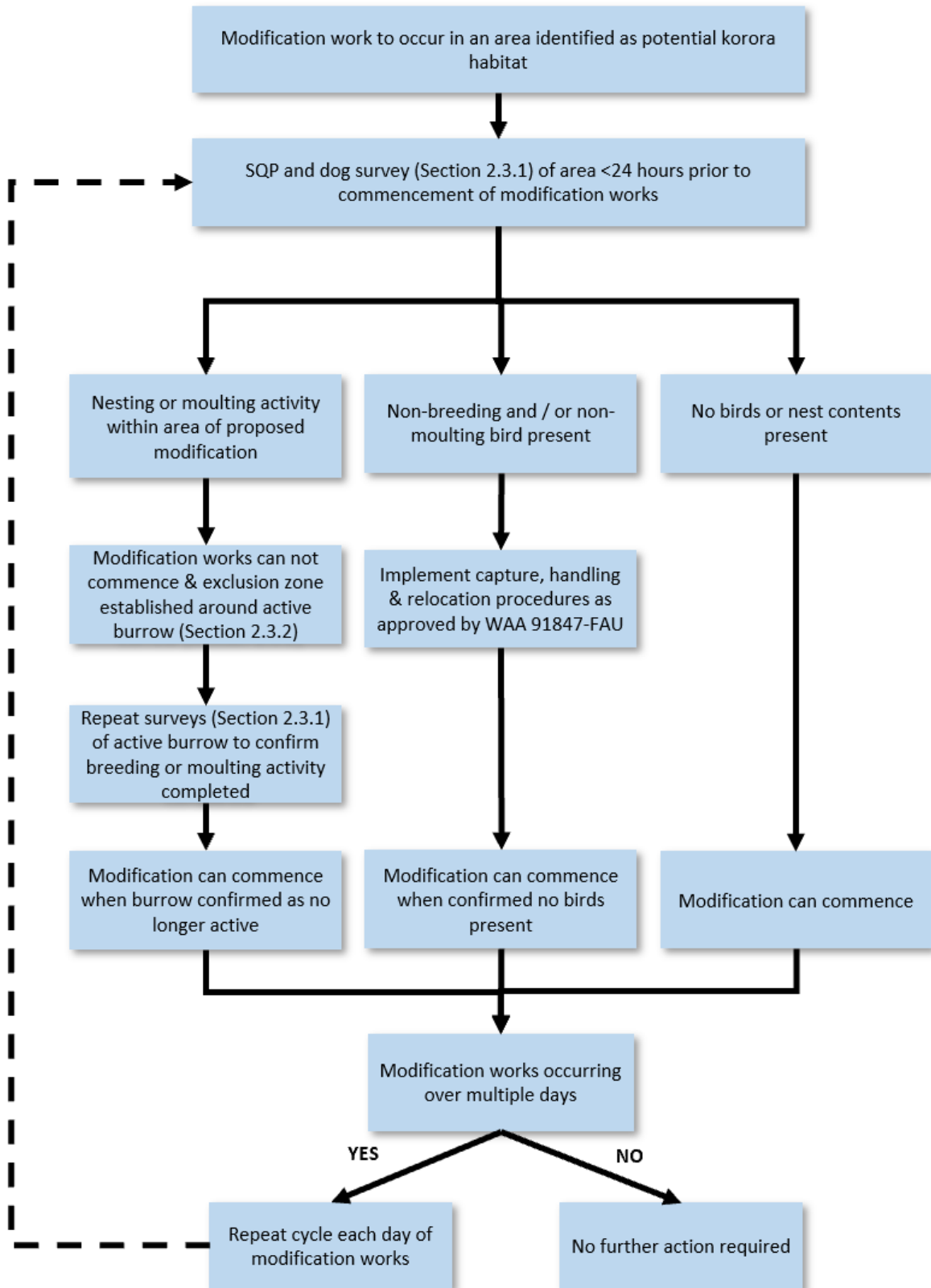


Figure 2: Process for managing kororā associated with habitat modification works



2.3.4 Rock removal

The process for managing kororā to enable the movement of rocks on the revetment is outlined in Figure 3 below:

- Where rocks along the revetment are to be moved using machinery, the area of revetment to be disturbed, plus 10 m to the north and south of that area (i.e. the effects zone) will be surveyed (as outlined in Section 2.3.1, page 12) for kororā within 24 hours of works. However, given kororā come on to land during the night, the process of surveying for the presence of kororā during the rock removal works will occur each day the works occur.
- During each survey, if no kororā are detected in the surveyed area, rock removal can occur immediately under the guidance of a SQP.
- If non-nesting and/or non-moulting kororā are detected, rock removal will not occur until the kororā have been captured and relocated to the release site approved in WAA 91847-FAU (see Appendix 1).
- Records will be kept of all relocated kororā (refer to Section 2.3.8 below).
- If nesting or moulting activity is detected, an exclusion zone will be established around the active burrow (as per Section 2.3.2 above) and the rock movement works will not occur within 10 m of the active burrow until nesting or moulting activities are completed (as determined by the SQP through subsequent fortnightly surveys as per Section 2.3.1 above). Rock removal works greater than 10 m away from the active burrow can occur under the supervision of the SQP.

In all instances, the SQP will make the final call in regard to when areas are clear of kororā or active burrows, and therefore when the works can commence.

Under no circumstances will breeding² or moulting birds be handled or relocated.

When machinery is used to move rocks, this will be done using a claw attachment so that the rocks can be lifted one at a time so that any incidental burrows discovered within the rock revetment (i.e. burrows not detected during the pre-construction survey) are uncovered progressively and slowly. A bucket attachment may be used for the movement of rocks below MHWS. All rock moving work will be undertaken by an experienced digger driver under the supervision of the SQP.

For rock moving above mean high water springs (MHWS), once each rock is moved, and assuming it is safe to do so, the area will be inspected by a SQP to ensure no kororā are hidden within the rocks. The rocks will then be placed in a suitable location that does not create a workplace hazard. Management measures will be implemented to ensure that kororā do not inhabit the stored rocks, such as:

- Placement of material such as bidum cloth or tight mesh fabric over the rock storage area; or
- Temporary fencing around the rock storage area.

At all locations where kororā are removed, or if movement of rocks extends over multiple (more than one) days, efforts will be made to discourage birds from being able to access the site overnight (as per above, i.e. placement of bidum cloth or temporary fencing). An additional effort may include moving as much rock as possible so that a bare ground surface is exposed thereby leaving no crevices for kororā to occupy. Where the area of rock removal and /or rock storage is covered or fenced, it is imperative that the material or fencing is securely fastened to minimise the chances of kororā entering the area through a gap. Just prior to the movement of stored rocks, the stored rock pile will be inspected by a penguin detector dog for the presence of kororā.

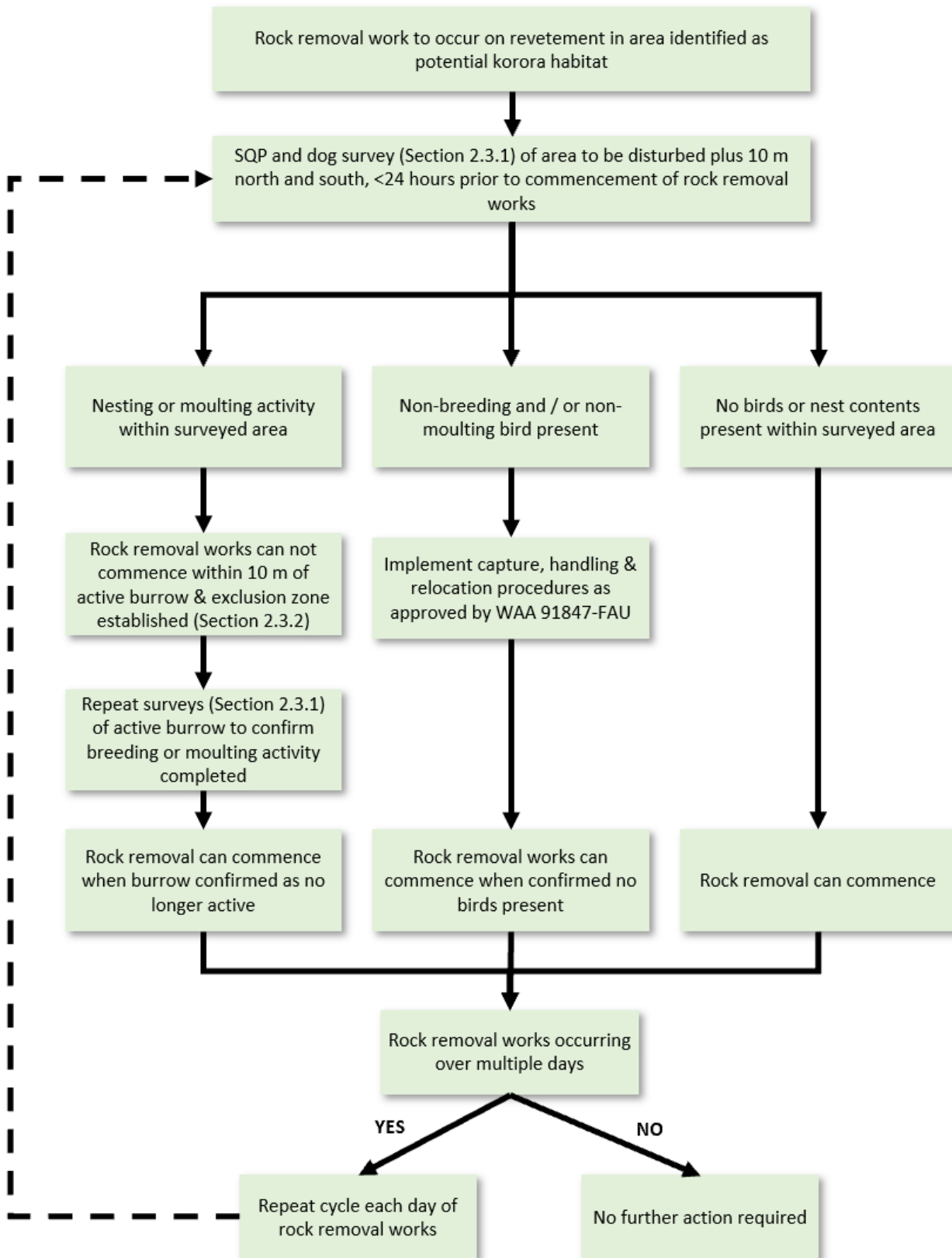


Figure 3: Process for managing kororā associated with revetment rock removal works



2.3.5 Piling

The process for managing kororā during piling works is outlined in Figure 4 below:

- If potential kororā habitat is identified within 10 m of piling works, the area will be surveyed (as outlined in Section 2.3.1, page 12) for kororā within 24 hours of works. However, given kororā come on to land during the night, the process of surveying for the presence of kororā during the piling works within 10 m of identified potential habitat will occur each day the works occur.
- During each survey, if no kororā are detected in the surveyed area, piling works can occur immediately.
- If non-nesting and/or non-moulting kororā are detected, piling will not occur until the kororā have been captured and relocated to the release site approved in WAA 91847-FAU (see Appendix 1).
- Records will be kept of all relocated kororā (refer to Section 2.3.8 below). However, if the SQP determines that the process of relocation will cause more stress to the bird than if it was left in its burrow, a plan will be formulated to minimise effects from the piling (e.g. unobstructed access to the ocean, noise mitigation).
- If nesting or moulting activity is detected, an exclusion zone will be established around the active burrow (as per Section 2.3.2 above) and piling will not occur within 10 m of the active burrow until nesting or moulting activities are completed (as determined by the SQP through subsequent fortnightly surveys as per Section 2.3.1 above). Piling works greater than 10 m away from the active burrow can occur under the supervision of the SQP.

In all instances, the SQP will make the final call in regard to when areas are clear of kororā or active burrows, and therefore when the works can commence.

Under no circumstances will breeding² or moulting birds be handled or relocated.



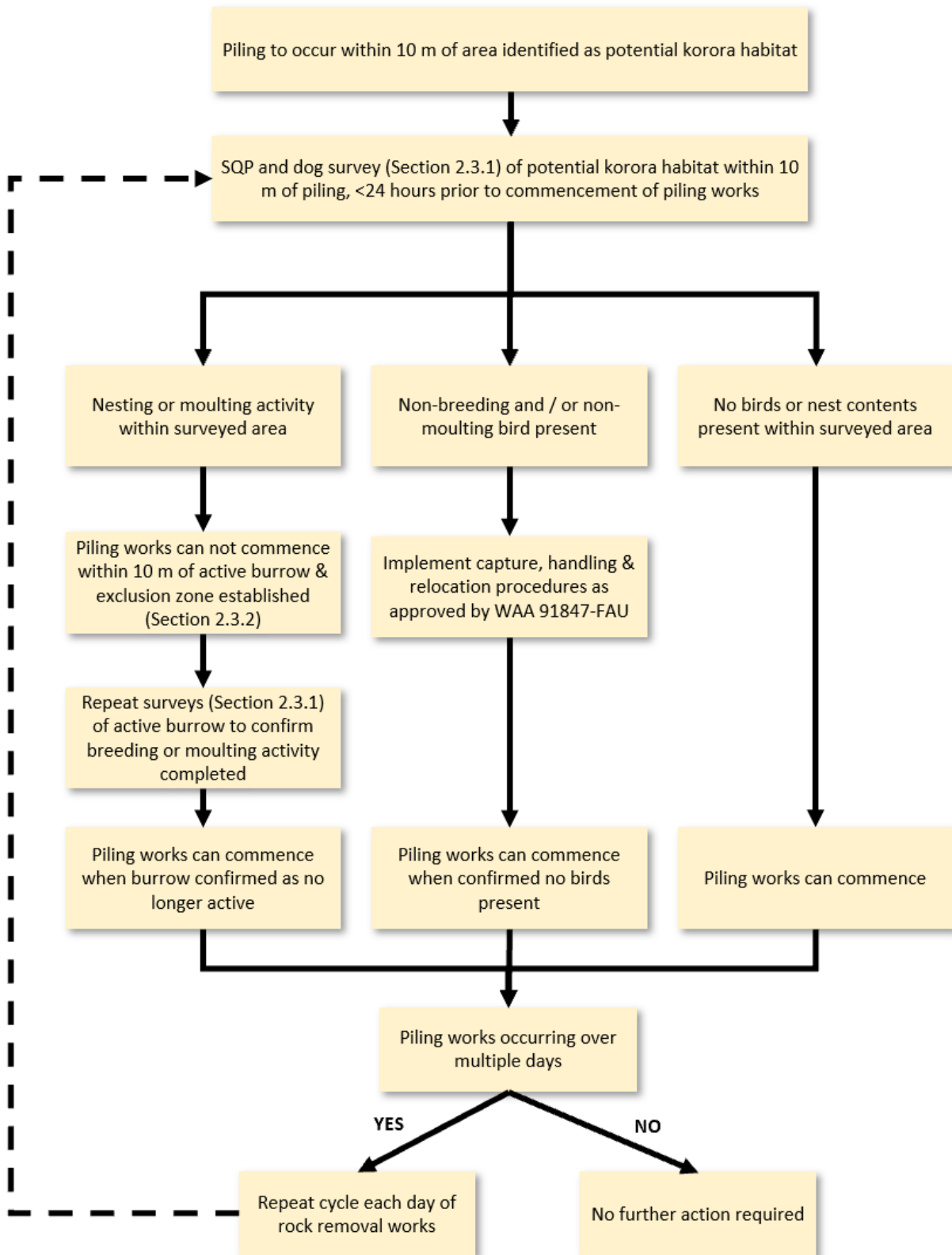


Figure 4: Process for managing kororā during piling works

2.3.6 All other enabling and construction works

The process for managing kororā for all enabling and construction works (excluding habitat modification and rock removal), is outlined in Figure 5 below:

- If no kororā detections are made during the pre-work survey, construction works will commence under the guidance of a SQP.
- If non-breeding and / or non-moulting kororā are detected during the pre-work survey in habitat that will be directly impacted by works, works will not occur until the kororā have been captured and relocated to the release site approved in WAA 91847-FAU (see Appendix 1).
- Records will be kept of all relocated kororā (refer to Section 2.3.8 below).
- If nesting or moulting activity is detected during the pre-work survey, an exclusion zone will be established around the active burrow (as per Section 2.3.2 above). As per condition EM.6C(b)iii, all works except rock removal and piling may only occur if these activities achieve a maximum sound level of 75 dB $L_{Aeq(15min)}$ as measured outside of the entrance of an active burrow. This airborne noise management approach is outlined in Section 2.3.6.1 below. Enabling or construction works can only occur within the effects zone once nesting or moulting activities are completed (as determined by the SQP through subsequent fortnightly surveys as per Section 2.3.1 above).

In all instances, the SQP will make the final call in regard to when areas are clear of kororā or active burrows, and therefore when the works can commence.

Under no circumstances will breeding² or moulting birds be handled or relocated.

All locations where kororā are removed from will need to be modified accordingly on that day in such a way as to prevent birds potentially re-gaining access to this area. The SQP will inform the construction team on the need for such modification, which may include:

- removing as much rock as possible, so a bare ground surface is exposed thereby leaving no crevices for kororā to occupy;
- fencing off the site with a penguin proof material / fence.



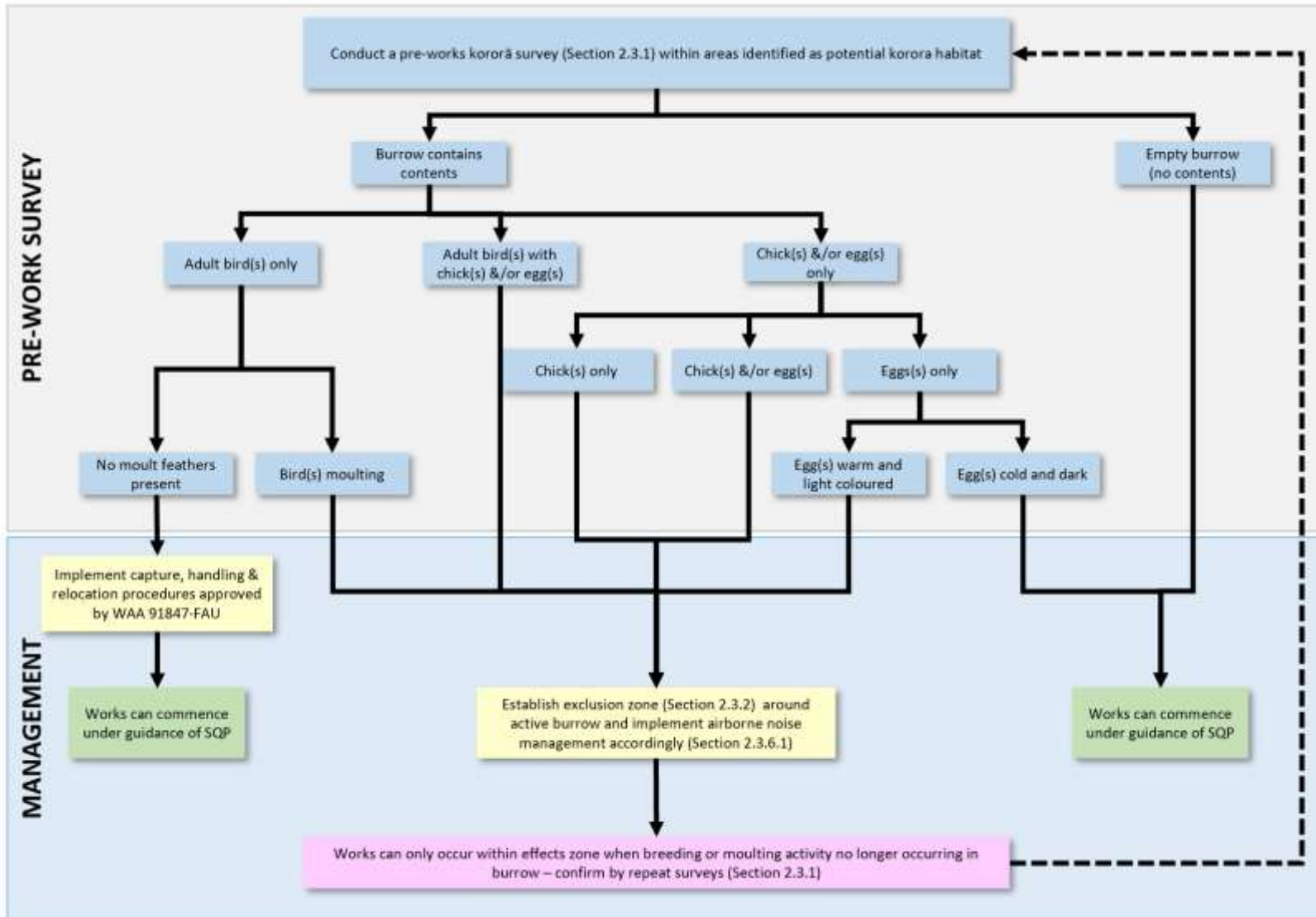


Figure 5: Process for monitoring and managing kororā associated enabling and construction works (excluding habitat modification, rock removal and piling works)



2.3.6.1 Airborne noise management procedure

To manage potential effects on nesting or moulting kororā detected during pre-work surveys (see Section 2.3.1 above), an airborne noise management approach will be used. As per Condition EM.6C(b)iii, this approach will only allow enabling and construction activities (excluding rock removal and piling works) to occur at locations where sustained airborne noise levels generated from construction are **below 75 dB $L_{Aeq(15\ min)}$ as measured outside of the entrance of an active penguin burrow or moulting penguin roost**. One-off or infrequent noise levels generated above 75 dB $L_{Aeq(15\ min)}$ outside active burrows or penguin roosts are not of concern. Of concern are sustained noise levels, i.e. noise levels outside active burrows or penguin roosts that average 75 dB $L_{Aeq(15\ min)}$ (or above) over a 15-minute period or longer; such noise levels will be managed and are addressed in this management plan.

To determine the setback distances for noise management, acoustics specialists will produce contours of the noise levels generated by the various enabling and construction works activities that show what distance works must be setback from active burrows to keep noise levels below 75 dB $L_{Aeq(15\ min)}$. Where noise mitigation can be implemented, contours will also be produced that show noise levels with noise mitigation in place. These contours will be overlaid with the kororā habitat within the project footprint and known burrows (an example is shown in Figure 6). Prior to the commencement of each type of enabling and construction works activity, noise levels outside of the entrance of active burrows in the vicinity of the works area will be ground-truthed by a acoustics specialist to verify the modelled noise setbacks (with the implementation of noise mitigation if appropriate); setback distances will be adjusted as required.



Figure 6. Example of modelled 75 dB $L_{Aeq(15\ min)}$ noise contours for borehole (yellow dot) geotechnic investigations. Outer yellow dotted line based on no noise mitigation, inner yellow dotted line with noise mitigation measures. Penguin habitat identified by yellow solid line on revetment and penguin burrows by blue numbered dots

To reduce noise levels at active burrows, sound mitigation techniques will be employed. It is recommended to undertake as much practicable mitigation as possible to keep noise levels as low as possible. For example, where practicable, noise barriers will be used to reduce noise levels generated by construction activities. Other mitigation measures include operator care to avoid unnecessary noise and ensuring equipment is well maintained. An adaptive management approach will be implemented to manage noise levels (i.e. other sound mitigation techniques will / may be utilised) and will be developed in consultation with a suitably qualified and experienced ecologist and acoustics specialist.

The Environmental Advisor will maintain a register (excel spreadsheet) of all verified noise levels in order to build up a record of relevant setback distances that meet the necessary threshold of **below 75 dB L_{Aeq(15 min)} as measured outside of the entrance of an active penguin burrow or moulting penguin roost.**

While not required by the consent conditions, in the case of any kororā found nesting or moulting on the surface (i.e. under vegetation), methods will be investigated to try and achieve sustained airborne noise levels generated from construction to 70 dB L_{Aeq(15 min)}. For instance, noise screening could be used as an option for protecting nests, and would be applied at the SQP's discretion.

2.3.7 Protocols if kororā are incidentally discovered during works

Despite the implementation of pre-work kororā surveys, it is possible that kororā may be incidentally discovered during enabling and construction works. In all such cases, a SQP will be contacted immediately. While waiting for the arrival of the SQP, the kororā will not be handled or disturbed further, and an efforts will be made to ensure an unobstructed path is available for the bird to the ocean.

Once on site, the SQP will decide on the best approach to manage the situation accordingly:

- If non-breeding or non-moulting kororā are incidentally discovered during enabling or construction works in habitat that will be directly impacted by works, then the capture, handling and relocation procedures in accordance with those approved for WAA 91847-FAU will be implemented.
- If non-breeding and / or non-moulting kororā are incidentally discovered during enabling or construction works in habitat that will only be indirectly impacted by works, then capture, handling and relocation will not occur; this is because non-breeding and non-moulting kororā are not confined to land and will be able to move of their own accord if indirectly impacted by works (providing an unobstructed path to the ocean is available to them). If such a path does not exist, then the capture, handling and relocation procedures in accordance with those approved for WAA 91847-FAU will be implemented.
- If breeding or moulting kororā (active burrow/s) are incidentally discovered during enabling or construction works, an exclusion zone will be established (outlined in Section 2.3.2, page 13) and adaptive management will be implemented to minimise effects on the kororā and to finish up the works within the effects zone (make it safe, close the site and remove construction equipment). Adaptive management appropriate to the situation will be developed and implemented immediately (or as soon as possible but within 24 hours) by a suitably qualified and experienced person and the construction team to minimise immediate risk to the kororā. Greater Wellington Regional Council and DOC will then be contacted to discuss the situation and determine if other or additional management measures should be put in place.
- If an injured or dead penguin is incidentally discovered during enabling or construction works, the SQP will follow the requirements as outlined in Clauses 9 and 10 of Schedule 3 of WAA 91847-FAU (see Section 2.3.9, page 23).



2.3.8 Kororā relocation records

The following information will be recorded for every kororā that is relocated through the Nga Ūranga ki Pito-One enabling and construction works:

- Date and time penguin found;
- GPS location;
- If the bird is banded (if so, the band number will be recorded);
- Name of the kororā handler;
- Relocation site the penguin is released into; and
- The time of release.

This information will be entered into an Excel spreadsheet, the results of which will be reported to DOC and GWRC on an annual basis during enabling and construction works in the manner described in Section 2.4.

As noted in Clause 25 of Schedule 3 of WAA 91847, monitoring of relocated korora is not required.

2.3.9 Injury and /or death of kororā

In the case of an injury or death of a kororā associated with the Project works, the SQP must be contacted immediately to provide the necessary guidance in accordance with the following requirements of WAA 91847-FAU:

- Schedule 3 Clause 8 - If any penguins are injured as part of the Authorised Activity, the Authority Holder shall contact Authorized Personnel listed under Schedule 1 Clause 3 to get advice on the management of the penguin.
- Schedule 3 Clause 9 - The Authority holder is authorised to euthanise any injured penguin on recommendation of the Authorised Personnel listed under Schedule 1 Clause 3 and/or a veterinarian.
- Schedule 3 Clause 10 - If any penguin should die during the authorised activities of catching, handling and releasing, the Authority Holder must:
 - a) Inform the Grantor within 72 hours. The body must be chilled (if it can be delivered within 72 hours) or frozen (if delivery of the body will take longer than 72 hours).
 - b) Send the body to Massey University Wildlife Post-Mortem Service for necropsy. The Authority Holder must also provide the animal's history (i.e. where it was captured).
 - c) Pay for any costs incurred in investigation of the death of any penguins; and
 - d) If required by the Grantor, cease the Authorised Activity for a period determined by the Grantor.

Note that dead penguins should be wrapped in tinfoil (dull side towards animal) and kept in the fridge. Ideally, they should not be frozen as this damages the tissues that may need to be investigated for the cause of death (if requested by DOC).

2.4 Reporting

As per Schedule 3 Clause 7 of WAA 91847-FAU, the Authority Holder must keep a record of all penguins encountered, captured and or relocated before or during construction. These records are to be provided to the Grantor on an annual basis every 1st May. Records must be emailed to permissionshamilton@doc.govt.nz and include the Authority Number (91847-FAU) and Authority Holder's name (Waka Kotahi NZ Transport Agency). A copy of each annual report will also be provided to the Manager at GWRC.



3 Tōrea Pango / Variable Oystercatcher

Tōrea pango / variable oystercatcher (*Haematopus unicolor*; Photo 2) are almost exclusively a coastal wader, favouring sandy and rocky shorelines (Crossland, 2001). This species is classified as *At Risk – Recovering* (H. A. Robertson et al., 2017), and is protected under the Wildlife Act (1953). The national population is estimated to be approximately 5,000-6,000 birds³. McArthur et al. (2019) estimated the Wellington regional population to be approximately 728 breeding birds. Most birds are sedentary, defending territories throughout the year.

As noted in consent condition EM.6B, for the purposes of Nga Ūranga ki Pito-One, **the breeding season for tōrea pango is defined as the period 1 September to 30 March**. Most eggs (2-3; Photo 3) are laid from mid-September to early February (Bell, 2010). Chick rearing/fledging generally occurs between mid-October to March (Figure 7). Breeding success of variable oystercatchers is often low, with main causes of failure being predation of eggs or chicks by a range of mammalian and avian predators, flooding of nests by big tides, and disturbance resulting from human recreational use of the coast.³

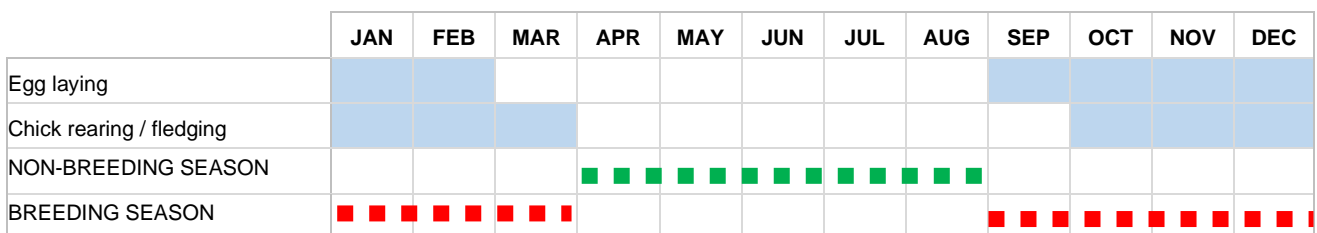


Figure 7: Indicative breeding cycle of tōrea pango / variable oystercatcher. (Shaded cells indicate when these activities may be occurring)



Photo 2: Adult variable oystercatcher and chick.



Photo 3: Variable oystercatcher nest and eggs.

³ Dowding, J.E. 2013 [updated 2017]. Variable oystercatcher. In Miskelly, C.M. (ed.) New Zealand Birds Online. www.nzbirdsonline.org.nz

3.1 Tōrea pango habitat & distribution along Nga Ūranga ki Pito-One

Tōrea pango are intertidal foragers, including on rock platforms. The nest is a shallow scrape, usually on a sandy beach just above MHWS, but also on shingle beaches and wave platforms (Heather & Robertson, 2005).

As required by consent condition EM.6B)b)i. the areas of tōrea pango foraging and nesting habitat have been identified along the Nga Ūranga ki Pito-One alignment, and are shown on Map 2. Tōrea pango have been recorded on each of the six shingle beaches (from south to north) along the alignment, which provide the following habitat features:

- Beach 1 (chainage 2310-2410) – intertidal foraging habitat and potential nesting habitat on the raised flat area adjacent to the rail line.
- Beach 2 (chainage 2850-3030) – most extensive tōrea pango habitat available along the alignment with areas of intertidal shingle beach and wave platform to forage on. Birds roost above MHWS and on the rocky outcrops. Breeding activity has previously been recorded on the northern beach.
- Beach 3 (chainage 3350-3450) – intertidal foraging habitat and roosting on the crest adjacent to the rail line.
- Beach 4 (chainage 3590-3740) – long narrow intertidal zone to forage in and roosting on the crest adjacent to the rail line.
- Beach 5 (chainage 3830-3920) – limited intertidal foraging habitat and roosting on the crest adjacent to the rail line.
- Beach 6 (chainage 4090-4190) – intertidal foraging habitat and roosting on the crest adjacent to the rail line.

3.2 Tōrea pango management

The process for managing tōrea pango during enabling and construction works is outlined in Figure 8 below:

- Twenty-four hours prior to the commencement of works within 20 m of identified tōrea pango nesting habitat, a SQP will survey the area to check for the presence or absence of breeding birds (as per the method outlined in Section 3.2.1 below).
- If no breeding tōrea pango are detected, works can commence.
- If non-nesting birds are within a works area, they will be quietly and passively shooed from the area. Enabling or construction works will not commence until the bird/s is/are at least 20 m away from the works area.
- As per condition EM.6Bb)iv, if an active nest is discovered within 20 m of the work site(s), works within this 20 m buffer will be delayed and no person or machinery shall enter the buffer area until nesting is complete (as determined by the SQP). Exclusion fencing will be installed as outlined in Section 3.2.2 below. To determine when nesting is complete and works can commence, the breeding site will re-surveyed as per the methodology outlined in Section 3.2.1 below. The frequency of monitoring will be determined by a SQP based on the nest contents at the time of discovery.



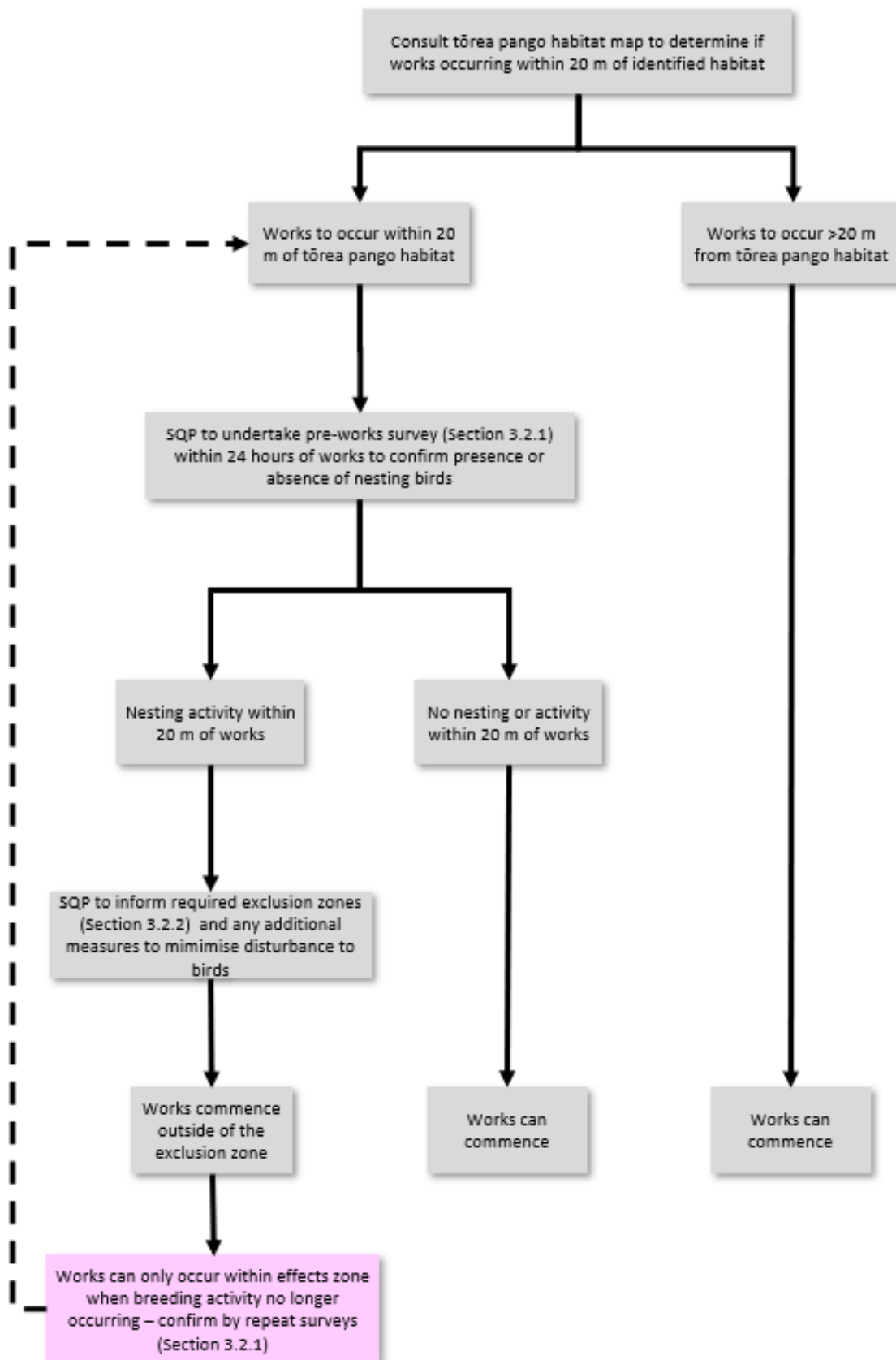


Figure 8: Process for managing tōrea pango for enabling and construction works



3.2.1 Tōrea pango surveys

Surveys for breeding activity will involve a SQP undertaking observational surveys of birds in areas identified as providing potential tōrea pango nesting habitat (refer to Map 2). For each survey:

- The SQP will be positioned at a location that avoids disturbing the birds as much as possible (e.g. from a boat or at the far end of the shingle beach);
- The duration of each survey will be a minimum of 15 minutes.
- Recorded data will include tōrea pango numbers, behaviours and any signs / observations of nesting activity (e.g. courtship behaviours, incubating birds, nest contents, chicks etc).

All tōrea pango observations will be recorded into the avifauna data layer on the Te Ara Tupua GIS platform.

Note that if active nests are identified through the pre-work surveys in locations where works are proposed, subsequent management actions will be implemented (as outlined in Section 3.2, Figure 8 and 3.2.2). No works will occur within established exclusions zones (Section 3.2.2) until it has been determined by the SQP that the nest is no longer active; this will be done through fortnightly surveys by a SQP using the methodology outlined above.

3.2.2 Exclusion fencing / demarcation & signage

On detection of an active tōrea pango nest, the SQP will immediately inform the Environmental Advisor to work with the Alliance's construction team to install exclusion fencing to ensure that works do not occur within 20 m of the nest.

The SQP will advise on the most appropriate materials and location to construct the exclusion fencing / demarcation, but may include the use of cinder blocks⁴ with coloured markers on top, or coloured stakes (refer to Figure 9 for examples). The objectives of this fencing are to:

- Ensure people and machinery do not enter the exclusion zone;
- Be constructed from materials that will not make the nest more conspicuous to avian predators, or move in the wind; and
- Not obstruct the ability for birds or chicks to access the beach and water to forage.

Movement of signage on the fencing could cause the nesting birds some distress. As such, signage alerting people to the presence of the active nest will be located away from the exclusion fencing, or attached in such a manner that it does not move.

The EA will undertake twice weekly inspection of any exclusion fences; if any are found to be damaged, the EA will ensure the fences are reinstated within 24 hours of the inspection unless it is unreasonable given weather conditions in which case they must be reinstated as soon as reasonably practicable.

At no time will tōrea pango or nest contents be handled or relocated; this Project does not have authority under the Wildlife Act (1953) to do so.

⁴ The nesting of tōrea pango on the rail ballast means it may not be possible to use waratahs or stakes due to the risk of these falling on the rail line. As such, cinder blocks with markers attached to them may be used in such circumstances.



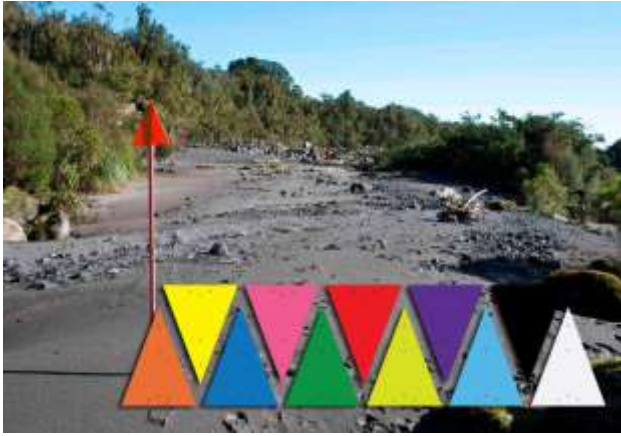


Figure 9: Examples of possible markers for demarcation
(Source: <https://www.advancelandscape.co.nz/shop/Field+Track++Site/Track+Markers+Small+Pack20.html>)

3.2.3 Protocols if nesting tōrea pango are incidentally discovered during works

While highly unlikely, it is possible that nesting tōrea may be incidentally discovered during enabling and construction works. In all such cases, a SQP will be contacted immediately. While waiting for the arrival of the SQP, all machinery and personnel must remain at least 50 m from the nest. Once on site, the SQP will supervise the installation of exclusion fencing and signage as outlined in Section 3.2.2 above. No works will occur within established exclusions zones (Section 3.2.2) until it has been determined by the SQP that the nest is no longer active; this will be done through fortnightly surveys by a SQP using the methodology outlined in Section 3.2.1 above.

3.2.4 Injury or death of tōrea pango

In the case of an injury or death of a tōrea pango associated with the Project works, the SQP must be contacted immediately to provide the necessary guidance in consultation with DOC.

4 Measures to Enhance and Protect Coastal Avifauna

In addition to the measures outlined in the preceding sections to manage effects on coastal avifauna during the construction of the Nga Ūranga ki Pito-One Project, the following measures have been incorporated into the Project design to enhance and protect coastal avifauna species and habitat.

4.1 Kororā nesting

As per consent condition EM.6B)a)v., 20 nest boxes will be incorporated into the Piki Wahine Point Ūranga for kororā. In addition 235 nest boxes will be incorporated into the crest of the revetment along the Nga Ūranga ki Pito-One alignment. The provision of these additional 235 nest boxes was identified⁵ as a requirement to offset the loss of kororā nesting opportunity arising through the revetment design change from natural boulder to concrete armour units.

The kororā nest boxes will be constructed and installed in accordance with DOC's 'Instructions for Building a Blue Penguin Nest Box'; these instructions are provided in Appendix 2.

The boxes will be constructed using H4 treated timber and after construction, they will be left exposed to the elements for a minimum period of three months with the lids off on a diagonal to allow rain to flow over them.

In all instances, the boxes will be installed above mean high water springs and outside of the splash zone. Installation will likely require movement of some small rocks to make level areas on which to place the nest boxes (a small gradient is required to allow for drainage out the nest box entrance). Soil will be deposited on these level areas to enable penguins to scrape and make a nest on this substrate. Boxes will not be installed directly onto concrete or rock surfaces. Following installation, rocks will be placed around the boxes to secure them in place.

The exact locations, spacings, timing of installation, and the installation itself will be advised / supervised by a SQP.

4.2 Coastal avifauna roosting

The following two forms of roosting habitat will be created for coastal avifauna as part of the Nga Ūranga ki Pito-One Project:

- As per consent conditions EM.11-13, offshore habitats must be designed and constructed to provide roosting habitats for coastal birds.
- As per consent condition EM.6B)c), tall structures must be incorporated into the Ūranga designs to provide safe roosting habitat for species such as shags and gulls. In total, 35 structures of varying heights will be installed. The design is finalised in the "*Furniture and Artwork Package*" and incorporates ecological advice.

⁵ Te Ara Tupua Alliance memo prepared by Dr Leigh Bull, dated 13 December 2021, titled 'Avifauna effects assessment: Proposed changes to the revetment design for Te Ara Tupua' which formed part of the S127 process.



4.3 Visual screening

As per consent condition EM.5(b), visual screens will be installed at each of the six seawalls alongside shingle beaches to minimise the effects of disturbance on birds (particularly tōrea pango) using those areas. Details regarding the design of the screens is included in the CEDMP and have been informed by a SQP to ensure the screens meet the consent condition requirement for minimising disturbance effects. The sections of louvered screens will extend 1600 mm or 1800 mm above the path.

4.4 Fencing

Currently kororā can freely access the area above the existing revetment, including the rail tracks. During the August 2021 kororā survey along the Nga Ūranga ki Pito-One alignment, a dead penguin was found on the rail tracks. As such, the fencing that will be installed between the shared path and the rail tracks will also provide protection to kororā by stopping the birds being able to access that area.

4.5 Plugging of “chimneys” in armour units

As identified in the avifauna assessment⁵ of the Nga Ūranga ki Pito-One revetment design change from natural boulder to concrete armour units, in order to assist kororā to access the crest of the revetment over the armour units, the “chimney” in each unit will need to be retrofitted with some sort of plug to ensure that penguins do not fall through these when trying to climb over the units.

The SQP will advise on the design and installation of the chimney plugs to ensure that they fulfil the requirements for kororā, including not impeding access underneath the unit.



5 References

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Appendix 1: Wildlife Act Authority 91847-FAU





Wildlife Act Authority for wildlife on non-public conservation land

Authorisation Number: 91847-FAU

THIS AUTHORITY is made this 15th April 2021

PARTIES:

The Director-General of Conservation and where required the Minister of Conservation (the Grantor)

AND

Waka Kotahi NZ Transport Agency (NZTA) (the Authority Holder)

BACKGROUND

- A. The Director-General of Conservation is empowered to issue authorisations under the Wildlife Act 1953.
- B. The Authority Holder wishes to exercise the authorisation issued under the Wildlife Act 1953 subject to the terms and conditions of this Authority.

OPERATIVE PARTS

In exercise of the Grantor's powers the Grantor **AUTHORISES** the Authority Holder under Section 53 (taking or killing of wildlife for certain purposes) of the Wildlife Act 1953 subject to the terms and conditions contained in this Authority and its Schedules.

SIGNED on behalf of the Grantor by **Angus Hulme-Muir (Operations Manager – Wellington)** acting under delegated authority

in the presence of:

Witness Signature

Witness Name: Bryn Sheppard

Witness Occupation: Senior Permissions Advisor

Witness Address: DOC Hamilton Office (Rostrevor Street)

A copy of the Instrument of Delegation may be inspected at the Director-General's office at 18-32 Manners Street, Wellington.

SCHEDULE 1

<p>1.</p>	<p>Authorised activity (including the species, any approved quantities and collection methods). (Schedule 2, clause 2)</p>	<p>Activity</p> <p>(a) To catch, handle and release the following species:</p> <p><u>Bird(s)</u></p> <p>i. Little Blue Penguin/ Kororā (<i>Eudyptula minor</i>)</p> <p><u>Reptile</u></p> <p>ii. Northern Grass Skink (<i>Oligosoma polychroma</i>) iii. Copper Skink (<i>Oligosoma aenuem</i>) iv. Glossy Brown Skink (<i>Oligosoma zelandicum</i>) v. Ornate Skink (<i>Oligosoma ornatum</i>) vi. Raukawa Gecko (<i>Woodworthia maculata</i>) vii. Ngahere Gecko (<i>Mokopirirakau</i>) viii. Barking Gecko (<i>Naultinus punctatus</i>)</p> <p>(b) To kill (euthanize) for animal welfare purposes (if required)</p> <p>Quantity</p> <p>(a) As required.</p> <p>Methodology</p> <p><u>Bird(s)</u></p> <p>(a) Capture by hand</p> <p><u>Reptile(s)</u></p> <p>(b) Capture by Funnel Traps (c) Capture by Pitfall Traps</p>
<p>(a)</p>	<p>The Land (Schedule 2, clause 2)</p>	<p>Capture Site</p> <p>(a) Construction Footprint for Te Ara Tupua Cycleway Project Section ‘Ngā Ūranga to Pito-One’</p> <p>Release Site – Bird(s)</p> <p>(b) Beachfront located between Kawiwharawhara and Ngauranga, 2km west of the construction site</p> <p>Release Site – Reptiles</p> <p>(c) Petone Beach/Foreshore – Sand Dunes</p>
<p>(b)</p>	<p>Personnel authorised to undertake the Authorised Activity (Schedule 2, clause 3)</p>	<p>(a) Karin Sievwright (b) Leigh Bull (c) Amanda Healy (d) Any other suitably qualified ecologist</p>

(c)	Term (Schedule 2, clause 4)	10 years (commencing on 15 April 2021 and ending on 14 April 2031)
(d)	Authority Holder's address for notices (Schedule 2, clause 8)	The Authority Holders address in New Zealand is: Level 7 Majestic Centre 100 Willis Street Wellington 6140 New Zealand Email: consentsandapprovals@nzta.govt.nz
(e)	Grantor's address for notices	The Grantor's address for all correspondence is: Department of Conservation Permissions Team 73 Rostrevor Street Hamilton, 3204 Email: permissionshamilton@doc.govt.nz

SCHEDULE 2

STANDARD TERMS AND CONDITIONS OF THE AUTHORITY

1. Interpretation

- 1.1 The Authority Holder is responsible for the acts and omissions of its employees, contractors or, agents. The Authority Holder is liable under this Authority for any breach of the terms of the Authority by its employees, contractors or agents as if the breach had been committed by the Authority Holder.
- 1.2 Where obligations bind more than one person, those obligations bind those persons jointly and separately.

2. What is being authorised?

- 2.1 The Authority Holder is only allowed to carry out the Authorised Activity in the Land described in Schedule 1, Item 2.
- 2.2 The Authority Holder must advise the Department of Conservation's local Operations Manager(s) one week prior to carrying out the Authorised Activity in the District, when the Authority Holder intends to carry out the Authorised Activity.
- 2.3 Any arrangements necessary for access over private land or leased land are the responsibility of the Authority Holder. In granting this authorisation the Grantor does not warrant that such access can be obtained.
- 2.4 The Authority Holder and Authorised Personnel must carry a copy of this Authority with them at all times while carrying out the Authorised Activity.
- 2.5 The Authority Holder may publish authorised research results.
- 2.6 The Authority Holder must immediately notify the Grantor of any taxa found which are new to science. In addition, the Authority Holder must lodge holotype specimens and a voucher specimen of any new taxa with a recognised national collection.

3. Who is authorised?

- 3.1 Only the Authority Holder and the Authorised Personnel described in Schedule 1, Item 3 are authorised to carry out the Authorised Activity, unless otherwise agreed in writing by the Grantor.

4. How long is the Authority for - the Term?

- 4.1 This Authority commences and ends on the dates set out in Schedule 1, Item 4.

5. What are the liabilities?

- 5.1 The Authority Holder agrees to exercise the Authority at the Authority Holder's own risk and releases to the full extent permitted by law the Grantor and the Grantor's employees and agents from all claims and demands of any kind and from all liability which may arise in respect of any accident, damage or injury occurring to any person or property arising from the Authority Holder's exercise of the Authorised Activity.

5.2 The Authority Holder must indemnify the Grantor against all claims, actions, losses and expenses of any nature which the Grantor may suffer or incur or for which the Grantor may become liable arising from the Authority Holder's exercise of the Authorised Activity.

5.3 This indemnity is to continue after the expiry or termination of this Authority in respect of any acts or omissions occurring or arising before its expiry or termination.

6. What about compliance with legislation and Grantor's notices and directions?

6.1 The Authority Holder must comply with all statutes, bylaws and regulations, and all notices, directions and requisitions of the Grantor and any competent Authority relating to the conduct of the Authorised Activity. Without limitation, this includes the Conservation Act 1987 and the Acts listed in the First Schedule of that Act and all applicable health and safety legislation and regulation.

7. When can the Authority be terminated?

7.1 The Grantor may terminate this Authority at any time in respect of the whole or any part of Authorised Activity if:

- (a) the Authority Holder breaches any of the conditions of this Authority; or
- (b) in the Grantor's opinion, the carrying out of the Authorised Activity causes or is likely to cause any unforeseen or unacceptable effects.

7.2 If the Grantor intends to terminate this Authority in whole or in part, the Grantor must give the Authority Holder such prior notice as, in the sole opinion of the Grantor, appears reasonable and necessary in the circumstances.

8. How are notices sent and when are they received?

8.1 Any notice to be given under this Authority by the Grantor is to be in writing and made by personal delivery, by pre-paid post or email to the Authority Holder at the address, fax number or email address specified in Schedule 1, Item 5. Any such notice is to be deemed to have been received:

- (a) in the case of personal delivery, on the date of delivery;
- (b) in the case of post, on the 3rd working day after posting;
- (c) in the case of email, on the date receipt of the email is acknowledged by the addressee by return email or otherwise in writing.

8.2 If the Authority Holder's details specified in Schedule 1, Item 5 change then the Authority Holder must notify the Grantor within 5 working days of such change.

9. What about the payment of costs?

9.1 The Authority Holder must pay the standard Department of Conservation charge-out rates for any staff time and mileage required to monitor compliance with this Authority and to investigate any alleged breaches of the terms and conditions of it.

10. Are there any Special Conditions?

10.1 Special conditions are specified in Schedule 3. If there is a conflict between this Schedule 2 and the Special Conditions in Schedule 3, the Special Conditions will prevail.

11. Can the Authority be varied?

11.1 The Authority Holder may apply to the Grantor for variations to this Authority.

SCHEDULE 3

SPECIAL CONDITIONS

Conditions for all wildlife covered under this authority

1. This Authorisation gives the Authority Holder the right to hold absolutely protected wildlife in accordance with the terms and conditions of the Authorisation, but the wildlife remains the property of the Crown. This includes any dead wildlife, live wildlife, any parts thereof, any eggs or progeny of the wildlife, genetic material and any replicated genetic material.
2. Unless expressly authorised by the Grantor in writing, the Authority Holder must not donate, sell or otherwise transfer to any third party any wildlife, material, including any genetic material, or any material propagated or cloned from such material, collected under this Authority.
3. The Authority Holder is permitted to kill wildlife provided reasonable efforts have been made to meet all of the terms and conditions expressed and implied in this Authority.

Penguins

4. The activity of capturing, handling, and relocating penguins must be undertaken in accordance with the Authority Holder's Penguin Management Plan (dated 04 February 2021) which is attached in Appendix 1.

Capture and Handling of Penguins

5. Penguins must only be handled by Authorised Personnel listed in Schedule 1 Clause 3 or those operating under the direct supervision of the Authorised Personnel listed in Schedule 1 Clause 3.
6. Penguins can only be captured, handled, and relocated if they are not nesting and/or moulting. Any penguin that is nesting and/or moulting must not be captured, handled, and relocated until the nesting and/or moulting is complete. If any nesting and/or moulting penguin is located during construction, the area around the penguin's nest must be cordoned off. Temporary signs must also be established information that a penguin is present and not to be disturbed.
7. The Authority Holder must keep a record of all penguins encountered, captured and or relocated before or during construction. These records are to be provided to the Grantor on an annual basis every 1st May. Records must be emailed to permissionshamilton@doc.govt.nz and include the Authority Number and Authority Holder's name.

Injury and/or Death of penguins

8. If any penguins are injured as part of the Authorised Activity, the Authority Holder shall contact Authorized Personnel listed under Schedule 1 Clause 3 to get advice on the management of the penguin.
9. The Authority holder is authorised to euthanise any injured penguin on recommendation of the Authorised Personnel listed under Schedule 1 Clause 3 and/or a veterinarian.

10. If any penguin should die during the authorised activities of catching, handling and releasing, the Authority Holder must:
 - (a) Inform the Grantor within 72 hours. The body must be chilled (if it can be delivered within 72 hours) or frozen (if delivery of the body will take longer than 72 hours).
 - (b) Send the body to Massey University Wildlife Post-Mortem Service for necropsy. The Authority Holder must also provide the animal's history (i.e where it was captured).
 - (c) Pay for any costs incurred in investigation of the death of any penguins; and
 - (d) If required by the Grantor, ceased the Authorised Activity for a period determined by the Grantor.

Lizards

11. The activity of capturing, handling, and relocating lizards must be undertaken in accordance with the Authority Holder's Lizard Management Plan (dated 30 March 2021) which is attached in Appendix 2.
12. Lizards must only be handled by Authorised Personnel listed in Schedule 1 Clause 3 or those operating under the direct supervision of the Authorised Personnel listed in Schedule 1 Clause 3.
13. The Authority Holder must sterilise any instruments that come into contact with the lizards and/or are used to collect and measure lizards between each location.

Lizard Salvage (before and during construction)

14. Prior to construction commencing, the Authority Holder must undertake lizard salvage using the following methods:
 - (a) Installation of baited pit fall traps
 - (b) Installation of baited funnel traps
 - (c) Destructive searches and/or checking of existing lizard habitat by hand
15. The Authority Holder must ensure all live capture traps are covered to protect lizards from exposure and to minimise stress. Damp leaf litter or other material must be provided to reduce desiccation risk and the bottom of the trap must be perforated to allow drainage of water.
16. The Authority Holder must ensure all live capture traps are checked every 24 hours.
17. The Authority Holder must ensure lizards are individually held in a suitable container (i.e breathable cloth bag). Any lizards held in containers must be kept out of direct sunlight to minimise overheating, stress and death.
18. If, before or during construction, any lizard species which is Threatened, At Risk, or Data Deficient and not already listed in Schedule 1 Clause 1 of this Authority is encountered at the construction site, the Authority Holder must contact DOC District Office within 24 hours. All construction must cease until the DOC District Office and Authority Holder establish how to respond to this species and whether it can be:
 - (a) relocated to the existing release site; and/or
 - (b) put in a captive holding facility until the Grantor and Authority Holder have confirmed if an alternative release site is required. If this option is selected the cost of care and subsequent release of the species is the responsibility of the Authority Holder.

19. Completed Amphibian and Reptile Distribution System (ARDS) cards for all herpetofauna sightings and captures (<http://www.doc.govt.nz/conservation/native-animals/reptiles-and-frogs/species-information/herpetofauna-data-collection/ards-card/>) must be sent to Herpetofauna, Department of Conservation, National Office, PO Box 10420 Wellington 6143 or herpetofauna@doc.govt.nz.
20. Post-salvage the Authority Holder must remove all traps, track markers, flagging tape or other material used whilst undertaking the Authorised Activity to capture lizards.
21. For every year that lizard salvage is completed, the Authority Holder must provide a annual report to permissionshamilton@doc.govt.nz summarising outcomes in accordance with the Lizard Management Plan. Each report must include:
 - the permission number; and
 - the species and number of any animals collected and released; and
 - the GPS location (or a detailed map) of the collection point(s) and release point(s); and
 - results of all surveys, monitoring or research; and
 - description of how the Lizard Management Plan was implemented including any difficulties encountered with capture and handling, how release sites were assessed, post release monitoring and what contingency actions were required.

Injury and/or Death of Lizards

22. If any lizards are found injured as part of the Authorised Activity, the Authority Holder shall contact Authorized Personnel listed under Schedule 1 Clause 3 to get advice on the management of the lizard.
23. The Authority holder is authorised to euthanise the injured lizard(s) on recommendation of the Authorised Personnel listed under Schedule 1 Clause 3 or a veterinarian.
24. If any lizards should die during the authorise activities of catching, handling and releasing, the Authority Holder must:
 - (e) Inform the Grantor within 72 hours. The body must be chilled (if it can be delivered within 72 hours) or frozen if delivery of the body will take longer than 72 hours.
 - (f) Send the body to Massey University Wildlife Post-Morten Service for necropsy. The Authority Holder must also provide the animal's history (i.e where it was captured).
 - (g) Pay for any costs incurred in investigation of the death of any lizards; and
 - (h) If required by the Grantor, ceased the Authorised Activity for a period determined by the Grantor.

Monitoring of wildlife post-relocation

Penguins

25. No monitoring of penguins is required once they have been relocated from the construction site.

Lizards

26. Monitoring of lizards once they have been relocated from the construction site is only required if more than >20 lizards are captured pre-construction and/or during construction. If the Authority Holder exceeds the number of lizards captured the Authority Holder must inform the Grantor (via the DOC District Office) that post-monitoring will be undertaken.
27. If post-monitoring of lizards is required, the Authority Holder must carry out the following on an annual basis during late spring/early summer:
 - (a) Installation of artificial retreats on the Land one month to monitoring occurring. Retreats to be checked daily for a week before being removed from the site.
 - (b) Installing of baited tracking tunnels. Tunnels to be left on the Land for 2 nights before being inspected and removed from the site.
28. The Authority Holder must keep a record of lizards encountered during post-monitoring. These records are to be provided to the Grantor on an annual basis every 1st June. Records must be emailed to permissionshamilton@doc.govt.nz and include the Authority Number and Authority Holder's name.

SCHEDULE 4

Appendix 1 – Penguin Management Plan (04 February 2021), see [DOC-6620746](#)

Appendix 2 – Lizard Management Plan (30 March 2021), see [DOC-6620744](#)



Appendix 2: DOC kororā nest box design



Instructions for Building Blue Penguin Nest Box

Based on Plan Prepared by Vince Waanders
Modified by Mike Rumble, March 2015

BEFORE YOU START!!!

- READ these instructions CAREFULLY before you put EACH box together, and re-read them BEFORE you move to the next Step.
- Do NOT move to the next step until you have checked the one you have just completed to make sure it is correctly finished.
- Check you have these materials:
 - Box pieces (9): 1 Tunnel Side, 1 Tunnel Roof, 1 Box Roof, 1 Uncut Box Side, 1 Cut Box Side, 1 Box Front, 1 Box Back, 1 Box Lid, and 1 Lid Stopper
 - Nails: 8 short nails, and 23 long nails
 - Glue: Construction glue (cartridge) – should be with the supervisor
- **WARNING**: Make sure you use the correct size of nails in the right areas. We don't want penguins to get hurt from nails sticking out!!!

Get your box checked as soon as you finish building it
then give your box a **NAME** and add a **SHORT** story or a picture

TWO Very Important Messages!!!

Left and Right Tunnels

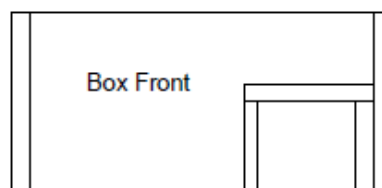
We need nest boxes with the entrance tunnel on the **LEFT** and the **RIGHT** sides. All you have to do is make sure the side of the side of the Box Front with "Inside" written on it is IS placed INSIDE the box. The box packs also have been set up to help achieve that requirement.

Gluing and Nailing

The Tunnel Sides and Tunnel Roof are the only parts where GLUING and NAILING is required



Tunnel on LEFT Side



Tunnel on RIGHT Side





**Instructions for Building
Blue Penguin Nest Box**
Based on Plan Prepared by Vince Waanders
Modified by Mike Rumble, March 2015

BEFORE YOU START!!!

- READ these instructions CAREFULLY before you put EACH box together, and re-read them BEFORE you move to the next Step.
- Do NOT move to the next step until you have checked the one you have just completed to make sure it is correctly finished.
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 - Box pieces (9): 1 Tunnel Side, 1 Tunnel Roof, 1 Box Roof, 1 Uncut Box Side, 1 Cut Box Side, 1 Box Front, 1 Box Back, 1 Box Lid, and 1 Lid Stopper
 - Nails: 8 short nails, and 23 long nails
 - Glue: Construction glue (cartridge) – should be with the supervisor
- **WARNING**: Make sure you use the correct size of nails in the right areas. We don't want penguins to get hurt from nails sticking out!!!

Get your box checked as soon as you finish building it
then give your box a **NAME** and add a **SHORT** story or a picture

TWO Very Important Messages!!!

Left and Right Tunnels

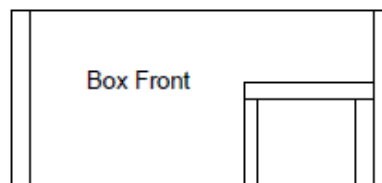
We need nest boxes with the entrance tunnel on the LEFT and the RIGHT sides. All you have to do is make sure the side of the side of the Box Front with "Inside" written on it is placed INSIDE the box. The box packs also have been set up to help achieve that requirement.

Gluing and Nailing

The Tunnel Sides and Tunnel Roof are the only parts where GLUING and NAILING is required



Tunnel on LEFT Side



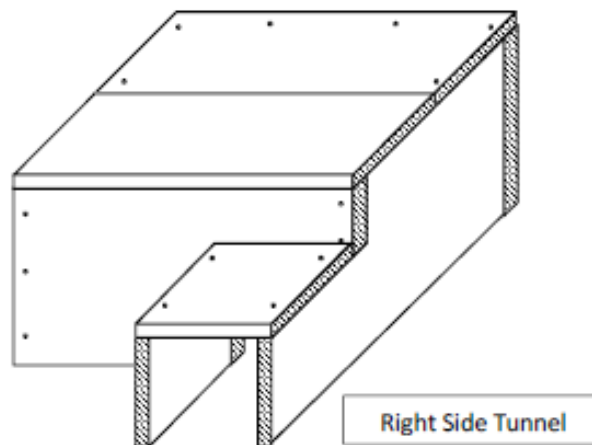
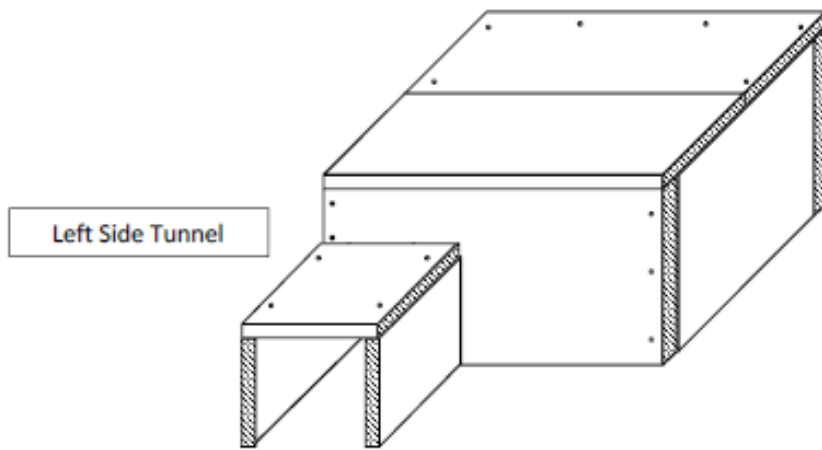
Tunnel on RIGHT Side





Little Penguin Nest Box

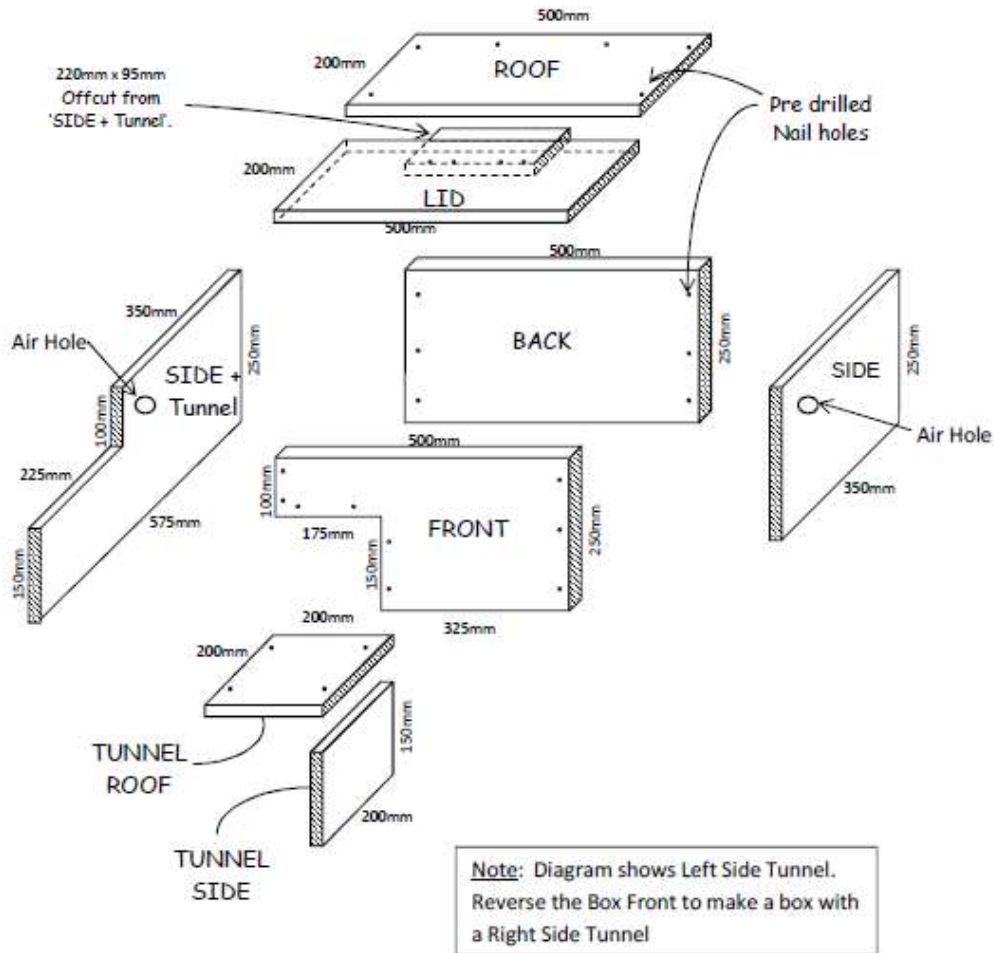
Modified design as used on Matiu/Somes Island
Modifications developed by Vince Waanders March 2011





Little Penguin Nest Box

Modified by Vince Waanders March 2011



ALL TIMBER: 25mm thickness. H3 Treated. Rough sawn. Pinus Radiata.	
ROOF	500mm x 200mm
LID	500mm x 200mm
FRONT	500mm x 250mm
BACK	500mm x 250mm
SIDE	350mm x 250mm
SIDE - Tunnel	575mm x 250mm
TUNNEL ROOF	200mm x 200mm
TUNNEL SIDE	200mm x 150mm





LBP Boxes: Trimming

Box Back: 6 evenly spaced nail holes (see box plan)

Box Roof: 8 evenly spaced nail holes – 4 where it joins the box back and 2 for each box side

Short Box Side (no tunnel): 1x25mm air hole, no nail holes

Long Box Side (with tunnel): Cut out 225x100 section, 1x25mm air hole, no nail holes

Note: 1. The off-cut from the box side becomes the Lid Latch

Box Lid: No nails

Box Front: Cut out 175x150 section and 9 nail holes (see box plan)

Note: 1. Half the box fronts to be LEFT-side Tunnel; half to be RIGHT-side.

2. Adding the word "Inside" on the inside of each box front will help the box builders.

Tunnel Side: No nails

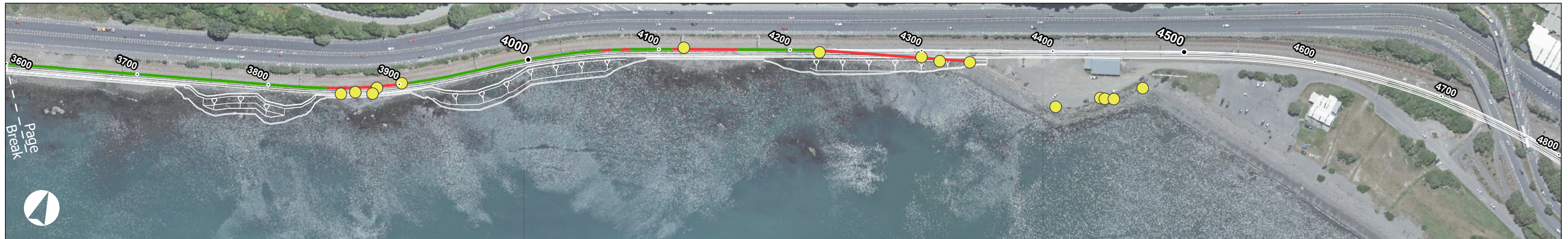
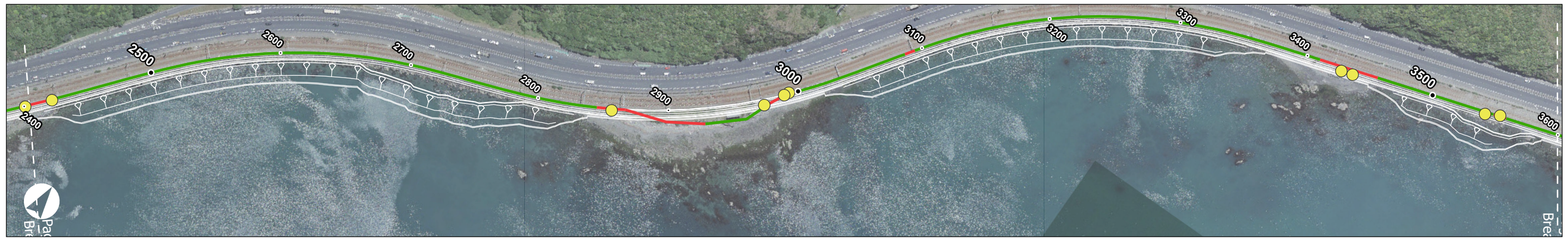
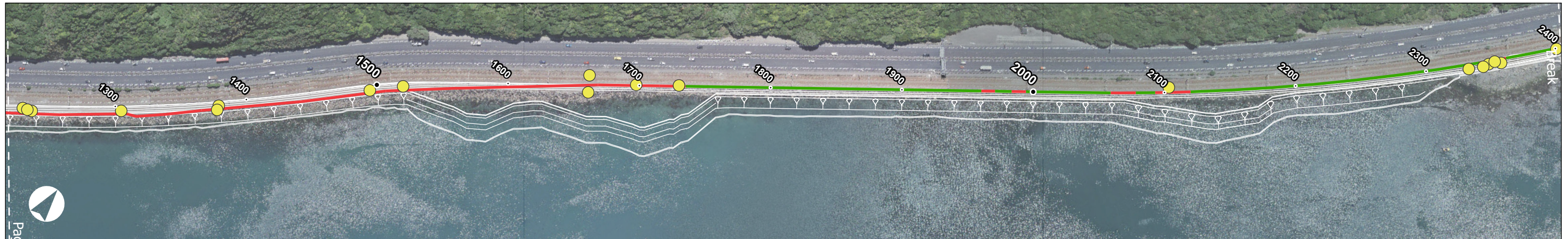
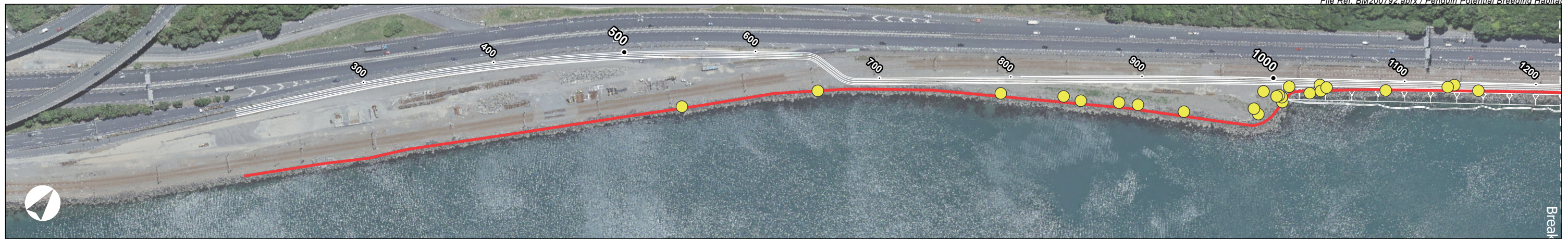
Tunnel Roof: 4 nail holes (two on each side)

Lid Latch: 4 nail holes off-set in pairs (latch made out of off-cut from box side)



Appendix 3: Habitat Maps





Appendix 4: Stakeholder Responses and Feedback



Stakeholder	Comment	Addressed
WCC	Pg 7 – Has the presence of dotterels nesting in this area been investigated	The project site does not provide habitat for dotterel. Furthermore, multiple avifauna surveys have been conducted along the project footprint (refer to ecological assessment that accompanied the resource consent application), with the only species confirmed nesting being kororā, tōrea pango and black-backed gull.
WCC	Pg 15 – I couldn't see Map 1, but would be good to touch base with F&B places for penguin locations and future nest boxes.	Will include map in final version – which only relates to the project site. All future nest boxes will also be located within the project footprint.
WCC	Pg 15 – Its worthwhile to note that penguins use any solid / semi solid structures as nesting if appropriate. A suggestion is to touch base with WCC regarding Cohham Drive as an example of creating space for penguins along the coastline as part of the design and development stage.	Yes, the author is familiar with the nesting habitats of penguins – having studied and worked with them for nearly 30 years and been involved in habtiat creation for other development projects.
WCC	Pg 19 – Sites within WCC boundary, send to places for penguins	The sites will be reported to DOC as per the requirement of the Wildlife Act authorisation.
WCC	Pg 27 – Who will be resourcing the treatment of injured penguins? Is there funding associated similar to funding allocated for necropsies by wildbase in point 2.3.9.(c)?	Aspects pertaining to funding are not a matter of consideration for this management plan.
WCC	Pg 30 – There should be an additional line for works occur outside of 20 m buffer. As there is a delay of survey and when works start, new nesting sites are possible. If the nest is located outside the known tōrea habitat, SQP should be consulted.	As noted in Section 3.2 “if works are to occur during the breeding season, 24 hours prior to the commencement of works within 20 m of identified tōrea pango nesting habitat, a SQP will survey the area to check for the presence or absence of breeding birds”. This timing does not represent a “delay”. Have added a new section (3.2.3) which outlines the necessary protocols should a nesting tōrea pango be incidentally discovered during enabling or construction works.
WCC	Pg 31 – Can this data be shared with council organisations?	Information can be provided to council on request.
WCC	Pg 32 – Does this involve ongoing maintenance of these structures?	Roost structures will not require ongoing maintenance.
GWRC	The protection for penguins meets best-practice standards, but we recommend a requirement to secure materials and machinery overnight, to prevent penguins taking up residence. This can be done by fencing them with orange hazard mesh attached between y-droppers/waratahs.	Such fencing may not be possible as plant and machinery may be left in different places, but this will be explored further.
GWRC	Roger has advised that it would be good to state in the AMP that the aim of achieving 75 dB noise exclusion outside of a penguin burrow is to achieve 70 dB inside the burrow (section 2.3.6.1, p 26/42). If a burrow is shallow or poorly defended, the 75 dB threshold should be open to review. Noise screening should be an option for protecting nests to be applied at the SQP's discretion	Plan updated with reference to 70 dB for birds found nesting or moulting on the surface.
GWRC	With regards the injury/death of penguins, dead penguins should be wrapped in tinfoil (dull side towards animal) and kept in the fridge. Using tinfoil instead of plastic is essential to be able to establish that the animals did not die of oil or related petroleum products. They should not be frozen as this damages the tissues that need to be investigated for the cause of death (section 2.3.9, p 28/42). It's worth noting that WildBase at Massey University may not always have the capacity to autopsy birds. In this instance, animals can also be sent to Gribbles or NZVP that have veterinary pathologists. Updated with reference to tin foil and fridge (not freezer).	Reference now included regarding tinfoil and fridge, however no changes made in regards to the vet listed in the plan as this is a requirement of the Wildlife Act authorisation.
GWRC	In terms of exclusion fencing for variable oystercatchers (section 3.2.2, p 32/42), we discourage the use of a single fencing wire as this might be a collision risk for the birds unless marked with flappers. It's preferable to just mark the nests with a ring of coloured stakes like the blue ones DOC uses for track marking and develop signage (for example on corflute that can be cable tied to the posts) to explain why the posts are in place .	Updated with this method for demarcation.
GWRC	Roger requested the GIS link to look at spatial data, and may have some more comments depending on what he finds here	Actioned – Roger Uys provided with viewer access to the penguin layer of the online GIS data collector.

Stakeholder	Comment	Addressed
DOC	Firstly, regarding risk to penguins from the holes in the xblocks. The penguin specialist group discussed this with NZTA and agreed that these holes could have plants such as flax installed to fill them. Will this occur?	No due to risk to structural integrity of the blocks.
DOC	In regard to post-construction monitoring, penguin boxes that are being made to replace lost habitat should be monitored annually for 3 years after installation during breeding season to determine the proportion of the boxes that are being utilised by penguins.	No plans to undertaken such monitoring at this stage as it is not required through the consent conditions.
DOC	In regard to post-construction monitoring, variable oystercatchers should be monitored annually for 3 years post-construction to determine the number of breeding adult pairs (and compared with pre-construction number of pairs).	No plans to undertaken such monitoring at this stage as it is not required through the consent conditions.
HCC	No comments received on the Avifauna Management Plan	
MWSG	The plans don't highlight any possible opportunities for iwi mana whenua to be involved in the work outlined in these plans.	New section (1.3) added outlining the opportunities for iwi mana whenua to be involved in the avifauna aspects of the project



Te Ara Tupua Alliance
Shifting gear to connect past, present and future

4

Predator Control Plan

NKP-TAT-APW-MPN-GV-NS-000028



Quality Assurance Statement		
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Revision Schedule		
Rev. Number	Date	Description
<i>Internal reviews</i>		
A	3/10/2022	Draft document for information & internal reviews
B	16/10/2022	Draft document for stakeholder reviews
C	25/01/2023	Final draft document for review by Waka Kotahi
<i>Submission for certification</i>		
1	21/03/2023	Final plan for certification
2	19/04/2023	Final plan for certification post GWRC comments

Disclaimer

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Table of Contents

1	Introduction	3
1.1	Project background	3
1.2	Project elements	4
1.3	Mana whenua	4
1.3.1	Connection to Te Whanganui-a-Tara (Wellington Harbour).....	4
1.3.2	Opportunities to collaborate in pest control activities	4
1.4	Ecological Assessment	5
1.4.1	Native penguin nesting boxes and other nesting native birds	5
1.5	Ownership and management of Shared Path and associated assets.....	5
2	Predator Ecology	6
2.1	Rodents.....	6
2.1.1	Mice (<i>Mus musculus</i>).....	6
2.1.2	Ship Rat (<i>Rattus rattus</i>)	7
2.1.3	Norway Rat (<i>R. norvegicus</i>)	7
2.2	Mustelids.....	7
2.2.1	Weasel (<i>Mustela nivalis</i>).....	7
2.2.2	Stoat (<i>M. erminea</i>)	8
2.2.3	Ferret (<i>M. furo</i>).....	8
2.3	Other predators of note	8
2.3.1	Hedgehogs (<i>Erinaceus europaeus</i>) and feral cats (<i>Felis catus</i>)	8
3	Predator Control Plan	9
3.1	Control methods.....	9
3.1.1	Kill traps	9
3.1.2	Vertebrate Toxic Agents (VTAs).....	11
3.2	Monitoring methods	14
3.3	Data management	16
3.3.1	Trap.NZ.....	16
3.3.2	Neighbouring Predator Control Projects.....	16
3.4	Public engagement and communication.....	17
3.4.1	Communicating the Predator Control Plan to the public	17
3.5	Te Ara Tupua Predator Monitoring	18
3.5.1	Location, type and regime	18
3.5.2	Predator thresholds	18
3.5.3	Predator Monitoring Assumptions	18
3.6	Te Ara Tupua Predator Control	19
3.6.1	Section one – Shared pathway from Hutt Valley rail bridge to Honiana te Puni Reserve.....	19
3.6.2	Section two – Honiana te Puni Reserve.....	21



3.6.3	Trap preparation and deployment	22
3.6.4	Trap checks and maintenance	23
3.6.5	Predator control network annual audit.....	23
4	Summary	24
	Appendix 1: Predator Plague Cycle	
	Appendix 2: Annual Summary Calendar of Operations	
	Appendix 3: Monitoring Network Map	
	Appendix 4: Predator Control Network Map	
	Appendix 5: DOC-series trap maintenance check list	
	Appendix 6: Stakeholder Responses and Feedback	



1 Introduction

1.1 Project background

Waka Kotahi New Zealand Transport Agency have consented and are planning to construct the Ngā Ūranga ki Pito-One for Te Ara Tupua (**the Project**). This involves the construction of a shared path from the Ngā Ūranga interchange (**Ngā Ūranga**) to just south of the Petone Railway Station in the north (**Pito-One**).

A condition of consent for the Project is the preparation of an Ecology Management Plan (**EMP**) prior to construction and a Predator Control Plan (**PCP**) is to be included as part of the EMP. The purpose of the PCP is to protect coastal birds (particularly nesting birds) from predation by rodents and mustelids.

Consent conditions EM.9 and EM.10 relate specifically to the requirements of the PCP and the management of predators – namely rodents and mustelids – and states:

Condition ref	Condition	Location where addressed
EM.9	<p>(a) A predator control programme shall be implemented during construction and operation of the Project for a duration of 35 years. The programme shall be detailed in a Predator Control Plan included as part of the EMP. The purpose of the Predator Control Plan is to protect coastal birds (particularly nesting birds) from predation by rodents and mustelids;</p> <p>(b) The Predator Control Plan shall include the following information:</p> <ul style="list-style-type: none"> i. Details of ownership and management of the Shared Path and associated assets; ii. Locations of penguin nesting boxes at Piki Wahine Point ūranga and other nesting birds along and adjacent to the Shared Path which exist at the time that the Predator Control Plan is prepared; iii. Locations of all nesting areas for variable oystercatcher; iv. Areas along and adjacent to the Shared Path, including the provision of a map showing where predator control is required; v. The target pest species; vi. Predator control measures to be used; vii. The frequency of pest management activities; viii. Opportunities to co-ordinate with predator control programmes being undertaken by other parties in areas near the Project; ix. Monitoring frequency and methods; x. Adaptation to respond to outcomes of monitoring; and xi. Trigger levels above which pest control measures will be increased. 	<p>(a) This management plan particularly Section 3</p> <p>(b) N/A</p> <ul style="list-style-type: none"> i. Section 1.5 ii. Section 1.4 iii. Section 1.4 iv. Appendix 3 and 4 v. Section 2 vi. Section 3.1 vii. Appendix 2 viii. Section 3.3.2 ix. Section 3.5 x. Section 3.2 and Section 4 xi. Section 3.2 and Section 4
	The Predator Control Plan shall be prepared in consultation with the parties listed in EM.2.	Section 1 of the EMP

This Predator Control Plan (**PCP**) addresses the requirements under conditions EM.9 and EM.10 and is a component of the wider EMP for the Project. Henceforth throughout this report, the term 'predators' refers only to rodents and mustelids.

1.2 Project elements

The Project will provide a 4.5 km shared path between Ngā Ūranga and Pito-One featuring the following key elements¹:

1. A rail overbridge (the shared path bridge) across the Hutt Valley Railway Line, connecting the shared path from Ngā Ūranga to the coastal edge;
2. A path with a 5 m surface width on existing and newly created land and coastal structures, on the seaward side of the Hutt Valley Railway Line;
3. A varied coastal edge which incorporates ūranga (landings), a rocky revetment and the intermittent use of strategically placed seawalls along the path edge. The coastal edge treatment provides resilience, reflects the natural landscape, avoids sensitive habitat areas, provides for cultural expression and enhances amenity;
4. Construction of new offshore habitat for coastal avifauna;
5. Connections to the Pito-One to Melling (P2M) path and Pito-One Esplanade;
6. Construction of a new integrated clubs building at the eastern end of Honiana Te Puni reserve.

1.3 Mana whenua

1.3.1 Connection to Te Whanganui-a-Tara (Wellington Harbour)

As outlined in the Mana Whenua Values Plan², Te Whanganui-a-Tara (Wellington Harbour) has great cultural, historical and spiritual significance for Taranaki Whānui and Ngāti Toa. The harbour, the land surrounding it and the rivers and streams that feed into it, helped sustain the life of those residing within the two pā. To this day, the harbour and the surrounding area continue to provide fisheries, food and other resources for mana whenua. Therefore, the health and wellbeing of the harbour is of vital interest to mana whenua to ensure that it and its resources are sustained for many more generations to come. The name Te Ara Tupua is an acknowledgement to the guardians of the Harbour, Ngake and Whāitaitai.

The Mana Whenua Values Plan states that “*Mana whenua see this project as an opportunity to restore our connections with the harbour and share our whakapapa of this space*”.

1.3.2 Opportunities to collaborate in pest control activities

The planned predator control activities and associated monitoring outlined in this PCP will be undertaken by a contractor appointed by the consent holder. The set up and running of the pest control infrastructure presents an opportunity for mana whenua to be involved in and/or upskill individuals in predator control.

The specifics of mana whenua involvement will depend on Health and Safety constraints but may include the following types of activities/learning opportunities:

1. Deployment, micro-siting, baiting and setting of predator traps/monitoring devices with a focus on knowledge sharing on animal behaviour and ecology that underpins the types and numbers of control tools to be used and the deployment locations.
2. Toxic control operations, approvals/licenses required, types of bait, toxin types, target animals, managing risks to non-target species and efficacy versus trapping. This will depend on operational Health and Safety plans and any other constraints as to the level of involvement possible given it involves the use of toxins.
3. Recording field data, the types of data collected and why, and the uploading, storing and accessing of that data and its relevance and utility to long term pest control programs.

¹ Technical Report 9 – Ngā Ūranga ki Pito-One Shared Path: Ecological Assessment, Boffa Miskell Ltd, 22 September 2020

² Mana whenua values plan – NKP-TAT-APW-MPN-GV-NS-000017. Co-developed between Taranaki Whānui, Ngāti Toa Rangatira and Te Ara Tupua Alliance.



1.4 Ecological Assessment

Ecological values were identified in the Ecological Assessment of the Project area in 2020³. These specifically relate to indigenous vegetation, herpetofauna, freshwater, avifauna, and marine values. The control of predators will ensure ecological values thrive in a modified environment and continue to successfully occupy areas of coastal habitat.

The Ecological Assessment deemed the overall level of effects of the Project on ecological values to be Low to Very Low. An effective PCP aims to protect ecological values at place and enhance the environment to ensure the Project continues to have a low impact on values.

1.4.1 Native penguin nesting boxes and other nesting native birds

As per consent condition EM.9B(ii) the location of penguin nesting boxes at Piki Wahine Point Ūranga are required to be outlined in the PCP. A total of 20 nest boxes will be incorporated into the Piki Wahine Point Ūranga for kororā/little penguin. In addition 235 nest boxes for kororā will be incorporated into the crest of the revetment along the Nga Ūranga ki Pito-One alignment. The exact locations, spacings, timing of installation, and the installation itself will be advised / supervised by a suitably qualified and experienced penguin expert.

As required by consent condition EM.9B(ii) the locations of other nesting birds along and adjacent to the shared path which exist at the time that the PCP plan is prepared are required to be outlined. The areas of Tōrea pango / variable oystercatcher (*Haematopus unicolor*) foraging and nesting habitat have been identified along the Nga Ūranga ki Pito-One alignment, and are shown in the Avifauna Management Plan:Nga Ūranga ki Pito-One (Map 2).

1.5 Ownership and management of Shared Path and associated assets

As per consent condition EM9.9B(i) The PCP is required to include the details of ownership and management of the Shared Path and associated assets. It is our understanding at the time of preparing this PCP that Waka Kotahi will be the owner of the shared path and responsible for the management of the shared path and the associated assets.

³ Boffa Miskell, Ngā Ūranga ki Pito-One Shared Path Ecological Assessment, 22 September 2020

2 Predator Ecology

Invasive predators outlined in this PCP prey on native birds, lizards, and invertebrates, and are known to destroy indigenous vegetation, ultimately disrupting the natural ecology of an environment. The omnivorous nature of rodents means that at times, competition for food sources with native wildlife is high, and this can cause declines in native wildlife populations.

The coastal environment along the Project's boundaries is highly susceptible to predator interactions with all native species being at risk of predation or foraging effects. Neighbouring environments to the Project include (but are not limited to), temperate climates with kohekohe and nīkau dominated canopies, as well as wet and cloudy climates with mixed beech and podocarp forested areas⁴. These ecosystems will influence predator numbers within the Project area throughout all seasons. Monitoring of predator species will be integral to understanding population drivers and thus, the optimal timing for control within the Project site.

Within New Zealand there is a significant relationship between native forest masting events and the rise and fall of predator populations – this is known as the 'predator-plague cycle'⁵ (Appendix 1). The coastal environment within the Project's boundaries is not likely to exhibit this cyclic change in predator abundance, however the neighbouring environments will be susceptible to this cycle and thus, will impact predator abundance within the Project site. Appendix 1 covers more information on this cycle.

The ecology of each of the target predator species covered in this PCP are slightly different; these are discussed below.

2.1 Rodents

2.1.1 Mice (*Mus musculus*)

Mice are prolific breeders and respond quickly to an increase in food abundance within an environment. Mice feed on native vegetation, especially seeds in mast events, and they are known predators of invertebrates, herpetofauna, and native bird eggs and chicks⁶. In the absence of control only severe winters or major predation events have the ability to reduce numbers. Selective predation of seeds by mice can alter plant species composition and reduce the forests' ability to naturally regenerate. Mice are a major threat to herpetofauna, which shelter within tight natural crevices, as mice can access the narrow areas that are inaccessible to other predatory mammals. Therefore, mice can have detrimental effects on native ecosystems.

⁴ Greater Wellington Regional Council, Wellington Reserve Native Plant Guide, pages 18, 26 & 27;
<https://www.gw.govt.nz/assets/Documents/2021/07/Wellington-Regional-Native-Plant-Guide-Revised-Edition-2010-Web.pdf>

⁵ Department of Conservation, Predator Free 2050 Practical Guide to Trapping, June 2021, page 17;
<https://www.doc.govt.nz/globalassets/documents/conservation/threats-and-impacts/pf2050/pf2050-trapping-guide.pdf>

⁶ Department of Conservation, www.doc.govt.nz



2.1.2 Ship Rat (*Rattus rattus*)

Ship rats are the most numerous rats in New Zealand's landscape and can be found in all ecosystems. They are very agile climbers and predominantly roost and nest within trees and shrubs. They are infrequent swimmers, however, put under enough pressure they will attempt to swim and can invade new environments in this way⁷. Due to their climbing ability, ship rats have the largest impact on native fauna. Like mice, ship rats feed on native vegetation, especially seeds in mast events, and they are known predators of invertebrates, herpetofauna, and native bird eggs and chicks. The main difference with mice is that ship rats predate on native bird fledglings and adults and are known to have had catastrophic impacts on 'nationally critical' bird populations in Aotearoa⁸. Ship rats occupy a home range of approximately 0.3-11.4 ha in size, depending entirely on food availability. Ship rats are prolific breeders and respond quickly to an increase in food abundance. When food rots or decreases in prevalence, the high-density population of ship rat's prey on more vulnerable food sources, such as native flora and fauna, being the main driver of major predation events on our native species.

2.1.3 Norway Rat (*R. norvegicus*)

In Aotearoa Norway rats most commonly occupy habitats near human habitation and waterways. They are less prevalent than ship rats in distribution across the country and are not present in all ecosystems. Norway rats are the largest of the rats within New Zealand. Norway rats climb much less frequently than ship rats and kiore and are very good burrowers. They most commonly roost and nest underground and are very strong swimmers. Norway rats are known to prey on native vegetation, especially flowers and fresh tree/shrub buds, and they are known predators of invertebrates, herpetofauna, and native bird eggs, chicks, fledglings and adults. Due to their large size, Norway rats are known to kill adult birds more easily than ship rats and kiore⁹. Norway rats occupy a home range of approximately 0.8-21 ha in size, fluctuating in size with food availability. The varied diet of Norway rats means that prey switching is likely and like ship rats, they can have detrimental impacts on native flora and fauna. Norway rats (and to a lesser degree ship rats) utilise modified landscapes like the shared path and associated rip rap structures and can use these areas as potential habitat and movement corridors and as such their control in these areas is essential to minimise potential impacts on native fauna.

2.2 Mustelids

2.2.1 Weasel (*Mustela nivalis*)

Weasels are the smallest mustelid introduced to New Zealand in the 1880s for the control of rabbits. They can easily be displaced by stoats and because of this, are present in most New Zealand ecosystems, but not all, in low numbers. They are less common than both stoats and ferrets and predominantly feed on mice. Even at low densities, weasels are known to impact native wildlife, including invertebrates, herpetofauna, and birds. They breed from September to March, often producing two to three litters a season, with four to six young per litter¹⁰.

⁷ Department of Conservation, Predator Free 2050 Practical Guide to Trapping, June 2021, page 13 & 14

⁸ Department of Conservation, Conservation status of plants and animals;

⁹ Department of Conservation, Predator Free 2050 Practical Guide to Trapping, June 2021, page 14 & 15

¹⁰ Northland Regional Council, Weasel, Stoat & Ferret; <https://www.nrc.govt.nz/environment/weed-and-pest-control/pest-control-hub>



2.2.2 Stoat (*M. erminea*)

The stoat is the most common mustelid in New Zealand, also introduced to help curtail the rabbit population in the late 1800's. For our native wildlife they are the most destructive pest in the country. Stoats are found in all ecosystems throughout New Zealand, including the harsh New Zealand alpine environment, and especially in New Zealand forests. Stoats breed once a year, however, can produce up to ten young per litter when food is plentiful (such as in a masting event). They are prolific breeders due to young females and their mother's being impregnated before ever leaving the den – once born and growing within the mother's den, male stoats roam the area and ensure all females within their home range are impregnated. The number of young produced in the litter each season depends entirely on food availability, in years of high food abundance (e.g., mast years), the number of young produced by each stoat will be very high, compared to years where food is scarce. They seriously impact our native avifauna, especially ground dwelling birds (such as kiwi (*Apteryx spp.*)), ground nesting birds (such as tawaki / Fiordland crested penguin (*Eudyptes pachyrhynchus*) and Tarapirohe / black-fronted tern (*Chlidonias albostrigatus*)) and cavity tree dwelling species (such as kākārīki (*Cyanoramphus spp.*) and mohua / yellowhead (*Mohoua ochrocephala*)). They truly can have unprecedented impacts on our native fauna if left unchecked.

2.2.3 Ferret (*M. furo*)

Ferrets are the largest mustelid to have been introduced into New Zealand to aid in rabbit control. Ferrets most commonly inhabit more open areas such as coastal habitats, pastoral lands and forest margins, consuming a diet predominantly of rabbits and hares. Ferrets can produce up to two litters per season with four to eight young in each. Although there are not thought to be any ferrets in Wellington, like weasels and stoats, ferrets can cause devastating impacts to native wildlife populations and have large home ranges meaning that they can disperse to new accessible areas relatively easily. Despite rabbits and hares being their predominant diet, they are known to predate on native species and compared to the other two mustelids, can easily kill an adult kiwi. They pose a serious economic threat to New Zealand's primary industry as they can pick up, carry, and spread bovine tuberculosis (Tb) to livestock¹¹.

2.3 Other predators of note

2.3.1 Hedgehogs (*Erinaceus europaeus*) and feral cats (*Felis catus*)

Another predators to note within the coastal environment but not included within the consent conditions are hedgehogs and feral cats. Hedgehogs and feral cats can have negative impacts on a range of native wildlife.

¹¹ Ferrets as Tb Hosts; <https://www.ospri.co.nz/assets/ResourcePDFs/TBfree-Ferrets-as-TB-hosts.pdf>



3 Predator Control Plan

3.1 Control methods

The control methods discussed in this section refer to the control of ‘predators’ as defined by this plan – namely rodents, weasels, stoats, and ferrets. There are many options for controlling these animals and a diverse range of control methods must be considered to ensure predator control is fit for purpose and efficient. Utilising various methods simultaneously will improve the success of control as it targets individuals with different behavioural preferences. Several factors must be considered when designing a predator control programme, including type of control tool, the landscape, non-target species and ways of minimising any non-target captures, maintenance procedures, and animal welfare.

In New Zealand, predator control is undertaken using trapping, both through kill traps and live capture traps, and by using toxic baits applied in bait stations, bait bags, strikers and through aerial application. Both traps and toxins that could be beneficial to this Project are described below (Table 3.1). Their direct application to the project is described in section 3.6.

Table 3.1: Control method/s employed for each species within this predator control plan.

Target Species	Control Method/s
Mice	Vertebrate toxic agents
Ship Rat	Kill trapping, vertebrate toxic agents
Norway Rat	Kill trapping, vertebrate toxic agents
Weasel	Kill trapping
Stoat	Kill trapping
Ferret	Kill trapping
Hedgehog	Kill trapping

3.1.1 Kill traps

A kill-trap is designed to render the target animal irreversibly unconscious by closing on it with sufficient force¹². Within New Zealand the National Welfare Advisory Committee (**NAWAC**) has set guidelines and thresholds that traps must pass before being signed off as an effective tool at killing a specific species. Traps that have passed testing under the guidelines laid out by NAWAC are considered to be humane for that species¹³.

Trapping is a very effective way of targeting species across the landscape. There are many factors that need to be considered to create an efficient trapping network, such as the behaviour of the target predator, efficacy of the trap, the type of habitat and landscape that is being trapped, and the labour capacity and skills. Trapping needs to be a dynamic process whereby predators are monitored over time and trapping efforts amended to reflect any changes to predator populations – both in population density and predator composition (e.g., the make up of the predator profile may change over time due to abiotic influences).






There are many trap types within New Zealand that are used to target both rodents and mustelids. All traps need to have an effective covering to prevent non-target interactions – these are either designed with the trap itself (e.g., D-Rat) or the trap is required to be covered with a ‘trap-box’ (e.g., DOC-series traps). The different trap types and coverings that will be used in this Project are described in the Table 3.2 below.

¹² Kill Traps, a guideline to trap possums, ferrets, stoats and feral cats using kill traps; National Possum Control Agencies, 2009; <https://pestdss.landcareresearch.co.nz/Content/BestPractice/Possums-43-46-NPCA-kill-trap-trapping-guide.pdf>

¹³ Bionet.NZ, <https://www.bionet.nz/rules/performance-traps/>



Table 3.2: List of trap types with trap name, target species (according to NAWAC), risks and mitigations in relation to the Project and photos. *target species killed by trap but not required to be controlled under consent condition EM9.

Trap Name	Target Species	Description	Risks	Photo
DOC200 single-set	Hedgehog* Norway rat Ship rat Stoat Weasel	<ul style="list-style-type: none"> • Single-kill trap • Requires clearing of animal after each capture • Requires lure to be re-freshed frequently • Targets wide range of predators 	<ul style="list-style-type: none"> • Small cats could access trap 	
DOC200 double-set	Hedgehog* Norway rat Ship rat Stoat Weasel	<ul style="list-style-type: none"> • Single-kill trap • Requires clearing of animal after each captures • Requires lure to be re-freshed frequently • Targets wide range of predators • Capable of capturing two predators within the single trapping bout 	<ul style="list-style-type: none"> • Small cats could access trap 	
DOC250 single set	Ferret Hedgehog* Norway rat Ship rat Stoat	<ul style="list-style-type: none"> • Single-kill trap • Requires clearing of animal after each capture • Requires lure to be re-freshed frequently • Targets wide range of predators 	<ul style="list-style-type: none"> • Small cats could access trap • Apature needs to be small enough to eliminate penguins from using as a roost / nest which may eliminate large ferrets 	
Victor Professional	Norway rat Ship rat	<ul style="list-style-type: none"> • Single-kill trap • Requires clearing of animal after each capture • Requires lure to be re-freshed frequently 	<ul style="list-style-type: none"> • Parts may seize quickly in a coastal environment and may be best suited to use where Norway rats present 	
Envirotools D-Rat	Ship rat	<ul style="list-style-type: none"> • Single-kill trap • Requires clearing of animal after each capture • Requires lure to be re-freshed frequently • Must be placed in wooden tunnel to comply with NAWAC 	<ul style="list-style-type: none"> • Does not target wide breadth of predators 	

3.1.1.1 Lure

Lures entice predators to interact with a trap by resembling their preferred food type. The longevity and appeal of the lure to the target species is vital when deciding which is most effective for the task. Lures in traps should be replaced every service (fortnightly). Changing between the types of lure traps are baited with (e.g., every 3-6 months), has been shown to be effective at increasing trapping success by targeting individuals with differing preferences. Lure type should be recorded in Trap.NZ to allow analysis of which lures are most effective for each target species.

3.1.1.1.1 Rodent Lure

Rodents prefer a diet made up of seeds, grains, and other plant materials, as well as invertebrates and small vertebrates. A fresh lure can easily be made using peanut butter, chocolate, or peanut butter mixed with rolled oats. However, for improved longevity, auto-dispensed lures or solid-state rat lures works best. The following list provides the rodent lures that will be utilised for rodent control within this PCP:

- Peanut Butter
- Fresh or Salted Rabbit
- PCR Rat and Possum Lure
- Connovation Erayz
- Connovation PoaUku
- Connovation Eggsellent¹⁴

3.1.1.1.2 Mustelid Lure

Mustelids prefer a diet consisting of eggs and meat, such as that from rabbits, rodents, birds, or other wildlife. Using different lures, such as both salted rabbit and a long-life lure block, will likely attract a wider range of individuals of the same target species with differing preferences.

- Traps targeting mustelids should generally be lured with fresh rabbit or if checking frequency is low then preserved rabbit (Connovation Erayz) should be used, which is also suitable for targeting rats and hedgehogs.
- A long-life, solid state block for mustelids (Connovation Poa Uku) has been proven to be more attractive than Erayz for attracting stoats for up to one month, and ferrets for up to three months. This lure is recommended as a long-life alternative to salted rabbit during summer if fresh rabbit is not available or trap check frequency is low.
- Connovation's Eggsellent lure is highly effective at attracting a wide range of target predators including stoats, ferrets, weasels, and rats, however, it needs to be freshly dispensed (ideally at least every 24 hours).
- Long-life lure dispensers such as MotoLUre and EzyLure™ (still in development) are able to dispense fresh lure including Eggsellent and remain operational for up to a year.
- Raw hens eggs can be used as a visual cue. Eggs can be topped with a tablespoon of peanut butter if rats are also being targeted.
- Connovation's Lure-It Salmon is a spray-on scent that can be used for scent trails between traps

3.1.2 Vertebrate Toxic Agents (VTAs)

3.1.2.1 Efficacy of toxins

In New Zealand, a range of vertebrate toxic agents (**VTA**), are used to kill predators such as rodents. Toxins are very effective at large scale as they can be widely distributed especially when helicopters and bait stations are used. Toxins rely on the target species ingesting bait as a food source eliciting a feeding response that results in death. Because of this, interaction rates tend to be higher with toxins than with traps. Four toxic bait operations targeting rats will be run each year to protect nesting coastal birds from predation from rodents, these will be in February, May, August, and November.

¹⁴ Connovation Lures; <https://www.connovation.co.nz/>



3.1.2.2 Recommended toxins

Table 3.3 lists different toxins that could be used for predator control within the Project. For each of the toxin control methods, the amount of toxin to be used per bait station, per operation and other key requirements are outlined on their label which must always be followed. Contractors are required to be trained and licenced for many of the available toxins discussed below.

One risk with toxins is secondary poisoning, whereby a species ingests a dead animal that has consumed toxic bait and dies from poisoning. Not all toxins have secondary poisoning effects, and whilst secondary poisoning can be beneficial where introduced predators consume the poisoned carcass, in most cases this is not a desired feature, e.g., pet cats and dogs can be susceptible to secondary poisoning. Secondary poisoning of non-target species is a real risk with some toxins, however, if delivered effectively or an alternative toxin used, this risk can be mitigated.

Table 3.3: List of rodent toxins, descriptions of each, their risk status and suitability for the Project.

Toxin	Description	Risks
Diphacinone	Diphacinone is a first-generation anticoagulant ideal for targeting rats. Diphacinone has a short life, so it does not bioaccumulate. Baits can be brought in blocks that are able to be wired into bait stations or placed on metal rods within bait stations – this prevents rodents from dragging bait out of bait stations and exposing to non-target species.	This toxin has a low risk of secondary poisoning, a CSL is not required, and Vitamin K can be used as an antidote in the event of accidental poisoning.
Pindone	Diphacinone is a first-generation anticoagulant ideal for targeting rats. Diphacinone has a short life, so it does not bioaccumulate.	This toxin has a low risk of secondary poisoning, a CSL is not required, and Vitamin K can be used as an antidote in the event of accidental poisoning.
Diphacinone and cholecalciferol (Double Tap)	Double Tap was developed to produce a bait that was as potent as brodifacoum but did not leave significant residues in the environment. It does not require a pre feed as it is a chronic toxin. Death can take 5-8 days with early symptoms being loss of appetite. Baits can be brought in blocks that are able to be wired into bait stations or into bait safes that rodents can feed from e.g. the pied piper bait station – this prevents rodents from dragging bait out of bait stations and exposing to non-target species.	Primary poisoning risk exists from direct ingestion of baits by dogs, cats, or people either through access to bait stations or eating the stomach content of recently dead rats if they die before they have completely digested the bait. Birds have been shown to be less susceptible to cholecalciferol than mammals. It is recommended that DoubleTap baits are used in the August toxic bait operation each year to provide an alternative to the two first generation anticoagulant baits recommended and that dogs are not allowed to be walked along the shared path during this toxic baiting operation to minimise the risks to dogs.



3.1.2.3 Bait stations

In most cases, ground-based toxic predator control operations require the use of a delivery mechanism, such as bait stations, to control non-target impacts. The choice of delivery mechanism depends entirely on the type of toxin being used, e.g., paste vs. pellets. Using a toxin that is safe, effective, and will not bioaccumulate in the environment thus endangering non-target species, is key to the execution of a successful toxin operation.

Rodents, particularly rats, are known to remove toxic baits from bait stations and cache these which can result in non-target species being exposed to these baits when removed from bait stations. Potential solutions to reduce this risk involve wiring pellet baits into bait stations or the use of bait station designs that make this caching behaviour difficult, e.g. the pied piper bait station. The pied piper bait station is a run through station with small openings in the underside of the tunnel roof that require rodents to access and eat bait through a grided bait basket (Figure 1). It is recommended that the toxic baits outlined in Table 3.3 are delivered in pellet form in pied piper bait stations to minimise the risk to non-target animals from toxic baits being removed from bait stations during toxic control operations.



Figure 1: The Pied Piper bait station, rodents cannot remove baits and are forced to eat bait within the stations.

3.1.2.4 Warning requirements and recommendations to minimise risk to dogs

Bait station networks are an effective option to deliver toxins and control high density rodent populations in urban environments. However, care must be taken where non-target species reside, such as pet cats and dogs. To enable effective control of predators within the Project area whilst further minimising risk to non-target species we have recommended the following:

- It is our recommendation that people are not allowed to take dogs along the shared path during the August toxic control operation period which is likely the entire month of August.
- If dogs are to be allowed access along the shared path, then they must be on leash at all times and signs must be erected at either end of the shared path as well as at points along the path.
- Signs should outline the risk to dogs from predator control activities (including toxic baiting) and the risks dogs pose to threatened native wildlife and the need to keep them on a leash, and the penalties that apply to dog owners not complying.
- Warning signs must be erected at either end of the shared path as well as at key points along the path (e.g. rest areas and areas people are likely to stop) during the four toxic control operations. These warning signs and the timeframe they are left in place must comply with label recommendations for the specific toxins used.

3.2 Monitoring methods

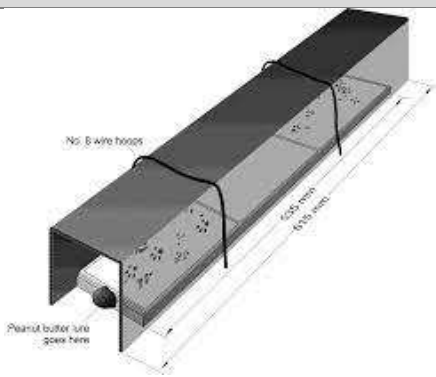
There are a number of methodologies available for conducting result monitoring surveys to determine predator diversity, abundance, predator habitat use, and effectiveness of the implemented predator control regime within New Zealand. The results from these methodologies are always considered over and above trap catch data, which can, at times, double as a form of surveying. Each monitoring technique has its advantages and limitations; however, it is important to be consistent in the monitoring approach to control for any bias.

Monitoring predators in a consistent manner over time will allow trends to be identified within the Project site during a year and within the same season across many years. This information will ultimately drive the predator control regime and trigger any adaptations (reductions or increases) in effort over time to reduce predator numbers to desired thresholds. Overall, monitoring is key to understanding the efficacy of control and addressing how predator control efforts are contributing to the system that is being protected.

The predator monitoring techniques outlined in Table 3.4 below have been derived from DOC best practice and are a toolbox of methods that can be utilised for this PCP. The monitoring regime for the Project has been tailored for use based on practical consideration of the topography, vegetation type and structure of the Shared Path. The tracking tunnel methodology is the preferred monitoring technique for this PCP. The Project site, however, is open and exposed to the elements and highly accessible to the public. Therefore, the preferred monitoring method of tracking tunnels may need to be adapted if challenges arise at deployment.



We recommend three monitoring surveys each year for rodents, in May, August and December as these are important months for rodents and key native coastal birds. Monitoring in August will follow the toxic control operation for rats and will provide a measure of success of that operation during the early stages of the breeding season for coastal bird species. December monitoring of rats allows an understanding of rodent abundance within the Project Area at a sensitive time for breeding birds as there will chicks present, and some species may have second clutches of eggs being incubated. May monitoring of rats enables an understanding of rodent abundance in autumn when rats numbers often are building up due to large amounts of food available. We recommend monitoring of stoats in August as female stoats will still be active prior to finding dens to give birth and then January when the juvenile stoats will be dispersing.

Table 3.4: List of predator monitoring techniques used widely in New Zealand for rodents and stoats¹⁵.

Monitoring Method	Target species	Frequency & Description	Photo
Tracking Tunnel	Rodents	<ul style="list-style-type: none"> • Three times per year: May, August and December with the August monitor being undertaken immediately following the toxic baiting for rodents. • One night monitor • Wooden tunnel; tracking card with black ink in centre • Peanut butter lure placed on each end of card • Identifying measure – footprints on card • 10 tunnels per line, tunnels 50 m apart; number of lines dependant on site size • Presence / absence data • Tunnels remain in-situ to reduce neophobic behaviour of target species 	
Tracking Tunnel	Mustelids	<ul style="list-style-type: none"> • Twice per year: August and January • Three-night monitor • Wooden tunnel; tracking card with black ink in centre 	

¹⁵ Department of Conservation, Predator Free 2050 Practical Guide to Trapping, June 2021, page 19 - 31



Monitoring Method	Target species	Frequency & Description	Photo
		<ul style="list-style-type: none"> • Erayz or salted rabbit lure within tea strainer placed in centre of tunnel and ideally attached to tunnel • Identifying measure – footprints on card • 5 tunnels per line 100 m apart; number of lines dependant on site size • Presence / absence data • Tunnels remain in-situ to reduce neophobic behaviour of target species 	
Chew Card ¹⁶	Rodents	<ul style="list-style-type: none"> • Three per year: May, August and December with the August monitor being undertaken immediately following the toxic baiting for rodents. • One night monitor • Corflute plastic card filled with an attractive lure such as peanut butter • Identifying measure – teeth marks on card • 10 cards per line 20 m apart; number of lines dependant on site size • Presence / absence data 	
Trail Camera ¹⁷	Mustelids	<ul style="list-style-type: none"> • Twice per year: August and January • 11-night monitor • Trail camera set c. 6-20 cm above ground with lure placed 1 m in front of camera • c. 150 g fresh rabbit between two Erayz baits wrapped in chicken wire & threaded onto a c.150 mm W x c.260 mm H No.8 wire 'croquet style' hoop pegged to ground between 60 cm-1 m in front of camera • Camera set to medium trigger sensitivity with three-photo burst when triggered & five minute forced interval between bursts • Identifying measure – photo of target species • 4 cameras per line 200 m apart; number of lines dependant on site size • Camera trap index of abundance – possible to detect coarse index of relative abundance over time 	

¹⁶ Chewcards: A guide to the interpretation of animal tooth impressions, page 29;
https://www.landcareresearch.co.nz/assets/Discover-Our-Research/Biodiversity/vertebrate-pests/Chewcard_interpretation.pdf

¹⁷ Department of Conservation Interim DOC trail camera guide v1.0.2: Using camera traps to monitor feral cats and mustelids



3.3 Data management

Good data management will be integral to the success of this PCP. Maintaining precise records for both control and monitoring activities is crucial and will allow for the evaluation of the success of the predator control at each site and enable this data to be shared with landowners and project partner groups as listed in Section 1 of this report and Ref EM.2 of the resource consent. The spatial and temporal trends of predator populations can be analysed, and thus will inform future pest management decisions at the site and allow all partner groups to undertake GIS analysis relevant their own requirements.

3.3.1 Trap.NZ

Trap.NZ is an online database that is free to use within New Zealand. Trap.NZ is the most commonly used database by both professional and community-based predator control projects throughout New Zealand. Once a project is set up, it is used to record data relating to the following:

- Trap networks (trap type, location, bait / lure type, predators caught, etc);
- Bait station networks (bait station type, location, toxin type, etc); and
- Monitoring (monitoring tool, location, predators identified etc).

Trap.NZ uses visual maps for displaying locations of predator control tools, as well as for analysing results. Data can be analysed via a range of options, for example, maps, charts, and tables, as well as the function to download data externally from the database. The ability to monitor predator catch and monitoring data in this way allows resources to be used in the most efficient way possible.

Each project within Trap.NZ can be displayed publicly to allow neighbouring projects to see what is going on around them. It is highly recommended that the Project be set up in Trap.NZ and all predator control data (trap catch data and toxin information) and monitoring data be entered into the database at each check. This will ensure data can be analysed in a timely manner and any adaptations to the predator control regime implemented in a timely manner. It is also recommended that access to the Trap.NZ data be granted to project partners to enable the data to be available.

There are many neighbouring predator projects in the areas adjacent to the Project. These are summarised in section 3.3.2.

3.3.2 Neighbouring Predator Control Projects

Neighbouring predator control projects have been identified through Trap.NZ at the writing of this PCP. The following table (Table 3.5) summarises adjacent projects by name, purpose, target species, and location in relation to the Project. These neighbouring projects will be providing direct benefit to the Project through reducing predator numbers within the neighbouring environments, and thus reducing overall predator immigration pressure to the coastal habitat along the pathway. Collaboration with some or all these projects in the future may increase the robustness of this PCP.



Table 3.5: Predator projects neighbouring the Projects boundaries¹⁸. Location is in relation to the Project.

Project Name	Purpose	Target Species	Location
Rodent Free Wadestown	Backyard trapping in Wadestown so as to remove rats, mice and hedgehogs and allow the birds to come back.	Rats, mice, hedgehogs	SW
Trelissick Park Group	Data deficient	Data deficient	SW
Predator Free Khandallah Reserves	To restore native flora and fauna in our suburbs by backyard and reserve trapping	Rodents, mustelids	W
Predator Free Newlands / Paparangi / Woodridge	Trapping the northern suburbs of Newlands, Paparangi and Woodlands	Data deficient	W
Wahinehine Park Traps	Data deficient	Rodents	W
Predator Free Horokiwi	A rural project undertaken by the Horokiwi residents	Rodents, hedgehogs, mustelids, rabbits, possums	NW
Korokoro Environmental Group	A community group that advocates for Korokoro's environment	Rodents, hedgehogs, mustelids, possums	N
Predator Free Petone	Predator Free Petone is supporting Predator Free Hutt Valley and wider New Zealand's efforts to remove predators from our environment - backyard and seashore community trapping to help make New Zealand Predator Free	Rodents, mustelids, possums	N
Predator Free Moera	Helping to create an environment where our native wildlife can find food and shelter	Rodents, hedgehogs, mustelids, possums	NE

3.4 Public engagement and communication

3.4.1 Communicating the Predator Control Plan to the public

A key part of maximising the efficacy and safety of the pest control activities within the Project Site will be the communication of this plan and its goals, methods and timeframes with the public that will use the shared path and neighbouring property owners and community groups neighbouring the project, as outlined in

¹⁸ Trap.NZ, find projects; <https://trap.nz/find-projects>



Table 3.5. Where possible, it would be beneficial to share the trapping and pest control information gathered as part of the project (enabling access to TrapNZ data) with these groups to provide context to their own pest control activities within neighbouring areas.

It will also be key to outline the obligations of the public using the shared path regarding the requirement that dogs are on leash the path at all times. Signs must be erected at either end of the shared path as well as at points along the path that explain clearly the risks that dogs pose to threatened native wildlife and the risks to dogs from pest control activities..

3.5 Te Ara Tupua Predator Monitoring

3.5.1 Location, type and regime

A tracking tunnel network will be used to monitor rodents and mustelids across the site, and these will be the key indicator species for triggering any change in predator control frequency over the Project site. Tracking tunnels must be left in-situ for the entirety of this project as this will reduce neophobic behaviour of rats as the tunnels become natural parts of the environment. Three lines will be implemented and monitored three times a year (see Table 3.4 and Appendix 2 for more information). There will be three lines each with 10 tracking tunnels within the Project site. One line will be at the southern end of the walkway, near the rail bridge, one in the central section of the Pathway, and another through the Honiana te Puni Reserve.

A fourth line of tunnels could be erected on the northern side of State highway 1, along the bush edge if there is possible collaboration with neighbouring projects (see section 3.3.2). This line will provide valuable information on predator populations feeding into the Project Site but its establishment will depend on landowner access. Neighbouring predator control projects may be able to aid in the running of this line. This line will not be under effective predator control it will serve to provide information on rat indices only and will act as a control for rat populations outside of the Project area.

A site survey pre-deployment will be essential. If tracking tunnels are deemed too difficult to install within this landscape, a chew card monitoring regime for rodents should be used and ensure that on completion all litter is collected. All monitoring results must be entered into the project on Trap.NZ (see section 3.3.1). See Appendix 3 for maps showing locations of the tracking tunnel network.

3.5.2 Predator thresholds

3.5.2.1 Rodent monitoring thresholds

To ensure successful fledgling of coastal avifauna is achieved, rats should be kept $\leq 10\%$ tracking tunnel index over the Project site. This rate should be monitored very closely in the first three years of the Project and altered, if need be. If rats are above the 10% tracking tunnel index threshold during the August monitoring period then extra predator control effort must be implemented to reduce populations, as outlined in Section 3.6.1.2).

3.5.2.2 Mustelid monitoring thresholds

Although stoats and weasels will be monitored as part of this project they are difficult to monitor successfully in an urban environment. As rat populations tend to drive mustelid numbers in forested areas (such as the neighbouring environments), this Project will rely on rat tracking tunnel thresholds to guide any changes in predator control effort across the site. Catch trap data can also be used to identify activity trends over time.

3.5.3 Predator Monitoring Assumptions

Given the habitat descriptions for the site and the neighbouring environments, a rat index threshold of $>10\%$ has been assumed to guide predator control operations. This threshold should be adjusted over time if appropriate, as real-time data is collected and analysed. Bait station and trap networks should be able to keep predators below these thresholds except in times of rodent population explosion events, however, the numbers, location, types and efficacy of control devices recommended in this report will be reviewed as part of the overall review of this PCP in five years (2027), as outlined in Section 4.0.



3.6 Te Ara Tupua Predator Control

The following predator control plan for Te Ara Tupua has been developed to protect the coastal avifauna along the extent of the Shared Path, and to also complement the design of the Project site. Predator control has been split between two areas:

- a) Section one – shared pathway from Hutt Valley rail bridge to Honiana te Puni Reserve
- b) Section two – Honiana te Puni Reserve

To protect the coastal avifauna along the Shared Pathway, predator pathways into the site need to be controlled. This PCP covers all access points to the coastal area (namely each end of the Shared Path and any culverts or under-road assets that may encourage predator dispersal from the northern side of state-highways 1 and 2 into the coastal environment) in order to intercept predators as they move through the landscape. Proposed trap locations outlined in Appendix 4 are indicative only – micro-siting of each trap location will need to occur at deployment (i.e., refined on a scale within several meters in the field based on appropriate land features and habitat). This will ensure each trap is placed within a suitable micro-habitat for the target species to maximise capture success.

The target predators are attracted to cover and tend to move along waterways and linear features including along habitat boundaries, tracks, and fence lines. Traps should be placed under cover, such as under trees or scrubs if possible. The trap entrance needs to remain clear, so any vegetation around the entrance needs to be cleared. If required, traps can be raised above ground level using atlas blocks in locations where traps may be at risk of rising water levels. However, this adds additional cost, increases conspicuousness, and thus increases the chance of vandalism or theft, and may make the trap less stable and less accessible to target animals, so is not advised for the majority of traps unless they are at-risk of flooding (or if flooding proves to be an issue in future).

Predator control plans for each section of the Shared Path are discussed below. Appendix 2 provides an annual summary calendar showing timings of control and monitoring operations for this PCP.

All trap check results must be entered into the project on Trap.NZ (see section 3.3.1).

3.6.1 Section one – Shared pathway from Hutt Valley rail bridge to Honiana te Puni Reserve

3.6.1.1 Trap Network

Rats will be targeted using a network of DOC200 double-set traps along the stretch of pathway from the Hutt rail bridge to Honiana te Puni Reserve (Appendix 4). These traps must be placed in areas where there is likely to be limited or no public access, a very selective approach needs to be taken when installing these along the pathway. There may be areas where DOC200 double-set traps are too large to be installed given the small coastal margin and it may be necessary to substitute other single set box trap types at these sites (see Table 3.2). Traps shall be placed in areas where rat interaction is likely, i.e., near natural bottlenecks, near native vegetation, or where areas of this sort are not present, close enough to the coastal edge as possible. Trap maintenance regimes must be followed to ensure proper functioning of trap mechanisms in this environment (Appendix 5). If traps begin to fault despite regular maintenance, another rat kill trap type should be implemented from the toolbox in Table 3.2.





Figure 2: Example of DOC200 double-set placement where no natural features exist. Orange circle = possible DOC200 double-set location.

Mustelids will be targeted near penguin habitat along this stretch of Pathway. A network of DOC200 double-set trap boxes will be used (Appendix 4). DOC200 double-set traps will be set c. 100 m apart along the entire stretch of walkway, as close to the coastal section as possible.

The DOC200 double-set network will be checked and rebaited on a fortnightly schedule for the entire year. This frequency covers the penguin moulting (March – April), pre-breeding (April – May) and breeding season (June – November) when penguins are more susceptible to predation from mustelids, while also ensuring mustelids are unable to build in numbers while penguins are away at sea. It also protects other coastal avifauna along the Pathway from mustelid predation while they are at their most vulnerable during the breeding and fledgling season (September – February).

As the Shared Path will be a public area, lure choice will need to accommodate this. A dry lure (such as raw chicken egg) or long-lasting lure (such as the Connovation Poa Uku) could be used over a meat-based lure to prevent any unwanted smells emanating from traps during the summer months. Lure type must be alternated every four months.

Traps shall be placed in areas where mustelid interaction is likely, i.e., near natural bottlenecks / pathways, near native vegetation, or where areas of this sort are not present, close enough to the coastal edge as possible (Table 3.2). Traps must be secured in place to reduce sympathetic spring-off and to prevent them from being washed away or stolen¹⁹.

If ferrets are detected in the system a single DOC250 single-set trap box will be placed within a 50 m radius of active penguin next boxes / burrows or other known nesting native coastal birds. DOC250 single-set trap boxes must be placed in areas where penguins are unable to gain access to the trap box (given the slightly larger aperture than the DOC200 series boxes), and where the public has limited or no access. If suitable areas cannot be identified, then DOC250 should not be used due to the potential risk to penguins. Trap check frequency will follow the same regime as the DOC200 double-set network above.

¹⁹ Department of Conservation, Predator Free 2050 Practical Guide to Trapping, June 2021, page 62

3.6.1.2 Toxic bait operation

Four toxic bait operations will be run each year to protect nesting coastal birds from predation from rodents, these will be in February, May, August and November. Rodent run-through bait stations (preferably pied piper bait stations) must be used where they can be tethered to the ground. Pied piper bait stations will minimise the ability of rodents to remove toxic baits from bait stations and reduce risks to non-target species.

Bait stations will be placed at a 100 m spacing along the pathway. There will be four toxin operations each year, three using either diphacinone or pindone in the February, May and November toxin operations and one using Double-Tap in the August operation, as the risk at this time to public and non-target species will likely be lower at this time (Appendices 2 and 4) as potentially less people access the Project Site – provided that's the access of dogs can be excluded to the walkway during this time. Alternating toxin types will ensure toxin resistance does not develop within the rodent population and individuals not fond of one type of bait will hopefully consume the other bait type (or be caught within a trap). Each toxic operation will run for two weeks. For diphacinone and pindone baits, after toxic bait is deployed on day 1, the amount of bait in each bait station must be checked on days 3 and 7 and topped up if required. Toxin deployment must always follow label instructions, and appropriate warning signage must be displayed at all entrance points alerting public to the presence of toxic baits.

As discussed in section 3.5.2, the rat monitoring tracking tunnel index during the August monitoring period should be $\leq 10\%$. If rats are found to be above this threshold within the site, an extra toxic bait operation should be implemented in September. Monitoring should occur within four weeks post-operation, to ensure the operation is successful at reducing rat populations below the $\leq 10\%$ target index.

3.6.2 Section two – Honiana te Puni Reserve

3.6.2.1 Trap network

To successfully control and suppress rats in the reserve will take a high trapping effort. Rats can access this area easily, with many areas available for nesting. The reserve is currently highly frequented by the public; thus, rats scavenging from discarded food and rubbish bins will be an issue. Due to these pressures, trapping for rats in this area will target areas where they are likely to pass through – bush margins, stream edges and high-public use areas (such as parking areas). DOC200 single-set traps will be used to target rats in this section. The network of traps in this area will be set up and serviced in the same way as the DOC200 double-set trap network in section one, to create a contiguous line of traps for contractors to service. Lure will alternate throughout the season (Appendix 4).

At the end of section one, the Shared Pathway continues around the back of the Honiana te Puni Reserve. In this area DOC200 double-set traps will be set within / near bush areas to cover the coastal fringe of the Reserve, to protect coastal avifauna from mustelid predation. Stoats and weasels will be targeted in this area.

Traps should be checked and lured on the same regime as above in section one, see 3.6.1.1. This will cover the area where predators are likely to invade the coastal bird habitat along the Shared Path as well as anything residing within the reserve.



3.6.2.2 Toxic baiting operation

A bait station network will complement the trapping effort and will be installed in similar areas to the DOC200 double-set traps (within / near bush areas, offset from the rodent trapping network in this area; Appendix 4). The toxic baiting programme will follow the regime outlined in section 3.6.1.2. Likewise, this network will be included in any operation triggered by exceedance of the 10% rat monitoring threshold described above in section 3.6.1.2.

3.6.3 Trap preparation and deployment

Before DOC-series traps are deployed (or other traps that use wire baffle entrances), all sharp edges on the wire entrance baffles need to be filed back to a smooth edge. This will reduce the likelihood of a target individual either avoiding the trap or entering the trap then backing out due to injury caused by any sharp edges and subsequently developing trap shyness. Do not assume that this process has been completed by trap supplier.

Given the presence of native coastal birds (e.g., penguins) it is crucial that the boxes and wire baffle system that house the DOC200 single and double set trap are manufactured correctly – the two entrance baffles must be on opposite sides of the trap from each other to restrict non-target access.

Traps should all be test fired and checked for mechanical reliability and the trigger weight calibrated to approximately 70 g. The factory trigger weight for DOC200 and DOC250 traps is reported as 80 g meaning that small female weasels will likely not trigger them. Trigger weight can be set following DOC guidelines²⁰.

A warning sign, such as “WARNING – DO NOT TOUCH”, should be stencilled onto the top of the trap (e.g., with red spray paint) and traps must be anchored to the ground to prevent movement. This will ensure that double-set traps have reduced sympathetic spring off and will also ensure theft of traps is mitigated. The contractor should choose the best anchoring mechanism depending on medium trap is being placed on. This must be audited to ensure anchoring mechanism is fit for purpose (see 3.6.5). Trap box lids should be secured with a hex-head or square-head screw to mitigate against unauthorised entry to the trap box (e.g., small children).

Upon deployment, traps should be ground-truthed to ensure the most effective placement to maximise target catch. The person deploying the traps must ensure:

- Each trap is placed near cover (where possible);
- Each trap is oriented to allow easy entry;
- Each trap box is placed flat and stable on the ground (unstable surfaces deter predators);
- The entrance is clear of vegetation and debris;
- Check the traps to ensure they are good working condition before deployment – including that the wire baffle system is in place to stop penguin access;
- Mark and record traps on Trap.NZ

²⁰ How to properly calibrate the spring off weight of a DOC 200; <https://www.youtube.com/watch?v=11t9II2FpFk>



3.6.4 Trap checks and maintenance

Triggered traps should be cleared, reset, and rebaited if required. During traps checks, untriggered traps should be set off, reset, and then rebaited where bait has been removed or has degraded. Dry firing of untriggered traps can cause unnecessary wear and damage and firing of untriggered traps should use a pair of old socks or something similar to replicate the cushioning effect when an animal is caught. Traps must be regularly cleaned with a wire brush to remove mould, fur, and bits of dead animals.

During trap checks any non-target animals captured in traps (particularly native fauna including birds) must be recorded and adjustments made to trigger weights and potentially entrance baffles to reduce risk to the capture of native fauna.

Regular checks and maintenance to a high standard is required to ensure:

- Lures do not become depleted or rotten;
- Test the trap regularly to ensure it is mechanically sound including checking for worn pivots and weakened springs and that its set to the correct trigger weight;
- Access to traps remains open i.e., the trap has not become overgrown, and if so, any obstructing vegetation is either sprayed or cut back.

An annual trap maintenance round must be undertaken on all trap types and this will double as an audit of trap condition and enable any replacement devices to be sourced. For DOC series traps, within this maintenance round every trap must be calibrated to the correct trigger weight to ensure mice are unable to be caught as this restricts trap access for target species²¹. Appendix 5 outlines a trap maintenance check list which must be used to ensure traps remain in good working order.

3.6.5 Predator control network annual audit

The contractor employed to deploy and service the predator control and monitoring network described in this plan must be audited twice yearly. Firstly, the contractor should be audited on their health and safety practices to ensure they are delivering the work in a controlled, safe manner that meets all contractual and Worksafe regulations. Secondly, the contractor must be audited on performance to ensure the predator control and monitoring networks are being operated in the correct way to ensure effective control of predators along the Shared Path.

²¹ Department of Conservation, Predator Free 2050 Practical Guide to Trapping, June 2021, page 65



4 Summary

This PCP has been designed to meet the conditions EM.9 and EM.10 of the resource consent for the Project. This plan should remain dynamic and adaptable as predator populations may alter in composition and density over time and the tools and techniques available for the control of rodents and mustelids are frequently being added to and improved. For that reason, it is recommended that this PCP be reviewed in five years (2027) in order for monitoring data and trap catch data to be analysed and the PCP updated and amended if necessary. Predator thresholds can be altered, if need be, based on real-time data for the Project site.

Overall, this PCP aims to suppress predators to low levels to enable successful breeding of coastal avifauna along the Shared Path.



Appendix 1: Predator Plague Cycle

When conditions are favourable, native trees and tussock produce a high abundance of seed (masting event) which ultimately ends up on the forest floor to be consumed by native wildlife and unfortunately, rodents. Rodents within the area take advantage of the overabundance of food and breed rapidly. Subsequently, mustelids feed on the high rodent populations which allows them to produce a higher number of young than in non-masting years. Once the seed germinates or rots, populations of rodent's switch to other food sources – native flora and fauna. As rodent numbers decrease due to the lack of food in the system, the extremely high-density mustelid population continues to feed, however on prey other than rodents – native flora and fauna. These plagues of predators can be very detrimental to native wildlife populations and in terms of the Project, will seriously affect the coastal wildlife populations.

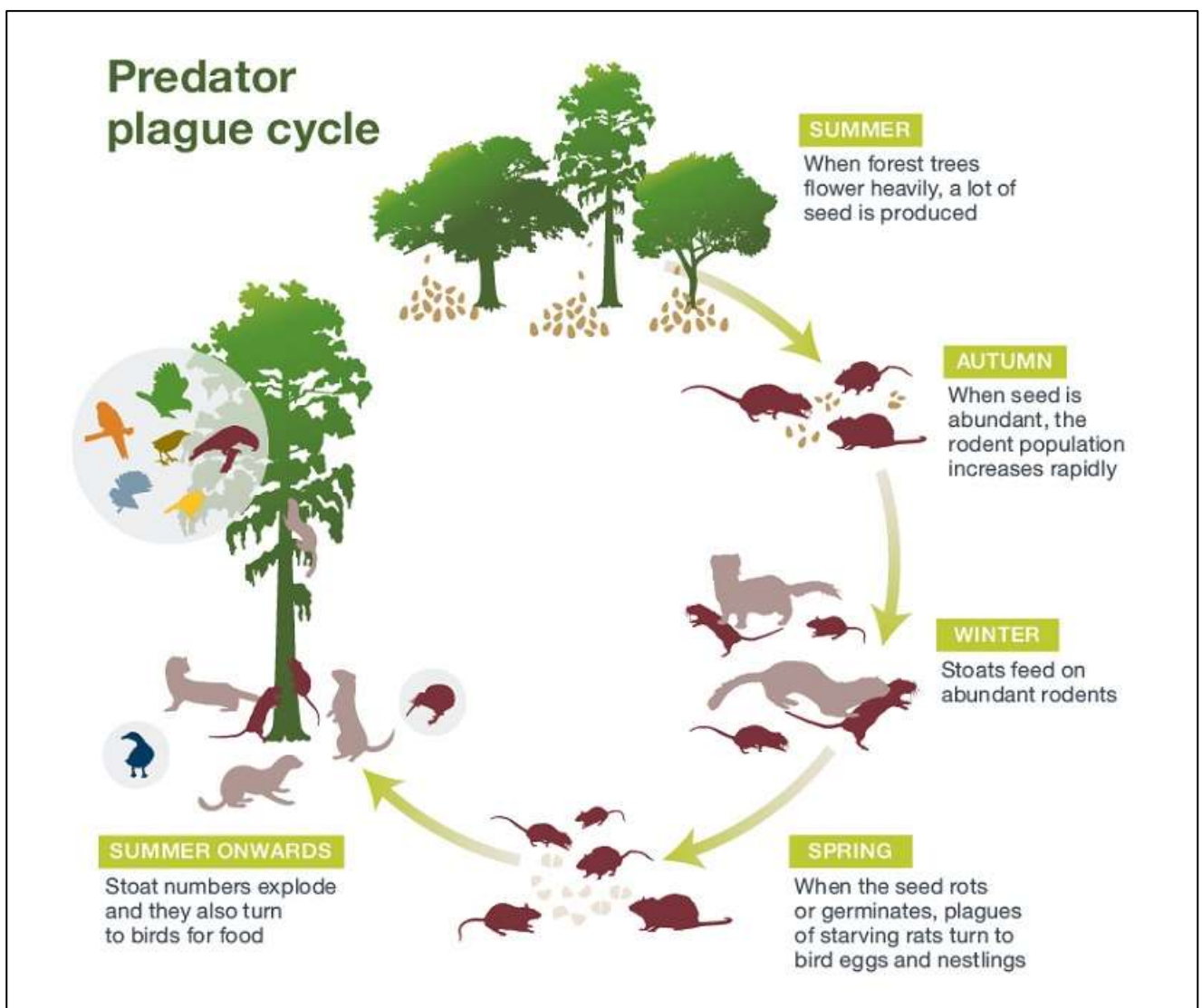


Figure 3: Predator-plague cycle – a common predator-prey relationship seen in New Zealand forest ecosystems²²

²² Department of Conservation, Predator plague cycle, <https://www.doc.govt.nz/our-work/national-predator-control-programme/predator-plague-cycle/>



Appendix 2: Annual Summary Calendar of Operations

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Penguin breeding period												
Penguin moulting												
Other coastal bird breeding and fledgling												
DOC200 single set and double-set network trap check frequency	Fortnightl y	Fortnightl y	Fortnightl y	Fortnightl y	Fortnightl y	Fortnightl y	Fortnightl y	Fortnightl y	Fortnightl y	Fortnightl y	Fortnightl y	Fortnightl y
Diphacinone/pindone operation		X			X						X	
Double-tap operation								X				
Tracking tunnel monitor					X			X			X	





Appendix 3: Monitoring Network Map





Appendix 4: Predator Control Network Map



Appendix 5: DOC-series trap maintenance check list

	Performance Standard	Evidence
1.	Trap is set correctly	<ul style="list-style-type: none"> a) Correct bait for the current month is positioned in the holder. b) Trigger plate is angled approximately horizontal and as close to the baffle as possible. c) All trap plates move freely when the trap is set (springs are tensioned in a set position) d) The trap box is marked correctly with the trap number.
2.	Trap is secured correctly	<ul style="list-style-type: none"> a) Trap is secure in within the tunnel and correctly positioned. b) All mesh is securely fixed to the trap box with no gaps other than the opening aperture which shall measure no greater than fifty millimetres square. c) Internal baffle is in line with the trigger plate d) Tunnel lid is secured firmly
3.	Trap functions correctly	<ul style="list-style-type: none"> a) The trap can be sprung by gently lowering a 100 g weight onto the distal end (end furthest from the hinge) of the trigger plate. b) When it sets off the moving parts do not touch any part of the tunnel or baffles c) Double set traps do not spring off 'sympathetically' i.e. when one trap is sprung by a dummy capture (e.g. rolled newspaper ~40 mm diameter) the other trap remains set. d) All moving parts on non-stainless-steel traps are lubricated with builder's pencil or graphite powder so that they move freely without binding when the trap is actuated.
4.	Trap is sited correctly	<ul style="list-style-type: none"> a) The trap box is positioned in such a way that it is unlikely to be damaged or accidentally sprung by stock and where located on visitor walking tracks is not obstructing passage. b) The trap box is seated firmly on the ground so that it is stable and does not move in any direction when moderately firm pressure is applied to it (palms placed flat on top of the box at opposite ends). c) Tunnel has been pegged to the ground if specified.
5.	Trap is cleaned correctly	<ul style="list-style-type: none"> a) The entire trap is substantially free of animal matter (fur, tissue and bone) from previous captures. b) Any uneaten bait and captures have been discarded at least 5m from traps and away from waterways. c) Both ends of the tunnel are clear of vegetation to 300mm. d) Tunnel is in good condition. e) Both ends of the tunnel are clear of vegetation to 300mm. f) Tunnel is in good condition.

See also: [Department of Conservation, Predator Free 2050 Practical Guide to Trapping, June 2021, page 65](#) for complete list of equipment needed for trap maintenance and calibration.



Appendix 6: Stakeholder Responses and Feedback



Stakeholder	Comment	Addressed
HCC	I note the report under conditions EM.9 and EM.10 the term 'predators' refers only to rodents and mustelids. Makes no reference to the issue of cats. Could Include in Predator Ecology: The overarching goal of this PCP is to contribute to the restoration and enhancement of indigenous biodiversity. Mitigate foreseeable threats to indigenous fauna attributable to the introduction of domestic cats as part of the proposed residential development of the site by ensuring the relative abundance of cats within the PCP area is maintained at a residual trap catch of ? 5%. Letter drop needed to educate residents. Consider: Dogs and Pukekos.	The purpose of the PCP is to protect coastal birds from predation by rodents and mustelids and although cats are a predator and known threat to coastal birds their control in peri-urban environments in particularly contentious and outside the scope of the PCP. I suggest we look for opportunities to co-rodinate with other PCPs being undertaken by other parties that may already have be targeting feral cats near the project (as instructed by consent condition EM.9 (viii). We have added wording around the need for dogs to either be excluded during key toxic baiting operaitons from the walkway and onleash at all times. I'm not sure about the comment referring to the "proposed residential development" as i wasnt aware of this?
HCC	could be shown as a table (Predator control methods) as a quick reference guide: Column headings: Common name, species name, Category, Expected abundance (L,M,H) and control method.	The current table is simple and covers the species and control tool type. I would be hesitant to include expected abundance as we have a monitoring program outlined that will provide more accurate guidance on actual abundance
HCC	Hedgehog wooden traps need a much larger entrance at the rear, than the rat/mice traps. The traps DOC 200 may need modification so that a hedgehog can enter. I would not use Victor PCR model due to rush and coastal conditions.	DOC traps routinely catch large numbers of hedgehos with DOC200 and 250 baffles large enough for them to enter and be captured. Good point regarding the Victor PCR traps and rust and this is included as a risk for this trap, however, it is one of the only non-DOC style traps that has passed NAWAC testing for Norway rats and is still useful to include within the toolbox
HCC	Provide and share data from monitoring to landowner (HCC) and GWRC. Sharing data allows all stakeholders to create GIS maps with measurements. Allowing for further site investigation if data identifies cause/analysis trend changes	Agreed, data management section updated to reflect this comment
HCC	There is no mention of a public awareness campaign with regards monitoring and trapping. Presentation and distribution of the predator control programme goals, objectives and strategies to nearby residents is expected to effectively introduce the programme and resident obligations (Dogs on leads, don't let your cats out at night). Signage and letter drops will be used to further highlight the goals, objectives, and strategies of the programme, including opportunities for community involvement in cat and dog control and trap monitoring. Could include a timeline/schedule of monitoring table which could also be sent out to residents. Monitoring is reviewed in 2027. Create a timeline for transparency. Appendix?	Agreed, communicating the goals and methods to be used as part of implementing the PCP with neighbouring residents will be important and a section has been added to the report to include this.
HCC	Where is an example of the monitoring forms? -Appendix?	The monitoring data will be recorded in Trap NZ and I'm unsure an example of the TrapNZ form is useful in this document
HCC	Please include predator control area and network map. Appendix 3, 4 and 6 could be on one map - show bait stations, tracks and location. Would need a legend.	Apologies if this was missed off the draft report as these are separate Pdf maps until the report itself is compiled as a pdf. An overall control area map would be helpful, we can combine several of the maps but all information on one map will likely be alot to digest given similar locations of devices and monitoring so we will keep as at least two maps 1. control devices and 2. montioirng locations.
WCC	Possums have not been included and should be as they would periodically move along coastlines as we see along the south coast	Whilst possums will periodically move along the coast the purpose of the PCP is to protect coastal birds from predation by rodents and mustelids and including possum control requires control tools that create added risk for native species and non-target species (eg dogs) given the open architecture required for possum traps and bait stations targeting toxic control of possums. We would not recommend adding in possum control tools to this plan due to these potential risks to non-target species and the relatively lower risk they pose to coastal birds compared to the target species.
WCC	Rats in general use modified lanscapes as highways. I provides increase in food avaiability especially through weeds and disturbed soil. As this is along the coastline, the riprap is also adding to the movement and harbouring of these pest animals. Coastlines serve as a rich food source	Agreed, the PCP has been updated to include this commentary

Stakeholder	Comment	Addressed
WCC	The Capital Kiwi project has brought Kiwi back into Wellington, The primary target species is stoats, its essential to keep targeting this species.	Agreed and the resource consent requires the PCP to provide a 35 year commitment to targeting rodents and stoats within the project area
WCC	It is worth mentioning that there are no ferrets in Wellington currently	Good point, comment added to PCP to make this clear
WCC	Re Hedgehogs: As this is along the coastline, this species should be considered as very destructive, feels like an afterthought	Yes agreed hedgehogs are very destructive pests particularly for shorebird species. Their inclusion was not an afterthought but the report was just clarifying that although the consent conditions do not require the targeting of hedgehogs that their potential threat they pose shorebirds and the tools being suggested mean that they should and will be targeted alongside mustelids and rodents.
WCC	Add control methods of possums, Kill trapping and vertebrate toxic agents	Possum control tools have not been included as per the response to the previous query regarding possums
WCC	DOC 200's for stoats, victor pro for rodents. Do not use the PCR connection as its less effective than the DOC 200	Agreed and the PCP updated to reflect this
WCC	Depending on the type of lure and servicing schedule this would be more often than 3-6 months	Agreed, this is possibly a misunderstanding of what was proposed. The report outlines the lure replenishing needs to align with the servicing interval of fortnightly but that the type of lure used (peanut butter, salted rabbit etc) should be changed every 3-6 months to ensure a variety of lures are presented over time. The PCP updated to make this clearer.
WCC	Considerations for dog owners running/walking dogs in risk segment (maybe add "dogs should be on lead at all times" signs)	Agreed and updated section 3.1.2
WCC	VTA should also be rotated to include other alternatives. In WCC we use Brodifacoum, not the best for breakdown over time, but has a low risk to non-target species.	Agreed, rotating VTA types is useful to avoid bait shyness. We advise avoiding the use of second generation anticoagulants given the sensitive nature of the site and the coastal species present and the risk of secondary poisoning from invertebrates that consume toxic baits or from birds consuming dead rats that have consumed toxic baits.
WCC	Not sure you need 4 monitoring sessions in a year. I would suggest putting more resource towards servicing traps. 2 monitor sessions in May and November should be sufficient.	Fair point, PCP updated to include three monitoring points per year in for rodents and two for stoats. The three for rodents will be in May, August and December. Monitoring in August will follow the toxic control operation for rats and will provide a measure of success of that operation during the early stages of the breeding season for coastal bird species. December monitoring of rats allows an understanding of rodent abundance within the Project Area at a sensitive time for breeding birds as there will chicks present, and some species may have second clutches of eggs being incubated. May monitoring of rats enables an understanding of rodent abundance in autumn when rats numbers often are building up due to large amounts of food available. We recommend monitoring of stoats in August as female stoats will still be active prior to finding dens to give birth and then January when the juvenile stoats will be dispersing.
WCC	No significant difference between chew card monitoring and tracking tunnel, I would opt for Tracking tunnel May and Nov and chew cards on alternative dates.	Chewcards were recommended as one potential tool in the toolbox to ensure that there is a suitable option given the nature of the terrain within the project site and the presence of the public. It is best to use the same monitoring tool to ensure that seasonal and other trends can be compared easily.
WCC	More effective for Possums than for rodents	Agreed and removed
WCC	I would suggest the chew cards rather than the wax tags. Left for 1 night only. All litter from the site collected	Agreed and updated

Stakeholder	Comment	Addressed
		The PCP is targeting already rodents and mustelids that threaten coastal bird species including dotterel and the recommended numbers and spacing of control devices will provide good coverage of rat and stoat home ranges
WCC	Additional control methods should be put in place in case of native biodiversity detected such as nest dotterels,	
WCC	Catch trap data can also be used to identify activity trends over time.	Agreed, PCP updated to include reference to this
WCC	I would argue this as any interaction between people and the harbour will bring food to the shoreline, rodents will also move along the coastline so territories might be very localised.	Good point, PCP updated to outline need to review trap types, locations, numbers and efficacy as part of the PCP review after 5 years
WCC	Who will be analysing the data?	This has been removed as we are no longer recommending the analysis of lure data. However, there will be a review of the PCP after 5 years as already outlined in the report
WCC	So there will be a trap every 100m alternating D200 and GN trap?	Correct, PCP updated to clarify
WCC	All birds caught in traps need to be recorded. Adjustments should be made to trigger weight if found that native birds are getting caught in the traps.	Agreed and updated
WCC	Traps should be marked and recorded on Trap.NZ. WCC request access to the project to add to their information regarding trapping across the city.	Agreed and updated
WCC	Refrain from dry firing traps, this will shorten the trap's life and make it less effective.	Agreed and updated
WCC	Ensure that there is an audit on trap condition	Agreed and updated
Mana whenua	Overall, the plans are very light on any references to iwi mana whenua and no references to the connection that mana whenua have in relation to ecology and the broader environment nor do the plans highlight any possible opportunities for iwi mana whenua. Both the Mana Whenua Values Plan and the Cultural Impact Assessment articulates this in a very succinct way and could be used to help with that content.	Good point, a section has been added to the start of the PCP that outlines the connection mana whenua have to Te Whanganui-a-Tara as stated in the Mana Whenua Values Plan as suggested.
Mana whenua	In addition, the plans don't highlight any possible opportunities for iwi mana whenua to be involved in the work outlined in these plans. After reading the plans, I can see a nice package here for iwi mana whenua to be involved, be exposed and/or upskill Māori in ecological management e.g. working alongside ecologists to take part dune restoration, predator control, species relocation, monitoring etc. Unsure whether this is relevant for the management plans but keen to start work on framing up these opportunities with the ecologists. I haven't done much work to date but I know that has been something on the MWSG's radar. Will be interested in understanding from Boffa whether there are any examples of iwi and ecologists working together to achieve the best ecological outcomes in these works and what these opportunities could look like e.g. opportunities for work experience, internships, training etc.	Good point, a section has been added to the start of the PCP that outlines the opportunities for mana whenua to collaborate in pest control activities to be undertaken within the Project Site.

5

Artificial Marine Habitat Ecological Management Plan

NKP-TAT-APW-MPN-GV-NS-000054



Quality Assurance Statement		
Prepared by:	Dr Jacqui Bell	
Reviewed by:	Dr Tommaso Alestra	

Revision Schedule		
Rev. Number	Date	Description
<i>Internal reviews</i>		
A	3/10/2022	Draft document for information and internal reviews
B	16/10/2022	Draft document for stakeholder reviews
C	24/01/2023	Final draft document for review by Waka Kotahi
<i>Submission for certification</i>		
1	21/03/2023	Final plan for certification

Disclaimer

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Glossary

- **Biodiversity** refers to the variety of species within an ecosystem.
- **Biodiversity offset** is an action taken to secure biodiversity gains to account for residual adverse effects that cannot be avoided, remedied or mitigated. The objective of a biodiversity offset is to achieve no net loss and preferably a net gain in indigenous biodiversity.
- **Biodiversity compensation** is an action taken to address residual adverse effects on biodiversity when all measures to avoid, remedy, mitigate, and offset have been applied.
- **No-net-loss** refers to the objective for a biodiversity offset to provide gains in biodiversity that balance the residual biodiversity losses, whereby losses and gains in equivalent biodiversity values are quantified (taking into account uncertainty and time lags) at both the impact and offset site to demonstrate the objective.
- **Net-gain** describes the conceptual objective that at a specified point in time biodiversity values will be returned beyond the point they would have been if the impact had not occurred. Thus, net-gain offsets achieve conservation gains, but only for the proportion of the offset that increases biodiversity values above the point of a no-net-loss offset.



Table of Contents

1	Introduction	3
2	Installation.....	4
3	Ongoing Maintenance	4
4	Monitoring Methods	5
4.1	Habitat types	5
4.2	Monitoring	5
4.2.1	Methods	5
4.2.2	Timing and Frequency	5
4.2.3	Tide Pools.....	5
4.2.4	Eco-Enhanced Xblocs	5
4.3	Statistical Analysis	6
4.4	Reporting	6
4.5	Mana Whenua Opportunities	6
Appendix 1: Map 1 Reference Sites		
Appendix 2: Stakeholder Responses and Feedback		



1 Introduction

The Ngā Ūranga ki Pito-One Shared Path project (The Project) project involves 4.8Ha of reclamation and permanent occupation of high value marine habitat. To partly compensate for the loss of marine habitat and biodiversity, the installation of intertidal tide pools and ecologically enhanced subtidal concrete armour units is required under the Project's resource consent conditions.

This section of the Environmental Management Plan (EMP) documents the methods, timing and frequency of monitoring the tide pools and eco- enhanced armour units, under the following resource consent conditions, as well as the additional recommendations set out as part of the s127 application:

Condition ref	Condition	Location where addressed
EM.15	<p>a. The rock revetment and offshore bird habitats shall incorporate concrete intertidal rock¹ pools and subtidal concrete armour units designed to create water retaining features that provide habitat for a high diversity of marine species.</p> <p>b. The rock pools and armour units shall be designed and constructed to achieve the following:</p> <ol style="list-style-type: none"> i. A minimum hard shore surface area of 486m² from the rockpools positioned in clusters at varying heights between MHWS and MLWS and having a pool depth designed to provide for foraging by variable oyster catchers; ii. A minimum hard shore surface area of 730m² from the subtidal concrete armour units positioned below MLWS; <p>c. The methods for the placement of the rock pools and armour units shall be detailed in the Coastal Works CEMP required by Condition CA.9; and</p> <p>d. Detailed design and drawings for the rock pools and subtidal concrete armour units shall be submitted to the manager for certification in accordance with Condition CA.3.</p> <p>The EMP shall detail the methods, timing, and frequency of monitoring of the water retaining features that provide habitat for marine species, for the purpose of recording their performance. Monitoring shall be carried out for a period of two years following the placement of the rock pools and subtidal concrete armour units.</p>	Methods, timing and frequency of monitoring is detailed in Section 4.

Additional recommendations were made under separate s127 applications for changes to the revetment design. These recommendations accounted for the additional habitat loss associated with a change in the revetment footprint subsequent to detailed design. These recommendations included:

- a) An additional hard shore surface area of 2680m² from eco-enhanced subtidal concrete armour units, and
- b) An additional 60m² of additional hard shore surface area from eco-enhanced intertidal concrete armour units.

¹ Rock pools are referred to as tide pools within this document and in the design drawings



2 Installation

A mixture of artificial marine habitat types will be incorporated within the project design. These include:

1. Tide pools with a minimum surface area of 486m²
2. Subtidal eco-enhanced Xblocs with a minimum enhanced surface area of 3410m²
3. Intertidal eco-enhanced Xblocs with a minimum enhanced surface area of 60m²

Tide pools will be placed in clusters in the intertidal zone, within the horizontal berm, to create water retaining features located below Mean High Water Spring (MHWS) and emerged at low tide. The pools will have rock placed between them.

Eco-enhanced Xblocs will be interlocked and placed in the intertidal and subtidal slope of the revetment.

3 Ongoing Maintenance

Ongoing maintenance and inspection of the units is expected to be undertaken by Waka Kotahi. Replacement of any lost or broken units is the responsibility of Waka Kotahi.



4 Monitoring Methods

The monitoring methods are designed to test the hypotheses that the artificial marine habitats would initially support distinct benthic communities from those found on the rock revetment and on natural rocky reefs, but over time they would develop benthic communities more similar to natural rocky reefs than the revetment.

4.1 Habitat types

Monitoring will compare benthic communities in three habitat types: artificial marine habitats (tide pools and eco-enhanced Xblocs), control habitat (areas of unenhanced revetment immediately adjacent to the artificial marine habitats) and reference habitat (areas of natural rocky reef located at the southern headland of Kio Bay, see Map 1).

4.2 Monitoring

4.2.1 Methods

Monitoring of the water retaining features and features that provide habitat for marine species will be conducted for the purpose of recording their ecological performance. Monitoring shall be carried out by a suitably qualified and experienced marine ecologist.

Monitoring will be carried out using a 0.25m² quadrat photographed. Within each quadrat sessile and mobile species will be identified and counted. Mobile species will be classified as either small (<5mm length) or large (>5mm length). Both primary (sessile species attached directly to the substrate) and secondary (sessile species attached to the primary species) will be counted separately and summed to give a percent value that could exceed 100%. All organisms will be identified to the lowest practical taxonomic units.

4.2.2 Timing and Frequency

Monitoring will occur five times – A baseline survey prior to installation and post installation surveys 6 months, 12 months, 18 months, 24 months after the installation of the artificial marine habitats. Six monthly surveys will be carried out in the middle month of the season. For example, spring surveys are to be carried out in October, summer surveys are to be carried out in January, autumn surveys are to be carried out in April and winter surveys are to be carried out in July. This is to control for seasonal factors as much as possible.

4.2.3 Tide Pools

For the tide pools, the baseline survey will consist of 20 replicate quadrats, haphazardly placed on representative intertidal hard substrate within the project footprint.

Post installation surveys will consist of 20 replicate quadrats, haphazardly placed and sampled within representative habitat in each of three habitat types: tide pool habitat (one quadrat per tide pool)², control habitat (i.e., rock revetment at the project site) and reference habitat (i.e. natural intertidal hard substrate at Kio Bay, see Map 1, see Reference Site 1 in Map 1).

4.2.4 Eco-Enhanced Xblocs

For eco-enhanced Xblocs, the baseline survey will consist of 20 replicate quadrats within the intertidal and 20 replicate quadrats within the subtidal, haphazardly placed on representative hard substrate within the project footprint.

Post installation surveys will consist of 20 replicate quadrats haphazardly placed and sampled within the subtidal and 10 replicate quadrats haphazardly placed and sampled within the intertidal habitat. Quadrats will be placed in representative habitat in each of three habitat types: Eco-enhanced Xblocs (one quadrat per Xbloc), control habitat (i.e., rock revetment at the project site) and reference habitat (i.e., natural subtidal hard substrate at Kio Bay, see map 1).

² See revetment detailed design drawings for information on the placement of rockpools within the intertidal zone.



4.3 Statistical Analysis

Multivariate permutational analysis of variance (PERMANOVA) will be used to test the effects of habitat enhancement provided by each artificial marine habitat types (tide pools and eco-enhanced Xblocs) on biodiversity. Multivariate analyses will use Bray-Curtis dissimilarity matrices for (1) sessile species percent cover and (2) mobile species abundance.

Separate two-way PERMANOVAs (one for each type of artificial marine habitat e.g. tide pools, intertidal eco-enhanced xblocs and subtidal eco-enhanced xblocs) will be carried out with factors (1) Habitat Type (rtificial Marine Habitat, Control Habitat, Reference Habitat), and (2) Time (fixed). Similarity percentages (SIMPER) analyses will be used to identify the taxa driving differences in community composition.

Univariate two-way PERMANOVA (with factors Habitat Type and Time) based on Euclidean distances will be used to test differences in (1) species richness for sessile and mobile species combined, (2) total cover of fouling species and (3) total abundance of mobile species.

Mean density (number per m²) and percent occurrence (percentage of quadrats in which a species occurs) for all functional groups of mobile invertebrates, as well as the proportion of macroalgae canopy cover will be displayed graphically for each site.

4.4 Reporting

A monitoring report containing the survey results will be provided to Greater Wellington Region Council and DOC within 6 weeks of completing each survey. Raw data will be provided to GWRC using appropriate data sharing tools upon request.

4.5 Mana Whenua Opportunities

There are a range of opportunities for mana whenua to be involved in the monitoring of the artificial marine habitat. This could involve:

- Providing cultural design and narrative input into the eco-enhanced features of the Xblocs,
- Assisting with the collection of intertidal data in field surveys carried out along the revetment,
- Helping to process samples and record data for subtidal surveys,
- Accompanying the scientific dive team and assisting in carrying out subtidal surveys.



Appendix 1: Map 1 Reference Sites



This plan has been prepared by Boffa Miskell Limited on the specific instructions of our Client. It is solely for our Client's use in accordance with the agreed scope of work. Any use or reliance by a third party is at that party's own risk. Where information has been supplied by the Client or obtained from other external sources, it has been assumed that it is accurate. No liability or responsibility is accepted by Boffa Miskell Limited for any errors or omissions to the extent that they arise from inaccurate information provided by the Client or any external source.



DRAFT

Appendix 2: Stakeholder Responses and Feedback



Stakeholder	Comment	Addressed
Intertidal Rockpools and Subtidal Coastal Armour units		
GWRC	1. Mention in the definition of offsetting that the enhancement must be in the vicinity of the construction footprint and that it must be a like-for-like value add (i.e. high value subtidal reef replaced by the same area of lower value high/mid intertidal habitat still results in net loss and therefore still requires compensation, loss of subtidal reef replaced by new subtidal reef outside of the construction footprint is compensation). Therefore, I argue that this measure is compensation, not offsetting and should be included in the BCMP.	The introduction refers to the rockpools and ecologically enhanced armour units as biodiversity compensation.
	2. More detail required around the installation of rock pools and Xblocs (i.e. orientation, number of units in mid and low intertidal and subtidal, distance apart which impacts edge effects, predation pressure, movement corridors etc.). We need to see this level of detail to have confidence that units will have positive biodiversity outcomes and it is required by EM.15A condition (c) of the s127 as stated on page 4 of the EMP.	Stage C Detailed designs provided to GWRC for review
	3. Monitoring must be consistent and surveys must be conducted in the same month each season to avoid change of season effects as far as possible.	Revised wording specifies that monitoring is to be carried out in the middle month of each season.
	4. Monitoring methodology needs to be described in detail (e.g. number of rockpool and Xblocs to be surveyed at each shore height, quadrat size should be increased to more accurately quantify community recruitment, classification of fouling species, supporting photographs, methods of data sharing with GW etc.).	The number of rockpools has been clarified, quadrat size increased to 50cm, classification of fouling species has been outlined (using point intercept method), supporting photographs has been specified, methods for data sharing has been included. The number of rockpools at each tidal height has not yet been finalised in detailed design. We will add this detail once it has been finalised.
	5. Clarify that all four habitat types (artificial rockpools, Xblocs, control rocky habitat and artificial reference habitats) will be sampled seven times - 3 months prior and 6 months, 12 months, 18 months, 24 months after the installation of the artificial marine habitats.	This detail is included in the section Monitoring - Intertidal rock pools and Subtidal Habitat Enhanced Xblocs.
	6. Include GPS data for monitoring localities. Provide more details on the aerial image.	The maps provided are georeferenced maps that are designed to be taken into the field on an iPad.
	7. Plans and responsibilities around the replacement of lost units must be detailed.	Added a section 'ongoing maintenance' which details the responsibility of Waka Kotahi for inspections and replacement of lost or broken units.
DOC	Doc want to understand:	
	3. the temporal changes to community structure of the artificial rock pool units (ECONcrete tide pool), in comparison to the control and reference sites	Section 4.3 of the management plan details the statistical analysis used to describe the differences in species assemblages between habitat types (artificial marine habitat (rock pool or habitat xbloc), control habitat and reference habitat over time.
	4. the temporal changes to community structure of the habitat enhanced armour unit (modified Xblocs) in comparison to control and reference sites	see above
	Some suggested research questions and analysis:	

Stakeholder	Comment	Addressed
	1. Are there distinct differences found in assemblage composition between the sites (hierarchical cluster analysis)?	Section 4.3 outlines the multivariate statistical tests that can be used to determine differences in species assemblages between habitat types over time. This analysis will highlight whether or not there are differences in the assemblages between reference sites that should be taken into account when comparing natural habitat to the artificial habitat
	2. What are the differences in encrusting organisms between sites (mean percentage of encrusting phyla)?	Section 4.2.1 outlines the methods for identifying and counting percentage cover of sessile/encrusting species. Separate statistical analyses can be carried out using the methods described in 4.3 to identify differences in encrusting species between sites
	3. Mean density (number per m ²) and percent occurrence (percentage of quadrats in which this species occurred) of mobile invertebrates (> 5 mm) in quadrats.	A sentence has been added to section 4.2.1 outlining mobile species to be classified as either small <5mm or large >5mm to capture this detail. This data will be collected and displayed graphically as per the methods outlined in 4.3
	4. Quantify the proportion of macroalgal canopy cover, the percent covers of functional groups, and density of all visible mobile invertebrates.	This data will be collected and displayed graphically as per the methods outlined in 4.3
	Any covariate information to be recorded concurrently – what covariate data is proposed to be collected?	We will not be collecting any covariate data. The intention of the monitoring is to record how these artificial habitats are performing in the environment in which they have been placed and not to test any cause and/or effect of other environmental factors that may or may not be contributing to the accumulated biodiversity on these habitats and that are out of our control.
	Consider taking a photo of the quadrats as this will be useful to create a permanent record of the changes at sites.	This is now specified in section 4.2.1
	Skill level required of personnel undertaking fieldwork – who will be undertaking the diver surveys for this work? Even if doing photo quadrats to be analysed ex situ, at a minimum divers will need to be proficient in ID of invasive species and biosecurity protocols to identify pest species in situ and be able to remove them safely	Added a sentence to section 4.2.1
	Number and placement of replicates - Site selection of quadrats in the sampling areas need to be randomised to ensure statistical independence. Make sure enough replication in survey design to have power in the type of analysis you intend to do.	Added sentence to section 4.2.1 specifying randomly placed quadrats
	Temporal replication – make sure that the surveys are happening at the same time of year every time, the 6-month survey intervals being the exception.	Have added detail on the month in which surveys are to be carried out to ensure repeatability.
	Please confirm if the reference or control sites have rock pool habitat.	Yes they do
	Reporting - DOC request a copy of the monitoring reports.	Specified in section 4.4

Stakeholder	Comment	Addressed
	DOC have produced a monitoring toolbox for marine quadrat surveys that may be a useful reference to inform this monitoring plan	Thanks. We will keep the toolbox in mind. We have based this monitoring methodology off the living seawalls monitoring paper published here - Bishop, M. J., Vozzo, M. L., Mayer-Pinto, M., & Dafforn, K. A. (2022). Complexity–biodiversity relationships on marine urban structures: Reintroducing habitat heterogeneity through eco-engineering. Philosophical Transactions of the Royal Society B, 377(1857), 20210393.

Living Seawalls BCMP

<p>GWRC</p> <p>9. It is not sufficient to install living seawalls (LS) in the high intertidal as this will result in very limited recruitment of only a couple of species and will not come even close to contributing to a sufficient compensation package. Living seawall panels must be positioned with the lower half in the low intertidal and the upper half in the mid intertidal.</p> <p>10. LS panels should be manufactured locally, not in Australia.</p> <p>11. The Design Report for Living Seawalls is required</p> <p>12. Quadrat size needs to be increased.</p> <p>13. I tend to disagree that non-indigenous species should be removed as this fouls the results of the study. Of course we don't want to encourage the growth of these species but we need to understand what risks they might pose in areas that aren't actively managed. I propose removing non-indigenous species only after the two year investigation.</p> <p>14. The following details need to be included as per EM.16 condition (d) listed on pages 4&5 of the BCMP: specific locations of LS, baseline information on indigenous biodiversity at the recipient sites, and maintenance details.</p>		
<p>DOC</p> <p>how deep below Mean Low Water Spring (i.e., into the subtidal zone) do the seawalls at Frank Kitts Park and Greta Point extend?</p> <p>Are any parts of the seawall in the subtidal zone? If so, why is the design of the living seawall limited to the intertidal zone only?</p> <p>Regarding monitoring surveys DoC are eager to have robust information collected from this experimental compensation, to help inform future marine compensation proposals in the Aotearoa resource management space.</p> <p>The management plan needs to have clearly defined monitoring objectives</p> <p>Surveys need to be designed with statistical rigour in mind.</p> <p>Publishing the findings from the surveys in a scientific journal would be a great reporting output.</p> <p>DoC want to understand:</p>		<p>The sites identified for living seawalls (Frank Kitss Park and Greta Point) have since been identified as unsuitable, due to the lack of intertidal height on the seawalls at both sites. This would have resulted in the panels being placed in the high intertidal and therefore not providing a sufficient level of biodiversity enhancement. Upon further consultation with GWRC it has been decided that additional habitat enhanced xbloccs could be placed within the intertidal section of the revetment, thus providing biodiversity compensation at the site of effect. An additional 60m2 of habitat enhanced xBloccs will replace the 60m2 of living seawalls. This has been included in the Rock Pools and Coastal Armour Units Management Plan.</p>

Stakeholder	Comment	Addressed
	<p>1. the temporal changes to community structure across the five living seawall panel types</p> <p>2. the temporal changes to community structure of the living seawalls in comparison to the control and reference sites</p> <p>Some suggested research questions and analysis:</p> <ol style="list-style-type: none"> 1. Are there distinct differences found in assemblage composition between the sites (hierarchical cluster analysis)? 2. what are the differences in encrusting organisms between sites (mean percentage of encrusting phyla)? 3. Mean density (number per m²) and percent occurrence (percentage of quadrats in which this species occurred) of mobile invertebrates (> 5 mm) in quadrats. 4. Quantify the proportion of macroalgal canopy cover, the percent covers of functional groups, and density of all visible mobile invertebrates. 	

6

Dune Vegetation Restoration Plan

NKP-TAT-000-MPN-GV-NS-000029



Quality Assurance Statement		
Prepared by:	Melanie Brown Ecologist Boffa Miskell Ltd.	
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Revision Schedule		
Rev. Number	Date	Description
<i>Internal reviews</i>		
A	3/10/2022	Draft document for information and internal reviews
B	16/10/2022	Draft document for stakeholder reviews
C	25/01/2023	Final draft document for review by Waka Kotahi
<i>Submission for certification</i>		
1	21/03/2023	Final plan for certification

Disclaimer

This report has been prepared by the Te Ara Tupua Alliance for the benefit of the Waka Kotahi NZ Transport Agency. No liability is accepted by the Alliance Partners or any employee of or sub-consultant to the Alliance Partners companies with respect to its use by any other person. This disclaimer shall apply notwithstanding that the report may be made available to other persons for an application for permission or approval or to fulfil a legal requirement.



Table of Contents

1	Introduction	1
1.1	Location and landowner approvals	2
1.2	Iwi mana whenua opportunities	3
1.3	Involvement with other programmes.....	3
2	Pre-restoration vegetation survey.....	4
3	Restoration design.....	7
3.1	Approach.....	7
3.2	Considerations	7
3.3	Species	7
3.4	Planting numbers and design	8
4	Methods	9
4.1	Pre-planting weed management.....	9
4.2	Plant procurement.....	9
4.3	Planting methods	9
4.3.1	Sand binder planting methods.....	10
4.3.2	Vegetation Zone planting layout.....	10
5	Monitoring and Maintenance	11
5.1	5-year maintenance	11
5.1.1	Weed surveys and plant health checks.....	12
5.2	Failed planting replacements.....	13
5.3	Pest plant control	13
5.3.1	Trigger levels for pest control	14
5.4	Adaptive management.....	15

Appendix 1: Map 1 Dune Zones

Appendix 2: Map 2 Dune Mosaic

Appendix 3: Stakeholder Responses and Feedback



1 Introduction

Waka Kotahi New Zealand Transport Agency have consent to construct the Ngā Ūranga ki Pito-One for Te Ara Tupua (the Project). This involves the construction of a shared path from the Ngā Ūranga interchange (Ngā Ūranga) to just south of the Petone Railway Station in the north (Pito-One)

Dune vegetation restoration is to occur along a section of the Pito-One foreshore as part of the Te Ara Tupua construction project condition requirements. This section of the report relates specifically to conditions EM.19, EM.20, and EM.21, which relate to the vegetative restoration of the dunes. These conditions are outlined below in Table 1.1 alongside the section/s they are addressed in this report.

Table 1.1: Dune vegetation restoration conditions EM 19, 20 and 21 for Te Ara Tupua

Condition ref	Condition	Location where addressed
EM.19	a. Coastal dune vegetation shall be planted on approximately 0.8 ha of the Pito-One foreshore located between the Settlers Museum and Hikoikoi Reserve on the Pito-One foreshore as identified in Attachment B of these conditions, shall be established prior to the Completion of Construction, and maintained for five years following planting.	1.1, 3, 5
	b. The restoration shall be designed to establish coastal dune vegetation and enhance resilience and integrity of a naturally rare ecosystem.	3
	c. Plants for coastal dune restoration shall be sourced from the Wellington ecological district, or the Sounds Wellington ecological region.	4.2
	d. The coastal dune vegetation restoration is subject to the grant of landowner approval for works and other necessary approvals. If landowner approval is unable to be obtained for access to the proposed site, alternative locations or an alternative method to compensate for the loss of marine ecology shall be identified and implemented in consultation with the Manager.	1.1
EM.20	Prior to design of the coastal dune restoration, a vegetation survey of the existing area between the Settlers Museum and Hikoikoi Reserve shall be undertaken, and areas of existing vegetation mapped. This survey shall be used to inform design of the coastal dune vegetation restoration.	2, Map 1, Map 2
EM.21	The EMP shall include the following details for the coastal dune revegetation:	2, Map 1, Map 2
	a. The area to be restored;	
	b. The plants to be used for dune restoration including spinifex (<i>Spinifex sericeus</i>) and pīngao (<i>Ficinia spiralis</i>);	3.3, 3.4
	c. Procedures for carrying out the revegetation;	4.1, 4.2, 4.3
	d. Opportunities to co-ordinate with revegetation programmes being undertaken by other parties in area;	1.3, 5.1
	e. How the planted vegetation will be maintained for five years, including pest plant control and replacement of any failed plantings;	5
	f. Monitoring frequency and methods;	5
	g. Adaptation to respond to outcomes of monitoring; and	5.4
h. Trigger levels above which pest control measures will be increased.	5.3.1	

1.1 Location and landowner approvals

As per Condition EM.19 (a), the dune revegetation restoration is set to occur on an approximate 0.8 ha area of the Pito-One foreshore dune system, stretching approximately 740 m between the Settlers Museum and Hikoikoi Reserve. This area is roughly identified in Figure 1 below.

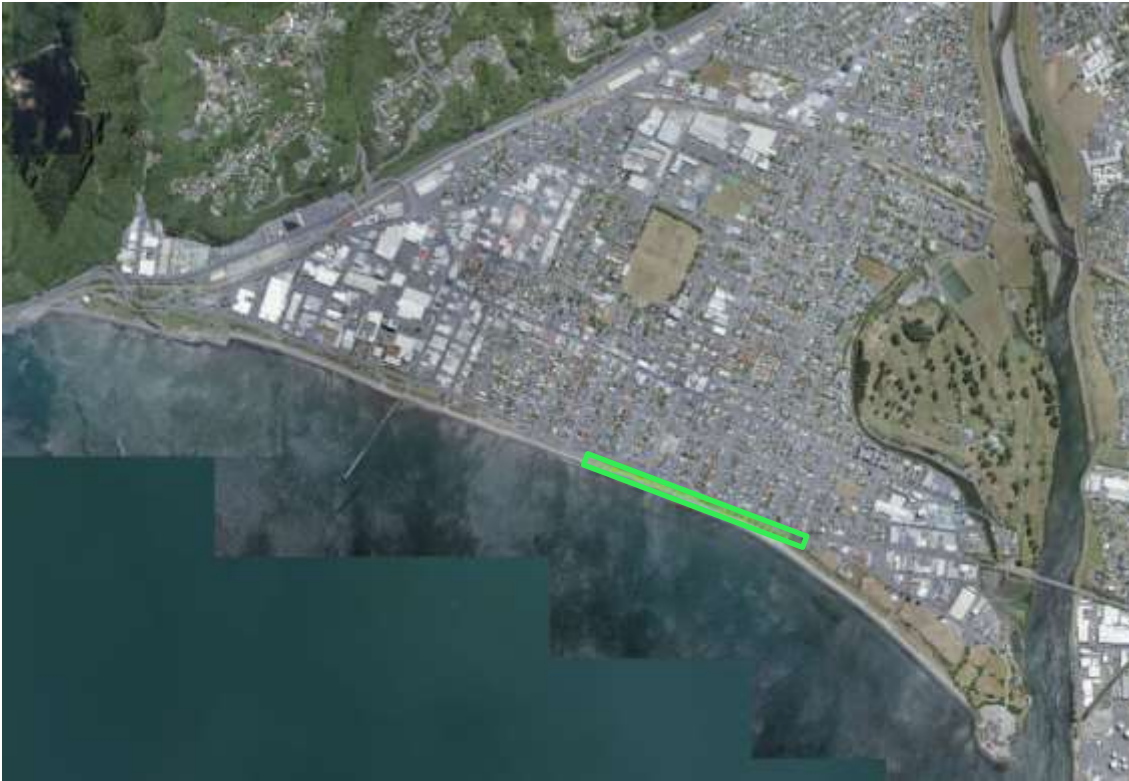


Figure 1 – Green rectangle indicates approximate site for dune revegetation restoration on the Pito-One foreshore.

The site is managed by the Parks and Reserves Team at Hutt City Council (HCC), and communications regarding confirmation of this site for dune vegetation rehabilitation is occurring presently between Te Ara Tupua Alliance and HCC. If this site is not approved for works by the necessary parties then alternative methods or locations shall be identified as per Condition EM.19 (d).

1.2 Iwi mana whenua opportunities

Ngā Ūranga ki Pito One is a landscape which mana whenua is deeply connected to. Mana whenua Taranaki Whānui ki te ūpoko o te Ika (Taranaki Whānui) and Ngāti Toa Rangatira (Ngāti Toa) are recognised kaitiaki and have created a Mana Whenua Vaues Plan (MWVP) (Taranaki Whānui, Ngāti Toa Rangatira and Te Ara Tupua Alliance, 2022) in partnership with Te Ara Tupua Alliance. Opportunities for iwi mana whenua to provide kaitiaki services in the project are outlined in the MWVP as follows:

- Environmental monitoring
- River and stream water quality monitoring
- Harbour and water quality monitoring
- Kūtai/mussel bed restoration programme
- Wildlife species protection and ecological programmes
- Penguin and lizard translocation and monitoring programmes
- Planting and site rehabilitation programmes.

There are opportunities for mana whenua involvement within the dune vegetation rehabilitation. Examples of such involvement could include (among other things) working together to carry out pest plant surveys and plant health surveys, and planting/weeding of the dunes (Sections 4.1, 4.3, 5.1.1, 5.3). This will consequently provide the opportunity for mutual knowledge transfer between groups.

1.3 Involvement with other programmes

Friends of the Petone Beach are a community group who have been restoring the dune system along Petone Beach since 2004. The Pito-One dunes benefit largely from the ecological restoration efforts of the group through eradication of exotic weed species and the addition of native dune species. The following management plan intends to enhance and further the restoration works already continually carried out by Friends of the Petone Beach. This will help to create planting and weed management solutions which complement the restoration work already carried out.



2 Pre-restoration vegetation survey

A survey of vegetation throughout the dune rehabilitation site was undertaken on 23 August 2022 to inform restoration design. A species list was assembled, and vegetation mapped.

The 0.8 ha site is approximately 740 m in length, running parallel between the shoreline and The Esplanade at Pito-one. The width of the dune feature varies throughout its length, generally wider (approximately 20 m) at the western end where it meets Hīkoikoi Reserve, narrowing to approximately 7 m at the eastern end by the Settlers Museum. This is a subset of a dune system which runs the entire length of Pito-one foreshore.

Vegetation on the site is a mosaic of typically expected native dune species, interspersed with exotic grasses and herbs throughout. The dunes have a very low gradient, with very few undulations. The broad zones noted within the dune system are the foredune, semi-stable, and landward, described below. Map 1 shows the approximate foredune, semi-stable, and landward zones, while Map 2 indicates the approximate extents of communities in the dune mosaic, with the dominant species in the mosaic labelled. It is noted that the communities are mapped as accurately as possible, though the nature of the mosaic layout and dynamic landscape means some community margins are likely to differ in actuality.

Foredune:

Shell deposits, pebbles and broken driftwood were present along the foredune, though these open areas had sparse scatterings of occasional sand sedge (*Carex pumila*), and scattered, small wīwī (*Ficinia nodosa*) (Figure 2). Sporadic sand tussock (*Poa billardierei*) was also identified in the foredune, encroaching from the semi-stable on occasion along with native spinifex (*Spinifex sericeus*) and rarely, pīngao (*Ficinia spiralis*). A variety of exotic herbs and grasses, most notably Yorkshire fog (*Holcus lanatus*) and gravel groundsel (*Senecio skirrhodon*) were distributed throughout the entire zone, suppressed in part by apparently recent driftwood depositions (Figure 3). Driftwood depositions continued along the entirety of the foredune. Where patches of open sand occurred, these were usually colonised by small Yorkshire fog seedlings. At the far western end of site, the foredune is almost entirely dominated by spinifex, with occasional wīwī throughout, and this area of the dune is narrow, so does not progress far into semi-stable before meeting the sea wall.



Figure 2 Foredune area at the eastern end of the site.



Figure 3 – Driftwood deposition at the eastern beach edge

Semi-stable:

The semi-stable area on this site is characterised by taller, native sand binding species such as spinifex, pīngao, sand tussock, with denser and taller wīwī, and a higher frequency of exotic grasses and vetch in areas which would otherwise be bare sand. Occasional patches of bare sand or driftwood are present, but Yorkshire fog, cocksfoot (*Dactylis glomerata*), and vetch (*Vicia* sp.) are commonly interspersed among individual native plants as well as the open spaces between, leaving little open bare sand. Occasionally, vetch dominated entire stretches up to 20 m long, climbing among established low growing native species (Figure 4). Occasionally whakariki is present, though largely suffering throughout. The gradient of this zone is still relatively flat, with undulations occurring mostly at road drainage culvert outlets or human foot traffic areas (Figure 5).



Figure 4 Vetch growing among wīwī



Figure 5 Semi-stable species with native coverage and interspersed exotic herbs and grasses

Landward:

The landward zone of the site ends where it meets the pedestrian concrete wall, and these species are generally only present at the eastern end of the dunes where the gradient is wider, allowing room for a natural progression closer to a backdune community. Some woody species are present, with few small ngaio identified, as well as taupata (*Coprosma repens*), and tauhinu (*Ozothamnus leptophyllus*). Bare sand is not often identified along this area, with the slightly raised and compacted sand (in comparison to lower shoreward zones) providing ideal habitat for exotic grasses to grow rank among the interspersed native species. Wīwī still retains a large presence, with occasional patches of pīngao or spinifex. Flax and woody coprosma species are sometimes dense along the back wall giving way to lower growing species and exotic grasses



Figure 6 The landward zone ends at the seawall



Figure 7 – More dense area of the landward zone with whakariki and taupata

Culvert outlet:

The few culvert outlets throughout the site have created wet depressions, approximately 1 m in width and 4 m in length, which house species such as persicaria (dominant), with oioi and umbrella sedge rarely sighted. It is noted that the survey was carried out following a large period of rainfall and so the wet areas may have been recorded as larger than would be typically expected.



Figure 8 Culvert outlet from sea wall with deep pooling after rain.

3 Restoration design

Considering the current vegetative cover of the dunes, those areas most crucial to the restoration of the dunes are the areas dominated by exotic grasses and herbs. Removal/reduction of exotic species will aid in the enhancement of the existing vegetation and provide opportunity for further native plantings to establish, with species chosen to enhance and increase the resilience of the dunes. The implementation of this restoration design will be followed up by a five-year post-planting monitoring and active maintenance.

Restoration design has been created to align with Condition LV. 4, pertaining to the CEDMP requirements for plant species, sizes, and maintenance, along with other landscape architecture requirements. This ensures plant species chosen are suited to both ecological and landscape architectural recommendations.

3.1 Approach

Due to the existing ecological condition of the site (i.e., large amount of native dune vegetation present) sensitive weed clearance will be required. While mechanical top-scraping of dunes is often a successful revegetation precursor for minimising weed species in the seedbank, leaving the existing native dune vegetation in place well outweighs the possible less labour-intensive benefits of scraping. To protect any fauna possibly present within the dune landscape, manual clearing of exotic species is recommended, supplemented by infill planting in the bare spaces to reduce available space for future weed colonisation. This method is more labour intensive and requires vigilant ongoing maintenance to remove roots and resprouting of unwanted species.

3.2 Considerations

Restoration design may also consider the influence of human activity on the dunes. Currently, with low-growing vegetation areas along most of the seawall, there is evidence of tracking through the dunes by pedestrians, which causes damage to dune vegetation. Planting woody backdune species at higher density along the back edge of the dunes may reduce accessibility over the landward zone and channel people towards the existing designated entrances to the shorefront. This, however, may be limited to only the wider dune section (east) as the thin sections in the west are not wide enough to comfortably progress to woody vegetation in such a narrow span.

3.3 Species

While it is usual for a natural system to feature bare areas of sand, this is likely to be re-colonised by exotic grasses if blank areas are left unplanted, and the open sand spaces will likely return to the current exotic coverage. Therefore, planting newly bare areas is recommended (i.e. replacing removed weed plants with native plants), and ongoing weed surveys and removal will be required for success. Species recommended are outlined in Table 3.1 below, and have been chosen for their local presence, contribution to the wider dune system, and likelihood of survival in the exposed conditions. Species listed are subject to nursery availability and may have to be revised slightly following consultation.

It is noted that the narrow and dynamic nature of the dune system means that there is often overlap of plants between the wider 'zones' outlined in the table. As well as this, the narrowest portion of the dunes at the western edge tend to contain only foredune habitat, with landward zone habitat limited to the wider portions of duneland which can accommodate the entire dune gradient. For this reason, there will be minimal backdune establishment in comparison to semi-stable species.



Table 3.1: Species recommended for dune enhancement and rehabilitation

Zone	Common name	Scientific name	% of planting mix in zone
Landward	Melicytus obovatus	<i>Melicytus obovatus</i>	10%
	Tauhinu	<i>Ozothamnus leptophyllus</i>	15%
	Taupata	<i>Coprosma repens</i>	15%
	Wīwī	<i>Ficinia nodosa</i>	10%
	Mingimingi	<i>Coprosma propinqua</i> var. <i>propinqua</i>	15%
	NZ Spinach	<i>Tetragona trigyna</i>	10%
	Pīngao	<i>Ficinia spiralis</i>	15%
	Coastal tree daisy	<i>Olearia solandri</i>	10%
Semi-stable	Sand tussock	<i>Poa billardierei</i>	20%
	Silver tussock	<i>Poa cita</i>	20%
	Pinātoro	<i>Pimelea prostrata</i> subsp. <i>prostrata</i>	15%
	Shore bindweed	<i>Calystegia soldanella</i>	10%
	Wīwī	<i>Ficinia nodosa</i>	15%
	Speckled sand sedge	<i>Carex testacea</i>	20%
Foredune	Pīngao	<i>Ficinia spiralis</i>	40%
	Spinifex	<i>Spinifex cericeus</i>	40%
	Sand sedge	<i>Carex pumila</i>	20%
Culvert outlet	Oioi	<i>Apodismia similis</i>	100%

3.4 Planting numbers and design

It is estimated that the site, at time of initial survey had an estimated 65% native species coverage. This leaves 35% of the site (or approximately 2,800 m²) unvegetated or vegetated by unwanted species. Spacing for planting will differ markedly between species, the vegetation zones and will also be determined on-site by the surrounding densities and composition of pre-existing native vegetation.

Final species numbers required are best determined one year prior to planting, to provide enough time for quality plant procurement, while also having up-to-date knowledge of the open space available to be planted. This will need to be determined by an on-the-ground survey, to establish any changes to the community areas and boundaries of the 'zones' currently outlined in Map 2. This will allow more accurate planting numbers and procurement. Numbers of species required will be able to be easily determined from the above planting mixes and an updated approximate native vs. exotic/bare coverage present on the site, closer to the time. For this reason, a concrete planting design has not been created as the dynamic nature of the active dune system will render any such plan irrelevant by the time planting occurs.

4 Methods

These methods should be implemented in time for planting to be completed prior to the completion of Project construction.

4.1 Pre-planting weed management

Unwanted species (namely exotic grasses) should be removed prior to planting, and prior to seasonal seeding, to reduce seed dispersal. Following weed removal, the area should be planted as soon as practicable to reduce the likelihood of recolonisation by exotic species and to reduce sand loss.

Weed management may need to occur in phases, targeting larger 'hotspots' of weed areas followed by rolling progression from one end of the dunes to the other, as planting occurs. It is recommended that prior to implementing the weed management programme, which is likely programmed at a later time, that a further weed mapping exercise is carried out to identify any hotspots or weed species presence which may have changed since the date of the initial survey and mapping.

Methods for weed removal should not include herbicides (unless species-specific conditions come to depend on it, in which case spot-spraying may be permitted through adaptive management). This is due to the presence of potentially sensitive lizard fauna in the area. Hand-clearing of weeds is recommended as this will reduce harm to indigenous flora and fauna already present.

Weed management will be continued following planting (see section 5.3).

4.2 Plant procurement

Plants procured for the site should be ecosourced from the Wellington Ecological District in the first instance. If not available in the Wellington Ecological District, then they should be ecosourced from the Sounds-Wellington Ecological Region. Following both of these unavailabilities, species should be reconsidered for one that is available in the Wellington-Sounds ecological region, or on a case by case basis may be approved as appropriate to source from another ecological region.

Sourced plants should be hardened nursery grown specimens, topped if required, as they are more likely to survive in the exposed conditions. Specimens accepted should be in healthy condition and in ready condition and size to be planted, from a reputable nursery.

4.3 Planting methods

All planting shall be undertaken based on established best practice revegetation techniques in relation to matching species with site conditions, with species placed in areas appropriately suited to the habitat and landform.

Planting should be undertaken in the autumn and winter months, once unwanted species have been removed from the planting area. Severe weather conditions such as drought, storms, and severe winds should be cause for suspension of planting operations.

It is recommended that one slow-release nitrogen-based fertiliser tablet is added to each individual plant during planting, to aid growth and establishment.

Although information on planting spacing is provided below, planting density will be subject to the condition of the dunes at the time of planting, as restoration works by Friends of Petone Beach are ongoing and may alter the current state of the dunes, as could severe weather effects such as washouts. Plants will need to be placed thoughtfully in order to work with the current native species cover, taking into account spacings provided with already existing native plants. Bare and open areas should be prioritised for planting, as opposed to areas with already relatively dense native cover.



4.3.1 Sand binder planting methods

- **Pīngao and spinifex**

Foredune plants, due to their highly exposed environment with loose substrate, require a specific planting technique to complement their growth adaptations and to prevent wind uprooting.

These species should be planted deeply into the sand, to a depth where the roots hang straight down to the bottom of the hole, and the levelled sand reaches at least halfway up their leaves. Ensure the plants are dug into the ground, rather than pulling sand up into piles around the plant. Long runners to be planted should be placed along in a trench, rather than a hole, to allow the entire plant to lay in the sand.

Pīngao and spinifex should be planted at 0.5 m spacings. These should be planted in groups separate to one another, rather than mixed.

4.3.2 Vegetation Zone planting layout

Planting layout should be undertaken with experienced planting supervisors. Plants shall be appropriately spaced in an informal manner (in all vegetation zones (Map 2)), avoiding straight lines or regular patterns, while ensuring even coverage among spots required for planting. Planting in straight lines may increase wind effects at the ground level and should be avoided.

Where possible, specimens should be planted using available shelter from other surrounding plants. This will provide protection during the establishment phase and increase planting success.

- **Foredune layout**

Species to plant in the active foredune consist of sand sedge, pīngao, and spinifex.

All of these species are recommended for planting at 0.5m spacings.

Sand sedge should be focussed at the toe of the dune, as it prefers moisture.

Pīngao and spinifex should not extend too far towards the shoreline, as the high tide will wash it away.

- **Semi-stable layout**

There are seven species recommended for the semi-stable zone. Wīwī can be planted at 0.5 m spacings, while all other plants are recommended at 1 m spacings.

The pattern of species layout should be somewhat mixed, rather than in species groupings.

- **Landward layout**

The landward zone has a mixture of sand binding, rush, and woody species.

Sand binder layout should be the same as the foredune, grouped and at 0.5 m spacings.

All other species should be mixed throughout, rather than clumped in species groups.

Pohuehue at the direct sea wall edge (as well as throughout) may prove effective at blocking unwanted pedestrian movement.

Ngaio should be placed at larger (5 m) spacings and dotted throughout rather than clumped together.

Pohuehue, whakariki, and tauhinu should be placed at 1.5 m spacings.

- **Culvert outlet**

This semi-wet outlet should be planted entirely in oioi, at 0.5m spacing. This should not be in a grid shape (to retain an organic appearance) and should be placed to work around existing native vegetation, as with all other zones.



5 Monitoring and Maintenance

In order to support the establishment of the planted individuals and ensure the dune system thrives, monitoring of the planted and weeded areas should be undertaken for five years post planting. Maintenance and monitoring should be undertaken by suitably experienced individuals.

5.1 5-year maintenance

Once planting is completed, maintenance should be undertaken for a period of five years. This shall involve:

Years one - three:

- Plant releasing every two months over the growing season (September to February). Any failed plants are to be recorded, and this information sent to the Alliance ecologist as soon as reasonable.
- Biannual weed surveys (autumn and spring) and plant health checks carried out by a suitably qualified ecologist, with written observations and recommendations.
- Any required infill replacement planting is to be undertaken in the next available planting season (autumn/winter).
- Contact with local community groups to identify what restoration activities (i.e. planting, weeding) have been carried out since previous surveys, in order to coordinate efforts.
- Quarterly weeding of the planted areas, with focus on releasing of plants as required

Years four - five:

- To continue as years 1-3, with plant releasing reduced to quarterly.

It will likely be difficult to determine newly planted specimens compared to already existing specimens if initial planting is successful in its establishment, considering they will be mixed together. For this purpose, it is recommended that the dune site be assessed as a whole when plant health checks and weed surveys are undertaken.



5.1.1 Weed surveys and plant health checks

Biannual (spring and autumn) weed surveys and plant health checks should be carried out across the entire site, by a suitably experienced ecologist. For ease of abundance estimations, the site may be assessed in sections. For ease of comparison between survey results, these sections should be kept consistent throughout monitoring.

Any species sighted classified as Notifiable Organisms must be reported directly to the Ministry for Primary Industries

▪ **Weed surveys**

The purpose of the weed surveys is to measure the changes in weed species abundance and diversity to produce appropriate management response recommendations.

Surveys should be undertaken by walking systematically through the site, noting all exotic and native invasive species, photographing the site (generally, and at specific established photo points) and species, and noting abundances of weed species using the ACFOR scale:

- Abundant = >30% cover
- Common = 20-29% cover
- Frequent = 10-19% cover
- Occasional = 5-9% cover
- Rare = <5% cover

All species recorded will be compared to the high priority Exclusion, Eradication and Progressive Containment categories of the species identified by Greater Wellington Regional Council (GWRC) in the Regional Pest Management Plan (RPMP) 2019-2039.

Any weed species present on site, but not listed in the RPMP (which focuses on species of regional concern), should be considered where they might pose an ecological risk to the site and to the planting programmes.

Those species which are deemed to pose an ecological threat will have their location marked on a map, and removal recommendation controls advised.

▪ **Plant health checks**

The purpose of the plant health checks is to determine if the new plantings are suffering from disease, death, nutrient levels, animal browse, or any other factors detrimental to the success of the plantings, and to what extent. This is to inform any required planting replacements and to provide recommendations for increasing plant health.

Plant success should also be observed.

This should be undertaken by systematically walking through the site, visually observing plants for signs of vigour, poor health, or death. The extent of any signs of plant stress should be noted through percent cover within the section, and this percent cover should be further divided into suspected cause of poor health (i.e. 20% plants in poor health, 10% suffering from animal browse, 10% dead from trampling). Species and location should be recorded.

This information will be reported and used to inform recommendations for increasing the plant health within the site. This report will also incorporate any plant loss information provided by external contractors or conservation groups recorded during weeding/plant releasing.



5.2 Failed planting replacements

Plant health check surveys (as required under the five-year maintenance plan) should take into account any failed plantings in order to feed into any required failed planting replacements. These should be matched up with any plant failure recordings identified during maintenance works to ensure accurate information for determining the replacement number of failed plantings, if required. Plant cover over the site of less than 80% will require enough replacement plantings to reach at least 80% cover over the site, and monitoring. An exception to this is noted at the very toe of the dunes where areas of open sand and driftwood are likely to persist and move constantly, In the case of these extremely active areas, the ecologist will use their discretion to ensure the healthy replacement cover of the dunes.

Replacement of failed plantings should be undertaken using the same guidance as with the initial planting, unless adhering to the guidelines as previous is deemed likely to cause further failure.

In the case of continuous failed planting attempts, or suspected continued failure, an adaptive management plan may be required at the discretion of the ecologist in order to provide native dune vegetation coverage.

It is noted that heavy foot traffic from humans and domestic dogs is present along this shoreline and can cause prominent vegetative dieback.

5.3 Pest plant control

Pest plant control plays a large role in the rehabilitation of the dune system. Pest plant control is to be carried out before planting (in specific planting areas to reduce competition) and throughout the five-year post planting maintenance period, where bi-annual weed surveys will aim to observe and recommend control methods of pest plants seen as ecologically compromising.

The current vegetation on site is largely native dune cover. To avoid harm to the existing native vegetation, hand clearance of pest plant species is recommended, and exercising caution around trampling of native species. Other pest plant control methods may be required in out years through adaptive management, if current pest plant species are not responsive to hand clearance and / or new ecological weeds establish in the dune system (i.e., selective herbicides may need to be adopted into the plan).

Pest plant species currently residing in the dune system and expected to be reduced in years 1 - 5 are shown in Table 5.1.



Table 5.1: Exotic species identified in the dune site to reduce through manual control over years 1-5

Common name	Scientific name
Agapanthus	<i>Agapanthus praecox</i>
Broom	<i>Cytisus/Genista</i> sp.
Catchfly	<i>Silene gallica</i>
Clover	<i>Trifolium</i> sp.
Cocksfoot	<i>Dactylis glomerata</i>
Treasure flowers	<i>Gazania</i> sp.
Gorse	<i>Ulex europaeus</i>
Gravel groundsel	<i>Senecio skirrhodon</i>
Hairy lotus	<i>Lotus suaveolens</i>
Hawksbit	<i>Leontodon taraxacoides</i>
Lotus	<i>Lotus pedunculatus</i>
Onionweed	<i>Allium triquetrum</i>
Oxalis	<i>Oxalis</i> sp.
Tree lucerne	<i>Chamaecytisus palmensis</i>
Vetch	<i>Vicia</i> sp
Wild mustard	<i>Sisymbrium</i> sp.
Wild radish	<i>Raphanus raphanistrum</i>
Yorkshire fog	<i>Holcus lanatus</i>

5.3.1 Trigger levels for pest control

Browsing mammals, such as possums, rabbits, hares, and ungulates, can have a significant effect on plant survivorship and ecological recovery. The reduction in native species composition and plant density minimises habitat and food resources that native flora and fauna rely on. When plants are damaged through browsing, they must then redistribute their resources into growing vegetative matter rather than pursuing reproduction through flowering, seed production, and fruiting, ultimately impacting the natural restoration of an area. This loss of nectar, fruit, and seed also impacts the survival of native fauna through a reduction in available food resource. Through high browsing pressure, the dune system will struggle to naturally regenerate as fewer seeds are produced, dispersed, and thus have the ability to germinate.

Browsing can be readily seen on vegetation and used as an indication of browser presence. A level of 20% browsing damage to plantings (to be recorded in the plant health surveys) should trigger pest control requirements. These requirements should be implemented following determination of the browsing species causing issue. If not immediately apparent, wax chew tags can be laid out to determine presence of browsers and likely culprits of the browsing damage. Following this, appropriate control measure should be undertaken, targeting the species detrimental to the plantings. The location in a dog-populated and urban environment may need to be considered in the production of any required browsing pest control management methods.

5.4 Adaptive management

Adaptive management may be required for reasons such as;

- Unforeseen events or maintenance outcomes (identified by ongoing monitoring) which do not enhance or restore the dune system, or;
- Trigger levels of pest species are exceeded.

This may be required in scenarios such as: selected species for planting have not, and are not, deemed likely to establish, pest plant management does not respond to hand-clearance, severe events (drought, storm) compromise the dune system.

Any adaptive management will require justification and direction from a suitably qualified ecologist in a separate adaptive management document. To note: the above reasons for implementing adaptive management are not exhaustive and will be case specific, and a suitably qualified ecologist should be consulted.





Appendix 1: Map 1 Dune Zones





Appendix 2: Map 2 Dune Mosaic





Appendix 3: Stakeholder Responses and Feedback



Stakeholder	Comment	Addressed
HCC	Location proper and adjacent pest and invasive weed control should be non-negotiable. Many invasive weeds in coastal habitats erode dunes (de-stabilise them) and also provide high food resource for mammalian predators (eg non-native convolvulus, south african ice plant, sea spurge, marram grass, lupin, bushy asparagus, buckthorn and tree mallow) SEE EM. 20 'E'	Ecologically harmful species/all exotic species will be noted in required weed surveys with recommendations for control
HCC	a. Pg. 49 EM.19- 0.8 ha of Pito-One (Petone) between Settlers and Hikoikoi reserve (attachment B). maintained for 5 years of planting Note: <u>should apply to lizard habitat as well then, focus on other species such as Katipo spider and sea/shore birds?</u>	There is a separate lizard management plan for the lizard release area which covers its consent conditions. Katipo/seashore birds are not part of consent conditions and so are not addressed here in the vegetation plan
HCC	b. To protect plant genetic health, Plants sources in Wellington Ecological district or Sounds Wellington region. Berhampore Nursery is a good resource, planting and weed control can be contracted by Conservation volunteers Wellington.	The ecological district is already outlined in the report. Berhampore Nursery/Cons. vols. noted thank you.
HCC	Note: landowner is iwi and HCC? Any private residential? Is there an alternate location or method already outlined in case this occurs? Possibly further down Petone esplanade-?	No private residential on the shore. Alternate locations are not stated in this report as this report adheres to the consent conditions which specifies to use this location. This location has not been rejected at time of writing so further options have not been stated.
HCC	a. Species to plant and protect: (while karo plant is native to NZ, it is NOT native to Wellington region and should generally be removed from dunes)	Any presence of karo (and subsequent removal req.) will be noted in weed surveys.
HCC	Species for planting/protecting: Pingao, spinifex, taupata, tauhina, mingimingi, maidenhair, weeping grass	All species except last three already in plan/present. Of those three, Mingimingi (Cop.prop) has been added, Maidenhair assumed to be Adiantum cunninghamii which is more suited to coastal forest rather than exposed dune. Weeping grass/microlaena stipoides likely requires more protection than available at this site

Stakeholder	Comment	Addressed
HCC	Consider low growing natives (sand carex, sand comprosmia, sand tussock, sand daphne) and list planting locations carefully. - Suggested locations: Sind-binding plants on semi-stables sides/foredune. Shrubby natives landward adjacent and adjacent to seawall. Backdune planting should be in small groups of 5-10 plants and around 80cm spacing within gaps created from removal of mirram grasses.	Low growing natives (3/4) listed already in plan, with shrubby natives outlined in landward zone (by seawall). Planting locations difficult to list carefully given distant time frame/variability over time of suitable spots, outlined in planting plan timing. There is minimal marram grass present to remove, most of the free space will come from exoic herbacious removal which is signposted for replanting in these gaps. Specific plantings of groups are not outlined as there is a lot of vegetation that will remain which the added plants will have to 'work around'
HCC	a. Outline risks of plantings and ecosystem (e.g dieback can occur to dune plants due to heavy foot and animal (mainly dogs) traffic	Note added to report section 5.2
HCC	(c) Plants for coastal dune restoration shall be sourced from the Wellington ecological district, or the Sounds Wellington ecological region. a. if unable to source, state suitable source	Consent requirement that they come from this eco Region. Another species may have to be chosen in the event. Note added section 4.2
HCC	. If any Notifiable Organisms (NO)s must be reported directly to MPI hotline. State this in baseline survey. A.State statistical methods used that will inform design. Suggested method to have quick overview look: Simpson's Index of Diversity. This method helps describe evenness and gives more weight to abundant species in a sample. Or look at species richness (overall # of species in a statistical mean) B.Mapping may already exist in ArcGIS or Hutt View	Simpsons diversity is a good index and demonstrated often on dues. The AFCOR scale is crude and relies broadly on estimations, however it does cover the entire area which increases the chances of finding exotic arrivals to the site, or changing locations of hotspots can be tracked rather than focusing on quadrats which exclude some areas. Mapping was not identified in Hutt Council Maps
HCC	; Pest control should specifically outline targeted species (and why) and methods pesticides (piclorum pasting) v other methods (only manual or hand pulling).	Report states manual only unless safe for use around lizards
HCC	Monitoring frequency and methods; Look to DOC and GWRC Dune monitoring plans. Easiest may be to have 10x10m transects.	Frequency and methods established
HCC	Adaptation to respond to outcomes of monitoring; add this to overall contingency plans	Covered by section 5.4 adaptive mangement ' <i>Adaptive management may be required for reasons such as; Unforeseen events or maintenance outcomes (identified by ongoing monitoring) which do not enhance or restore the dune system, or;Trigger levels of pest species are exceeded.</i> '

Stakeholder	Comment	Addressed
HCC	<p>Trigger levels above which pest control measures will be increased.</p> <p>a. Baseline survey of pests may be useful and data may already be available for area or similar plot.</p> <p>b. Storm or extreme weather conditions may merit extra monitoring or if invasion curve of exotic species increase.</p> <p>c. Review indicator species relevant to ecosystem (e.g native shore and seabird population)</p> <p>d. Keep photo points for monitoring</p>	<p>Pest management plan contains these aspects, and adaptive management is written into the report for any occasions such as weather events (which can also include reviewing indicator species). Photopoints note added.</p>
HCC	<p>Engagement and awareness opportunities with community</p>	<p>Open to this if requested however this is not currently part of consent conditions or further work requests.</p>
GWRC	<ul style="list-style-type: none"> •Sand coprosma (<i>Coprosma acerosa</i>) is unlikely to have occurred there naturally and possibly should be reconsidered. 	<p>Agree</p>
GWRC	<ul style="list-style-type: none"> •Ngaio (<i>Myoporum laetum</i>), pohuehue (<i>Muehlenbeckia complexa</i>) and whakariki (<i>Phormium cookianum</i> subsp. <i>cookianum</i>) are planted widely in coastal restoration projects, but that doesn't make them typical for this site. They are more typical of coastal escarpments in the Cook Strait. Consider replacing these with taupata (<i>Coprosma repens</i>), mingimingi (<i>Coprosma propinqua</i> var. <i>propinqua</i>), coastal tree daisy (<i>Olearia solandri</i>) and <i>Melicytus obovatus</i>. 	<p>Agree</p>
GWRC	<ul style="list-style-type: none"> •The New Zealand Spinach species listed, <i>Tetragonia tetragonoides</i>, only naturally occurs on the south coast around Cape Palliser and at two dunelands on the east coast in the Wellington region. More appropriate would be the native spinach, <i>Tetragonia trigyna</i>, which is found around the entire coastline of the Wellington region. I would also plant this in the landward portion of the beach, where it would more typically be found. 	<p>Agree</p>
GWRC	<ul style="list-style-type: none"> •Also appropriate for this site, but not listed, are pinātoro (<i>Pimelea prostrata</i> subsp. <i>prostrata</i>) and silver tussock (<i>Poa cita</i>). 	<p>Agree</p>

Stakeholder	Comment	Addressed
GWRC	<p>A couple of thoughts / suggestions from Ed on the Ecology Management Plans:</p> <p>1. Dune Restoration Plan:</p> <p>a. Section 1.1 – can we say ‘the site is (Delete 'currently') managed by the <u>Parks and Reserves Team</u> at Hutt City Council (HCC)...’</p> <p>b. Section 1.1 - In regard to the alternative location – have we already considered an alternative location being to the west of the Settlers Museum?</p> <p>c. Would the plan still be applicable to an alternative location or would it require significant change?</p>	<p>Alternative location has been considered (west of museum), however this management plan is specific to the consent conditions which specify this exact location. Alteration to the plan would require (among changing of the consent condition) a new survey/mapping and subsequent updating of plan, depth of which would depend on how drastic the differences between the two sites are. Updated to parks/reserves team.</p>
HCC	<p>Conservation Volunteers New Zealand may be interested as they perform extensive dune restoration along the south coast in Wellington. This may also be an opportunity for HCC Comms/Social media team to engage and partner with the public on this.</p>	<p>Public sphere can be added if required, however at current the plan adheres to the consent conditions and public engagement is not added into the ecological requirements at this point. Conservation volunteers noted, and will be passed on to community liaison. Plan does not need to be too prescriptive re: volunteer groups, but Friends of Petone are currently carrying out restoration in that exact area and have done so for a while so it is prudent to mention them</p>
HCC	<p>Placing weed mats and plant guards can help mitigate risk. Planting faster growing species next to slower growing ones may help with sheltering.</p>	<p>Plants will be infilled among existing plants which will provide pre-existing shelter. Exposed coastal environment will likely deteriorate/blow away plant guards quickly, and not be suitable for creeping plants. Weed mats will limit natural dune movement.</p>
HCC	<p>Where and how will information be recorded? And how can this be shared with HCC?</p>	<p>Information to be sent to Alliance ecologist as soon as reasonable following recording of failed plants. This will then be noted within the plant health report, available to HCC.</p>
HCC	<p>Opportunity for public engagement and awareness of project and possible use of citizen science to report unwanted pests (Inaturalist)</p>	<p>Open to this if requested however this is not currently part of consent conditions or further work requests.</p>
HCC	<p>Other weeds to watch out for that exist in surrounding dune systems: non-native common convolvulus , Carpobrotus edulis, Ammophila arenaria, Euphorbia paralis, Lupinus arboreus , Malva arborea and Lathyrus odoratus are invasive plant species to watch out for, as they proliferate easily.</p>	<p>Ecologically harmful species/all exotic species will be noted in required weed surveys with recommendations for control. Reservations about creating a specific list of species prior to surveys as this may give surveyors 'tunnel vision' about what to look for rather than assessing all species found</p>

Stakeholder	Comment	Addressed
HCC	Rats and mice should be included [in trigger levels], as these species are also a threat to native lizards. There should be a pre-emptive control on mammalian pests with standard Victor professional rat trap (tunnel), as these pose low risk harm to humans and dogs.	These species are not excluded in the trigger levels with a few exemplary species outlined. Very little evidence of mammalian browsing during initial survey, predator control plan (separate) addresses required control