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Revision: I

Boffa Miskell

Kennedy Point Marina

Kororā Construction Monitoring & Management Plan
Prepared for Kennedy Point Boatharbour Ltd

31 August 2021

Document Quality Assurance

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1.0 Introduction

Resource Consent (CST60082321-B) has been obtained by Kennedy Point Boatharbour Limited (**KPBL**) to construct, maintain and operate a marina (**the Project**) within the coastal marine area at Kennedy Point. The marina is to be located at the mouth to Pūtiki Bay on the southwestern side of Waiheke Island. The marina will provide permanent berthage for approximately 180 recreational boats in fully serviced berths ranging from 10-30 m in length. Temporary berthage for smaller visiting boats will also be available along with a range of other facilities for the boating public. Additional facilities include a floating car park, septic tanks, laundry, cafe, office and showers.

The consent conditions for the project include several that relate specifically to avoiding adverse effects on kororā / little penguin (*Eudyptula minor*). In relation to construction activities, these include conditions to be met prior to construction commencing (the preparation and approval of a construction monitoring programme for the duration of construction (condition 24A)); and conditions limiting construction hours (condition 61) and requiring management of construction works involving physical disturbance to the rock breakwater adjacent to the marina (condition 22(d)).

The little blue penguin monitoring programme (**LBPMP**) required by condition 24A was prepared in June 2020 (4Sight Consulting, 2020a) and was approved in principle by Auckland Council at that time. The purpose of the monitoring was to gather pre-construction data about kororā use of the Kennedy Point breakwater in advance of construction to inform the Construction Management Plan (**CMP**) required by condition 22, and conditions 22(d) and (e) in particular.[1]

Pre-construction monitoring was undertaken pursuant to the LBPMP in December 2020 (4Sight Consulting, 2020b), and the CMP (including the LBPMP) was approved by the Council on 11 January 2021. Further pre-construction monitoring was undertaken in February 2021 (4Sight Consulting, 2021b), and construction commenced in March 2021. A further kororā survey using a conservation dog was undertaken in April 2021 (4Sight Consulting, 2021a) and the consent holder amended its approved CMP to incorporate more specific methodologies to address the potential for kororā to be present in newly identified locations in the area where construction work involving disturbance of the breakwater rocks was planned (4Sight Consulting, 2021c). Shortly thereafter the consent holder paused on-site works and engaged Boffa Miskell Ltd to review its LBPMP, the monitoring data obtained and its CMP.

This review was completed in May 2021 and included several recommendations, one of which was for amendments to be made to the LBPMP and CMP to provide a more integrated strategy for monitoring and managing kororā during construction works. This is the purpose of this plan.

In July 2021, the Environment Court clarified that the monitoring programme required by condition 24A applied to the marina side of the breakwater and an area of the foreshore up to the first Pohutukawa tree (refer to Map 1).

[1] This CMP was eventually prepared in reliance on monitoring data gathered in December 2020 and approved in January 2021.

Map 1: Penguin Construction Monitoring Area (PCMA) for purposes of condition 24A

Legend

Monitoring Area

Map 1: Penguin Construction Monitoring Area (PCMA) for purposes of Resource Consent condition 24A.

0 25 50 100 m

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Approved: PW

4SIGHT CONSULTING

This current plan begins with a discussion of the consent condition monitoring and management requirements for kororā during construction of the marina (Section 2.0). It then provides some general information about kororā, including their conservation and population status (Section 3.1), breeding biology and ecology (Section 3.2), and a summary of the Kennedy Point breakwater monitoring data gathered to date (Section 3.3). An overview of the marina construction works and programme is then outlined (Section 4.0[2]). This is followed by construction methodology and associated management measures to be adopted to minimise effects on kororā (Section 5.0). The kororā monitoring techniques and programme during the construction of the marina is then detailed (Section 6.0). Lastly, as required by condition 22(e), details of how artificial burrows or nest boxes for kororā are to be incorporated into the reinstated rock seawall over which the wharf will be constructed are provided (Section 7.0).

The following terms are used throughout this document and defined as follows:

- "**Suitably qualified and experienced person**" (**SQEP**) means a person with a tertiary ecology qualification and experience working with kororā.
- "**Penguin construction monitoring area**" (**PCMA**) means the area identified in Map 1 for which kororā are monitored during the construction phase for purposes of condition 24A.
- "**Site area monitoring**" (**SAM**) means monitoring undertaken during the construction phase in advance of the proposed works to detect whether there are active burrows (refer Section 6.2.2).
- "**Ongoing Breakwater Monitoring**" (**OBM**) means regular monitoring of the entire PCMA undertaken during the construction phase (refer to Section 6.2.3).
- "**Active burrow**"[3] means a kororā burrow containing, or suspected to contain, a nesting bird, viable nest contents[4] or moulting bird based on the time of the year and other evidence observed at the burrow location by a SQEP.
- "**Rock removal methodology**" means the methodology for temporary removal of rocks from the breakwater described in Section 5.1.
- "**Habitat management measures**" means the measures to temporarily manage kororā access to habitat described in Section 5.2.
- "**Local habitat enhancement**" means the kororā habitat enhancement works described in Section 7.0.

[2] Information in this section of the document has been provided by KPBL.

[3] As per consent condition 24Ab, all active burrows are required to be clearly marked so as to be visually identifiable from no less than 5m away.

[4] Egg(s) and / or chick(s)

2.0 Consent Requirements

The conditions of consent relevant to the monitoring and management of effects on kororā during marina construction activities (conditions 22, 24A and 61) are included in Appendix 1.

Under condition 22, the wharf component of the CMP "*is to ensure that construction activity in the inter-tidal area is managed in a manner that avoids or minimises adverse effects on water quality and coastal processes, avoids adverse effects on Little Blue Penguins, and incorporates opportunities to enhance Little Blue Penguin nesting, roosting and moulting habitat*".

Under condition 24A the Little Penguin Monitoring Programme must set out the programme for "*the monitoring of Little Blue Penguins (Eudyptula minor) within or adjacent to the construction area during the construction works*". Its objective is "*as far as is reasonably possible, to detect any impacts of the construction works on Little Blue Penguins at the site, and the construction programme thereafter adapted to avoid any detected impacts from construction works*".

The scope of the wharf component of the CMP as it relates to kororā is both the intertidal area and above MHWS (as that is where kororā undertake their activities on land), and for the purposes of monitoring the references in the condition to "*within or adjacent to the construction area*", "*the area*" and "*the site*" refer to the area shown on Map 1.[5]

As noted, the objective of condition 24A is to detect any "*impacts from construction works*" (as far as is reasonably possible). In that regard, wharf construction impacts could be direct (i.e., causing physical injury or disturbance to birds within the site during works on the breakwater); or indirect (i.e., non-physical, but potentially disruptive to birds within or adjacent to the construction works on the breakwater (e.g., noise, vibration, lighting)).

Condition 22(d) specifically requires construction to avoid disturbing active burrows and nests being used by breeding and nesting penguins during their breeding season. Condition 61 also requires that construction work within the penguin breeding season should "*be reduced to the greatest extent practicable*".

To ensure that these requirements are achieved in an integrated manner, this plan provides specific details around how construction activities during this phase of the construction works, which require disruption to the breakwater habitat of kororā, will be managed to avoid direct and indirect effects on kororā using the breakwater as far as is reasonably possible. Details of how the programme of works for the whole marina will be managed to achieve condition 61 are also provided.

We note that a separate Predator Control & Penguin Monitoring Plan will be prepared and submitted to Council for approval prior to the completion of construction. Included in that plan will be the details regarding ongoing (post-construction) monitoring of kororā.

[5] *Ngāti Pāoa Trust Board v Kennedy Point Boatharbour Limited* [2021] NZEnvC 097

3.0 Kororā / Little Penguin

Weighing approximately 1 kg and standing 30-40 cm tall (Photo 1), the kororā is the smallest of all the 17 penguin species (Reilly, 1994).

Photo 1: Adult kororā / little penguin.

3.1 Conservation & population status

Kororā, protected under the Wildlife Act (1953), are native to New Zealand and Australia. 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). The northern form (*Eudyptula minor iredalei*) breeds around northern New Zealand from Northland to the Waikato region on the west coast and south to Gisborne on the east coast; it is estimated that there are approximately 5,000 – 10,000 breeding pairs of this form (C. J. R. Robertson & Bell, 1984; Taylor, 2000). Robertson et al. (2017) have assigned an *At Risk – Declining* classification to the northern little penguin.

In relation to kororā populations, studies have shown that low survival rate rather than breeding success is responsible for some observed declines (Colombelli-Négrel, 2015; Dann, 1991). The species is susceptible to large mortality events at sea that occur at irregular intervals (Taylor, 2000). Taylor (2000) also notes that predation by mustelids and dogs are likely to be the main land-based threat to northern little penguins, with colonies being lost from areas where people with dogs have easy access to the coast. Feral cats may kill adult penguins and chicks, while Norway rats can potentially take eggs and small chicks at some colonies (Taylor, 2000). Other rodent species do not appear to be a threat because adult penguins closely guard eggs and chicks (Taylor, 2000).

3.2 Breeding biology & ecology

This species has a variable breeding season where onset, determined by environmental conditions and prey availability (Perriman et al., 2000; Robinson et al., 2005; Weavers, 1992), and length of the season can vary greatly annually and geographically (Davis & Renner, 2010; Nisbet & Dann, 2009). The yearly cycle of kororā comprises three overlapping stages: (1) occupation of burrows and pair formation; (2) breeding (eggs and chicks); and (3) moulting (Figure 1).

When ashore, kororā are nocturnal, typically coming ashore after dusk and leaving before dawn. Adults are present at colonies throughout the year (Figure 1), though numbers are lowest between completion of moult and start of breeding (Marchant et al., 1990). Furthermore, the presence of

birds in their burrows during the day differs according to the stage of the annual cycle. During the non-breeding and non-moulting season, birds are rarely on land during the day, though may return to land at night.

Figure 1: Indicative[6] breeding cycle cycle of kororā in the Hauraki Gulf

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Burrow occupation												
Pair bond / nest building												
Egg laying												
Chick rearing / fledging												
Moulting												

3.2.1 Breeding

The kororā breeding cycle is the shortest (17.25 weeks) of all penguins comprising a 4 week pre-egg stage, then 5.5 weeks of incubation and a 7.75 week chick period (Richdale, 1957).

In the Hauraki Gulf, egg laying (one or two eggs) generally occurs from early September to late December; however, egg laying can occur as early as July (Geurts, 2006; McKenzie, 2011; van Rensburg, 2010) (Figure 1). Once laid, eggs are incubated for an average of 37 days, with both parents taking turns to incubate while the other forages at sea; incubation shifts can last 1-10 days. Once hatched, the chicks are guarded and brooded by their parents for 2-3 weeks (guard stage) until the chicks can self-thermoregulate (Photo 2). Guard duties are again shared by both parents, usually alternating daily. During the post-guard stage, the chicks are left alone in the burrow during the day while the parents forage, returning after dark to feed the chicks. Chicks fledge on average at 55 days.

Photo 2: Kororā chicks.

Like kororā elsewhere in New Zealand, birds in the Hauraki Gulf are known to lay replacement clutches in a single season following the failure of the first clutch (Geurts, 2006; McKenzie, 2011; van Rensburg, 2010). The occurrence of replacement clutches further adds to the asynchronicity of the breeding stages at any given time of the breeding cycle.

Kororā exhibit considerable variability in regard to reproductive success rates (Table 1). A number of factors have been shown to affect kororā reproductive success, including breeding habitat (Braidwood et al., 2011; Bull, 2000a; Colombelli-Négrel, 2015; Perriman & Steen, 2000), age and

[6] Based on information in the following sources: Guerts (2006), van Rensburg (2010), McKenzie (2011) and evidence of Sue Fitchett on behalf of SKP Incorporated dated 7 November 2017.

experience of birds (Nisbet & Dann, 2009; Ramírez et al., 2021; Robinson et al., 2005), disturbance (Vertigan et al., 2012) sea surface temperature and food availability (Cullen et al., 2009; Dann et al., 2000; Geurts, 2006; Kowalczyk et al., 2014; Perriman et al., 2000). Given all these potential factors, not surprisingly it can therefore be difficult to make direct connections between cause and effects in relation to reproductive failures.

Table 1: Summary of kororā reproductive success rates at various New Zealand colonies

LOCATION	YEAR	HATCHING SUCCESS	FLEDGING SUCCESS	PRODUCTIVITY	SOURCE
Tiritiri Matangi Island, Akld	2005-06	0.37	0.28	0.11	Geurts (2006); van Rensburg (2010)
Tiritiri Matangi Island, Akld	2006-07	0.6	0.51	0.33	
Tiritiri Matangi Island, Akld	2009-10	0.51	0.07	0.04	Boyer (2010)
Tiritiri Matangi Island, Akld	2010-11	0.93	0.94	0.88	McKenzie (2011)
Tiritiri Matangi Island, Akld	2011-2012	0.84	0.78	0.66	McKenzie (2011)
Matiu-Somes Island, Wgtn	1995-97	0.51-0.63	0.81-0.85	0.41-0.54	Bull (2000a)
Motuara Island, Marlborough	1995-96	-	0.33	0.13	Renner & Davis (2001)
Oamaru, Otago	1998-99	0.61	-	-	Numata et al. (2000)
Oamaru, Otago	2008	0.74	0.91	0.67	P. Agnew, pers. comm. in Sievwright (2014)
Taiaroa Head, Otago	1992-98	0.40-0.81	0.41-0.78	0.58-0.96	Perriman & Steen (2000)
Buller, West Coast	2006-07	0.79	0.84	0.62	Heber et al. (2008)
Buller, West Coast	2008-09	0.77	0.89	0.63	Braidwood (2009)
South Westland, West Coast	2008-09	0.81	0.99	0.79	Braidwood (2009)

3.2.2 Moulting

Kororā are confined to land during the annual moult (from as early as December to April in the Hauraki Gulf; Figure 1), during which all feathers are replaced simultaneously over the period of 2-3 weeks (Photo 3) (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, 2015).

Photo 3:. Moulting adult kororā.

3.2.3 Nesting / moulting habitat

Kororā form loose colonies, with burrows[7] located several metres apart (Braidwood, 2009; Bull, 2000a; Bullen, 1997; Marker, 2016). Colonies can range in size from a few to hundreds of pairs. Kororā exhibit high levels of site fidelity, generally returning to the same landing site and nest each breeding season (Bull, 2000b; Pledger & Bullen, 1998).

Burrows are generally situated close to the sea in burrows excavated by the birds or other species, or in caves, rock crevices, under logs or in or under a variety of man-made structures including nest boxes, pipes, stacks of wood or timber, and buildings. Several studies have shown the ability for kororā to adapt their nesting behaviour to urban environments; in response to the lack of "natural" habitats, birds successfully nest in rock crevices and human-made structures, such as breakwaters, that offer protection from the weather, tidal action, predators and human disturbance (Bourne & Klomp, 2003; Giling et al., 2008). Along the coast, penguin burrows are located above mean high water spring (MHWS) to ensure that waves do not inundate the burrow and its contents.

The ability to monitor kororā activity within a burrow is in part dependent on the ability to access the "chamber", which can be located at the end of a tunnel (in some cases be >1m long). Furthermore, due to the nature of the substrate in which a burrow is located, the tunnel isn't always straight and therefore a direct line of sight into the chamber isn't always possible. For instance, the irregular nature of riprap material within a breakwater means a burrow chamber can be located several metres within the breakwater, with the "tunnel" comprising a series of interstitial spaces at different angles, thereby making it impossible to monitor even when using a burrowscope.

3.2.4 Foraging & diet

Kororā are visual feeders foraging by pursuit diving; consequently, diving is exclusively diurnal (during daytime), with a midday peak (Cannell & Cullen, 1998; Preston et al., 2008; Ropert-Coudert et al., 2003, 2006). Kororā feed on small shoaling fish, crustacea and squid.

During the breeding season, kororā are generally near shore foragers; numerous studies have found that kororā generally travel no further than 20 km from the colony while feeding chicks (Cannell, 2016; Chiaradia & Kerry, 1999; Collins et al., 1999; Hoskins et al., 2008; Klomp & Wooller, 1988; Preston et al., 2008; Weavers, 1992). However, during the non-breeding season kororā forage further afield and often have multi-day foraging trips. McCutcheon et al. (2011) found that the foraging range of little penguins was greater during the winter non-breeding period; individuals conducting single-day trips typically foraged 8–14km from the colony, whereas individuals conducting longer trips (2-49 days) foraged at maximum distances of 62–147 km from the colony. Weavers (1992) also reported longer trips during the non-breeding season (up to 710 km from the colony).

[7] For the purpose of this document, "burrow" is the generic term used to describe any crevice, hole or structure used by a kororā when on land to rest, nest or moult in.

3.3 Kennedy Point – Kororā monitoring results

In October 2016, a survey of the western end of Waiheke Island, using a certified conservation dog, estimated a minimum of 53 active penguin burrows; this included at least five burrows on the breakwater at Kennedy Point (DabChickNZ, 2016). A repeat[8] of this survey in October 2017 reported nine possible penguin burrows within the Kennedy Point breakwater (DabChickNZ, 2017).

Surveys undertaken in February and April 2021 along the Kennedy Point breakwater for the marina development (4Sight Consulting, 2021b, 2021a) identified a total of 34 locations (26 of which were detected by the same certified conservation dog which undertook the 2016 survey at which kororā were either confirmed or likely present (refer to Map 2).

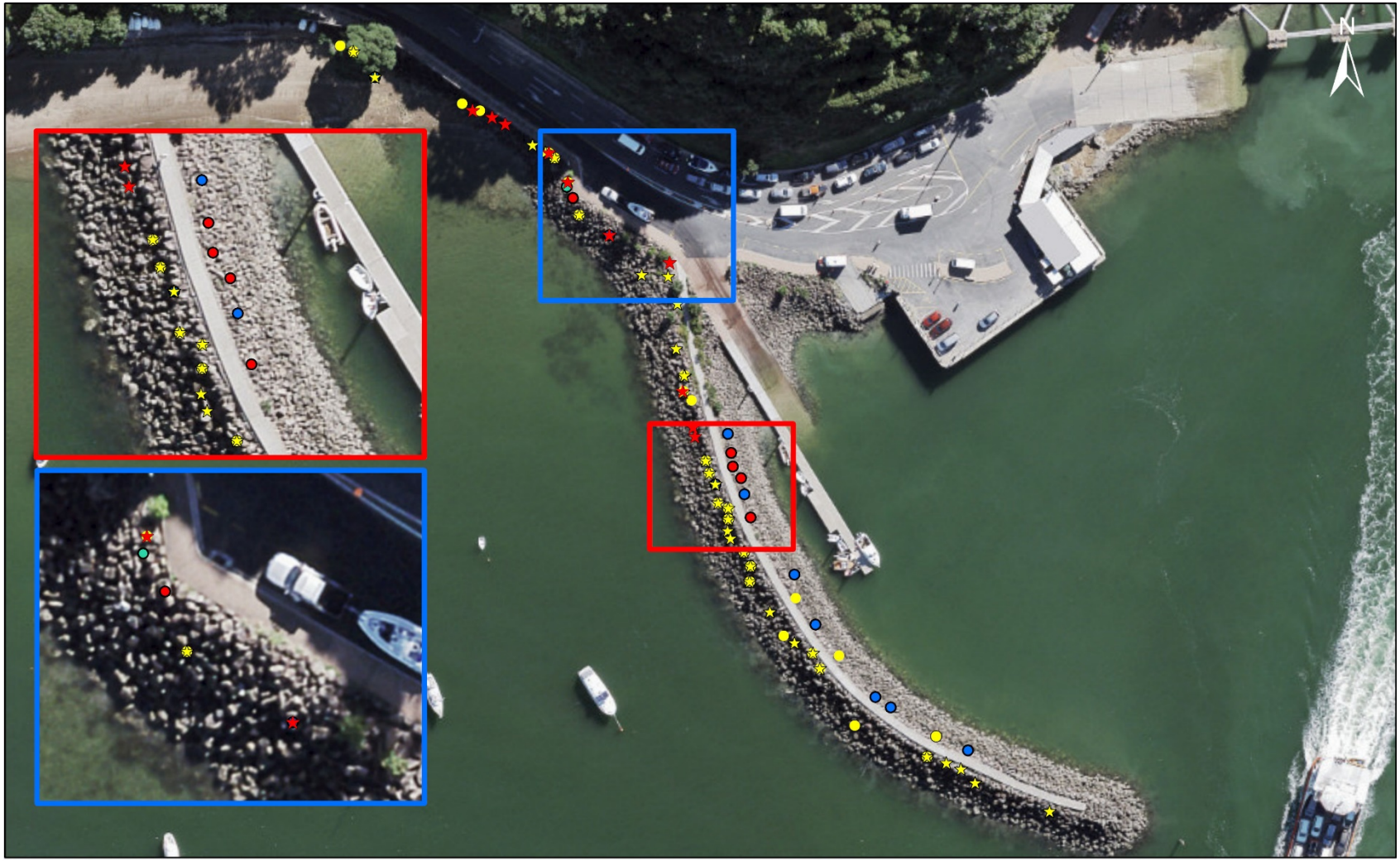
The results of the conservation dog surveys in October (2016 and 2017) and April (2021) provide a baseline estimate for the number of potential kororā inhabiting the breakwater prior to the construction of the Kennedy Point marina and will usefully inform the post-construction monitoring plan that will be prepared.

We note that based on the 2016, 2017 and 2021 surveys, it appears that the number of kororā inhabiting the Kennedy Point breakwater population has increased over the ensuing five-year period from approximately five to 34 burrows.[9] However, it is also important to note that these surveys were conducted at different times of the year and at different times of the kororā life cycle.

[8] Using the same certified conservation dog

[9] Noting that only 26 of these potential burrows were identified by conservation dog survey (4Sight Consulting, 2021a)

Map 2: Kororā detections



4.0 Marina Construction Works

4.1 Overview

Construction of the Kennedy Point Marina at Kennedy Bay, Waiheke Island involves the building of a fixed wharf to provide access from Donald Bruce Road over an existing rock armoured wall into the coastal marine area (refer to Map 3). All other components of the marina comprise floating pontoons, piers and finger jetties held in place with piles. Access from the wharf to the floating marina structures is by way of dual gangways extending from the wharf to the carpark and access pontoon.

The wharf will be constructed on-site using a mix of in-situ construction and prefabricated (off-site) components assembled on-site. All floating pontoons, piers, and finger jetties will be fabricated off-site, transported to the construction site and then piled in place. The gangways will also be fabricated off-site and then bought to site for installation.

The overall construction programme is estimated to be 24 months. Within that timeframe, the sequence of on-site works will generally be as follows: Wharf → Attenuators → Carpark Pontoons → Marina Berths & Pile Moorings → Office/Café Pontoon (refer to Map 3).

4.2 Marina wharf

4.2.1 Overview of works

The marina wharf is designed to span over the existing seawall / breakwater at Kennedy Point. The estimated area of disturbance to the breakwater rocks is approximately 5% of the breakwater in total.

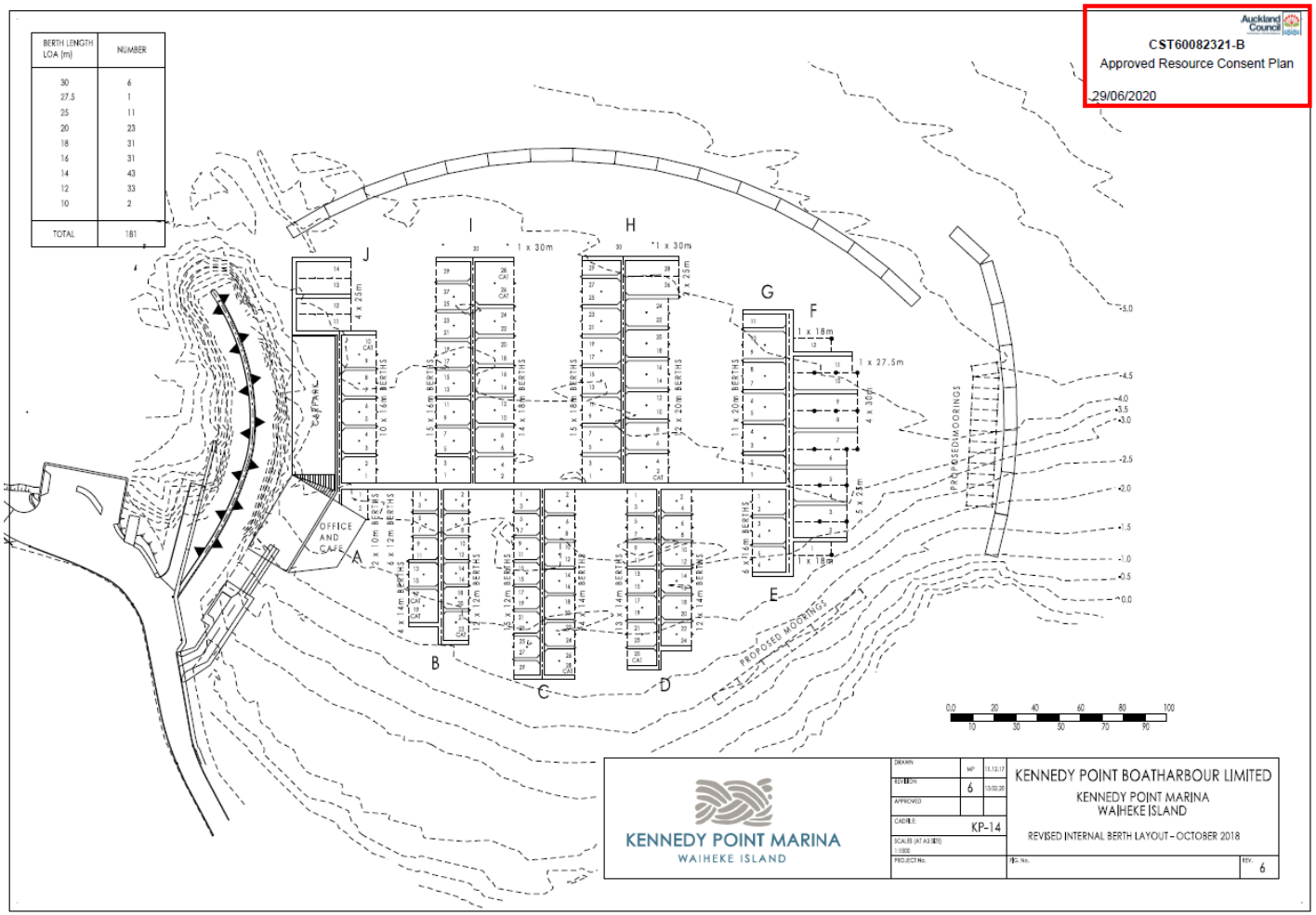
The wharf deck is supported by 24 piles in the locations shown in Map 4; all of the piles and the wharf deck itself are located within 30 m of MHWS (Map 5). Of these 24 piles, 10 require temporary disruption to the breakwater rock armouring. Table 2 itemises the work required for each of the piles and how the work will be completed.[10]

After the completion of piling the deck of the wharf is constructed. This involves the placement of precast headstocks onto each row of piles, then pre-cast panels between the headstocks. The wharf deck is then completed with an in-situ concrete pour over the pre-cast panels. All machinery involved in this process (i.e., cranes) is powered by barge mounted diesel combustion engine.

Final finishing of the wharf, involving installation of balustrades etc, will utilise standard electrically powered hand-held tools.

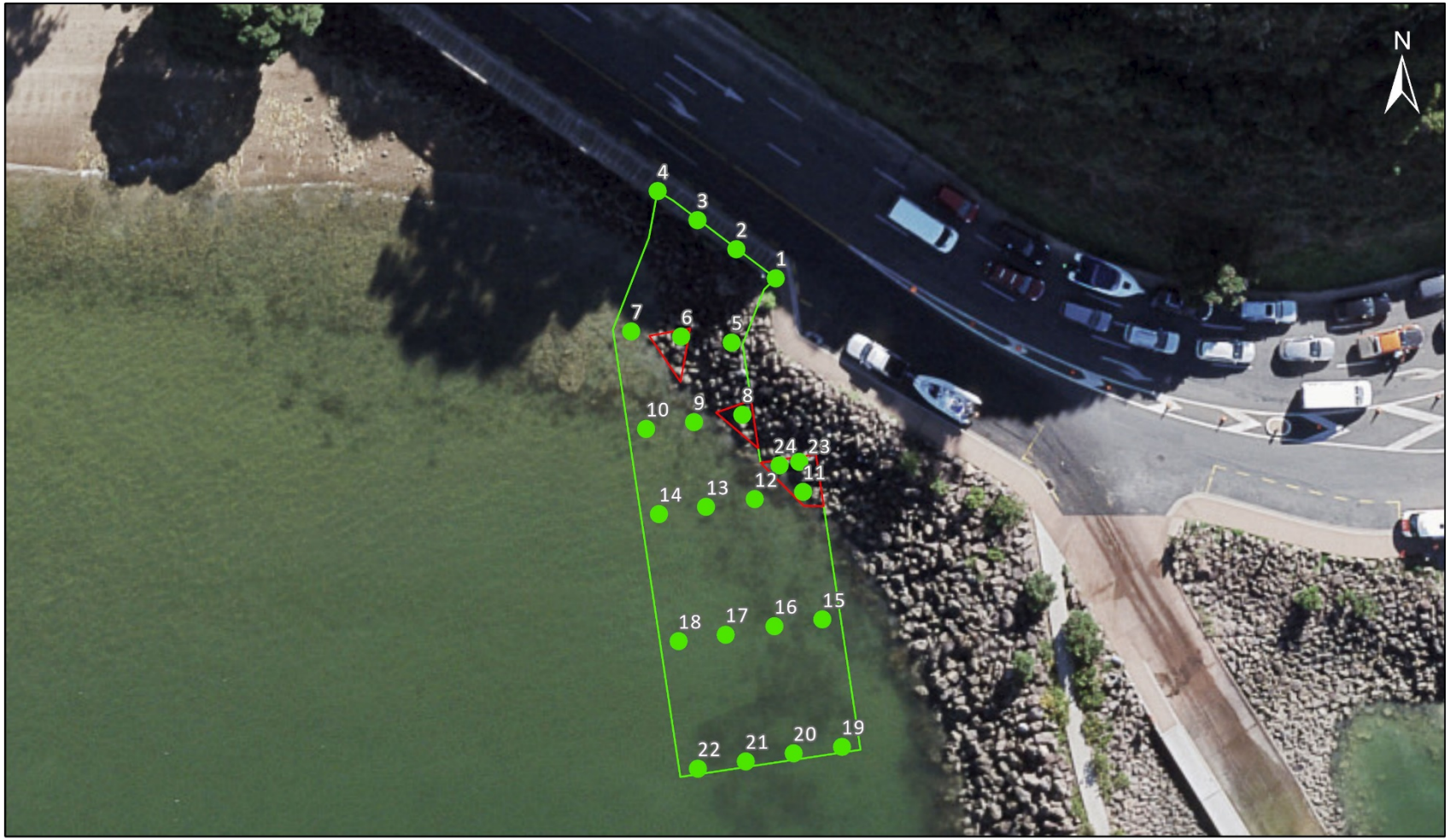
[10] Further details of these activities are provided in the Kennedy Point Marina Construction Management Plan (Kennedy Point Boatharbour Ltd, 2020).

Map 3:[11] General arrangement of Kennedy Point Marina



[11] Marina layout Plan prepared by Kennedy Point Boatharbour Limited

Map 4: Kennedy Point Marina wharf pile locations and numbers



Legend

- Pile Locations (Exact Location TBC on GPS survey)
- Rock Shifting Works - Exact Location TBC (Below MHWS)
- Proposed Wharf

Map 4: Kennedy Point Marina wharf pile locations and numbers.

0 5 10 20 30 m

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Author: CD
Approved: PW

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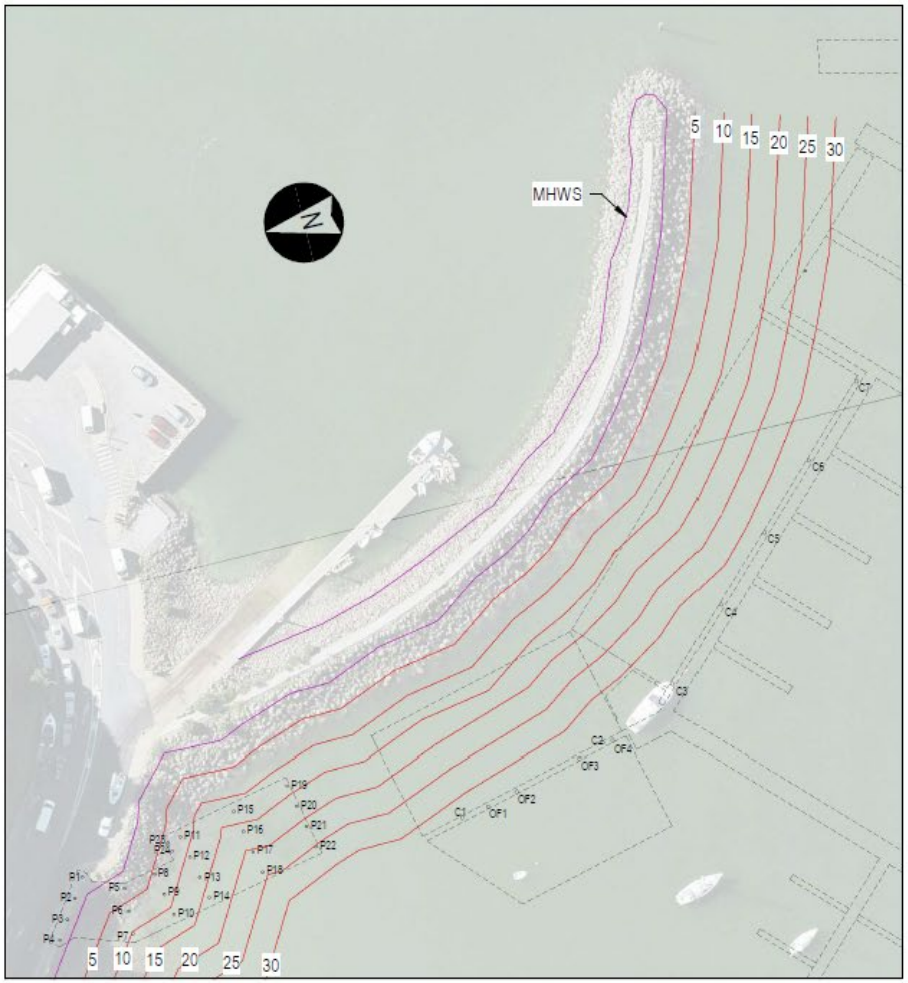
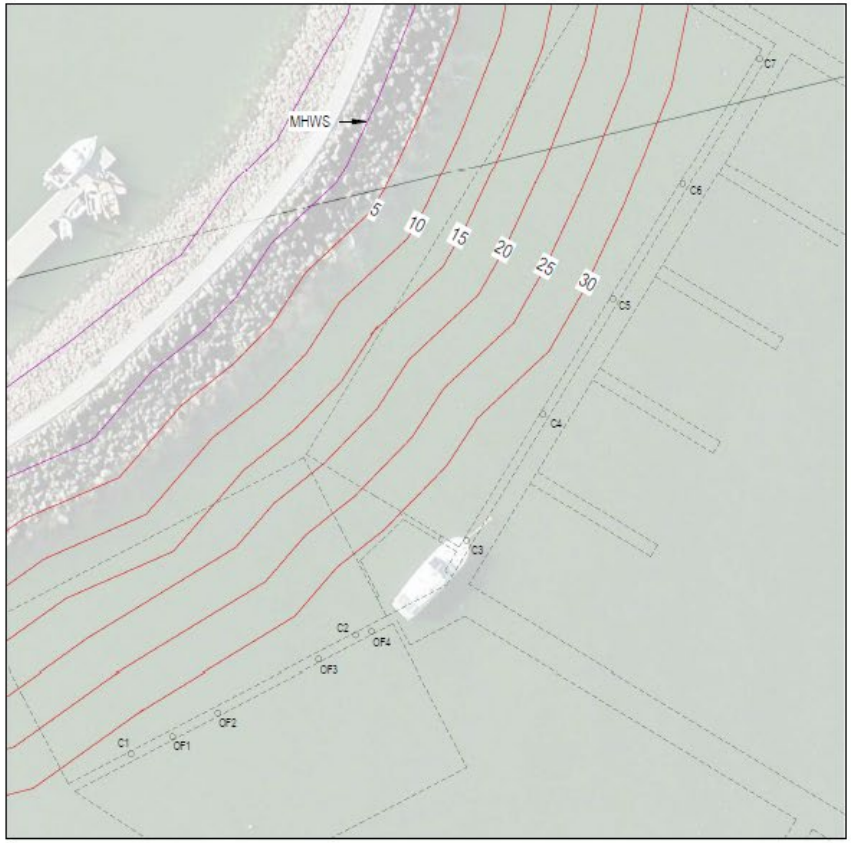
Map 5: Breakwater MHWS line offsets





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CLIENT: KENNEDY POINT MARINA WAIHEKE ISLAND

REV	DETAILS	DATE
0	ISSUED FOR REVIEW	16/07/2021
1	ISSUED FOR REVIEW	05/08/2021

PROJECT: KENNEDY POINT MARINA

SHEET DESCRIPTION: BREAKWATER MHWS LINE OFFSETS

STATUS: FOR REVIEW

DRAWN BY	APPROVED BY	SHT
MW	RB	A3
PROJECT NO.	SHEET NO.	REV
19-1014	G001	1

Table 2: Wharf Pile Construction Works Affecting Breakwater

PILE #'s (Map 4)	No OF PILES	BREAKWATER DISTURBANCE WORKS	METHOD
1 - 5	5	• Remove and stockpile rocks • Pile installation • Reinstate rocks around installed piles	Using land-based equipment (per approved CMP)
6, 8, 11	3	• Remove and stockpile rocks[12] • Pile installation • Reinstate rocks around installed pile	Using equipment located in the CMA
23, 24	2	• Remove and stockpile rocks • Pile installation • Reinstate rocks around installed piles	Using equipment either based on the partially constructed wharf deck, or located in the CMA, or from land-based equipment
7, 9, 10, 12-22	14	• Nil – all piles installed in seabed	N/A

4.2.2 Rock removal/reinstatement

As noted above, 10 piles require temporary disruption to the breakwater rock armouring (refer to Table 2 and Map 4). The method to be used to remove the rocks at each of these piles is outlined in the sections below.

Temporarily stockpiled rocks will be reinstated around the installed piles progressively as the piles are installed using the same method used to move them initially.

4.2.2.1 Piles 1 - 5

Rock removal to enable access for piles 1 to 5 (refer to Map 4) will be undertaken using a diesel-powered hydraulic excavator. Due to the location of these rocks close to or at the top of the breakwater, access for this work from a floating barge will not be possible. Instead, this work will take place from the land, following the installation of temporary ground protection and/or staging works as required (as per approved CMP methodology).

4.2.2.2 Piles 6 & 8

Rocks in the vicinity of piles 6 and 8 (refer to Map 4) were moved to allow access for piling works in June 2021 and have been stockpiled nearby (below MHWS). The rocks were removed using a diesel-powered hydraulic excavator located on a floating barge. This work proceeded under the supervision of Dr Leigh Bull who confirmed that there were no active kororā burrows with nesting or moulting birds in them prior to works (Boffa Miskell Ltd, 2021).

4.2.2.3 Pile 11

Due to the small number and size of the rocks in the vicinity of pile 11 (refer to Map 4 and Photo 4), these rocks will be shifted manually, or potentially using an underwater lift bag (Photo 5).

[12] Rock removal to allow installation of piles 6 and 8 has been completed (refer to Section 4.2.2.2).

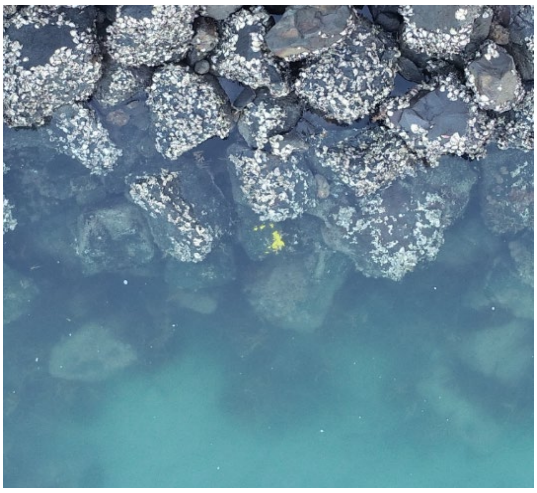

Photo 4: Rocks near P11 (yellow dot is at the edge of pile location)

Photo 5: Example of underwater lift bag

4.2.2.4 Piles 23 & 24

The rock removal methodology for these piles will be determined based on what is most practical at the time they are scheduled to be installed. If access by barge-mounted equipment is feasible, then that will be preferred. If not, and assuming it is feasible to do so, equipment located on the partially constructed wharf deck will be used. Only if neither of these options is feasible would removal using land-based equipment be undertaken (as per rock work for piles 1 to 5).

4.2.3 Wharf pile installation

The wharf piles are constructed by installing steel pile casings into the seabed, 'mucking-out' the spoil contained within the pile casing to embedment depth, cutting off the pile to design height, inserting a reinforcing steel 'cage' into the hollow pile casing and then backfilling the casing with concrete.

Two methods are available for installing the pile casings: either using a vibro-hammer head to vibrate the casing to refusal, or by drilling into the seabed to create a socket for the pile, and then inserting the pile casing into the socket. The installation time using a vibro-hammer head is between 20 to 40 minutes per pile casing, whereas the drilling method, could take up to several hours for each pile to be socketed into position.

Once the casings are installed to embedment depth, an auger attachment on the drill is used to 'muck-out' the material within the casing.

4.3 Floating attenuators

The individual pontoons making up the two floating attenuators (refer to Map 3) to be installed to create the sheltered water space for the marina piers will be manufactured off-site and then towed to the construction site. Once in position, piles to hold the attenuator pontoons in place will be installed from water-based equipment.

The closest attenuator pile to the breakwater is located approximately 38 m from MHWS; all other attenuator piles are located at >45 m distance (refer to Map 3).

4.4 Carpark pontoons

The individual pontoons making up the two separate sections of the marina's floating carpark (refer to Map 3) will be manufactured off-site and transported to the construction site and assembled. Once the assembled sections are in position, piles to hold them in place will be installed from water-based equipment.

The smaller carpark pontoon will be secured by two piles located at 32 m and 37.5 m respectively from MHWS on the breakwater (refer to Map 3). The larger carpark pontoon will be secured in place with five piles all located a minimum of 33m from MHWS on the breakwater (refer to Map 3).

4.5 Marina pontoons

The pontoons making up the marina piers and finger jetties (refer to Map 3) will be manufactured off-site and transported to the construction site. Once in position, piles to secure the pontoons in place will be installed from water-based equipment. Additional piles to define the berth pockets will then be installed.

The closest pier to the breakwater is J-Pier (refer to Map 3) and the closest pile associated with J-Pier is approximately 26 m from MHWS on the breakwater. Five other J-Pier piles are located within 30–40m of the breakwater, while the remainder of berth related piles are all >40 m distant.

Piles for pile moorings will also be installed as part of this phase of work. These piles are all located several hundred metres from the breakwater.

4.6 Office/Café Pontoon

The pontoons making up the platform for the marina office/café (refer to Map 3) will be manufactured off-site and transported to the construction site as an assembled unit. Once in position, piles to secure the assembled pontoon in place will be installed from water-based equipment. It is expected that this pontoon will arrive at site with most of the structural building elements for the office/café buildings already built. On-site building works to complete these structures will be confined to finishing works only.

The office/café pontoon will be held in place by four piles all located >35 m from MHWS on the adjacent breakwater.

5.0 Construction Management

Consent condition 22 requires *that "construction activity in the inter-tidal area is managed in a manner that avoids or minimises adverse effects on water quality and coastal processes, avoids adverse effects on Little Blue Penguins".* As such, this section describes the specific construction management measures/conditions to be adopted during marina construction works in the intertidal area to avoid adverse effects on kororā. In addition to that, it also describes specific construction management measures/conditions to be adopted during marina construction works that will occur outside of the intertidal area in order to avoid adverse effects on kororā as far as is reasonably possible. The following construction works are addressed: rock removal/reinstatement, piling and associated construction and overall programming of works to minimise activity during the kororā breeding season (as required by condition 61). A summary of the programme of works and management measures/conditions is then provided.

5.1 Rock removal/reinstatement methodology

The rock removal/reinstatement methodology is summarised above and described with specific reference to wharf piles requiring rock disturbance for installation (Section 4.2.2 and Table 2). Rock removal work is still required for piles 1 – 5, 11, 23 and 24. Rock reinstatement will also be required for those piles, as well as piles 6 and 8.

Where rocks are to be moved using machinery, the breakwater area within 20 m of the works will be surveyed for kororā on the morning of the works in accordance with the SAM method (Section 6.2.2 below) to determine if there are any Active Burrows within the survey area. The results of that survey will inform if rock movement can proceed. If any identified burrows are Active Burrows, the rock movement works will not proceed.

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 potential burrows and their surrounds within the wharf construction area 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 in the presence of a SQEP.

For rock moving above MHWS, once each rock is moved, the area will be inspected by a SQEP 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. If possible, rocks will be stored below MHWS to discourage kororā from occupying them before they are replaced onto the breakwater. However, if rocks are stored above MHWS, management measures such as those outlined in Section 5.1 would need to be implemented to ensure that kororā do not inhabit these.

If the 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. Such efforts may include:

- Remove as much rock as possible so that a bare ground surface is exposed, thereby leaving no crevices for kororā to occupy;
- Placement of material such as bidum cloth or tight mesh fabric over the area where rock movement has occurred (refer to Section 5.2); or

- Temporary fencing around the area where rock has been removed.

Where the area of rock removal 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.

5.1.1 Kororā management during mechanical rock removal

Although rock removal works will not proceed if SAM identifies Active Burrows within 20 m of the works, there is still the possibility of non-nesting or non-moulting birds being uncovered within the area of rock removal. Where this occurs, and a permit to handle them has not been obtained under the Wildlife Act 1953, the following actions will be undertaken:

- A SQEP will be present on site.
- Rocks will be lifted one at a time (as above).
- If possible, all obstructions between the kororā and the water will be removed to enable ease of access to the water.
- A distance of at least 5 m will be maintained between people and the bird.
- Works will only commence once the SQEP confirms the bird has left the works area.

Where non-breeding or non-moulting kororā are identified in a burrow that will not be directly impacted by the works, the SQEP may determine that measures to remove them from the burrow (either through active removal or passive movement[13]) to ensure they are >20 m from the works could result in greater disturbance and stress to the bird(s) than if they were to remain in the burrow. In such cases, the bird(s) will be left in the burrow and specific measures identified to minimise any indirect effects on the bird(s). Such measures may include limiting the duration of active works, implementing noise control measures (such as acoustic screens), or an alternative construction methodology with less potential disturbance to the bird(s).

5.1.2 Management where kororā handling authorised

Where a Wildlife Act Authority (**WAA**) to enable the capture, handling and relocation of non-breeding or non-moulting kororā has been obtained, it will be relied on to relocate kororā discovered within the breakwater construction footprint as far as practicable.[14] Note that breeding or moulting birds will not be captured, handled or relocated. Only a person or organisation listed in the WAA would capture, handle and relocate the penguin. Auckland Council would be notified immediately if it is necessary to catch and translocate any kororā.

A separate application has been made to the Department of Conservation (DOC) for a WAA in relation to this project. The final conditions that may be placed on that authority are therefore not known. What follows is a general description of what the WAA application has proposed for information purposes only.

Before a kororā is caught, the handler will put on a pair of gloves[15] and get a pet carrier box[16] that is lined with a towel in preparation for transporting the bird.

[13] Which may involve the removal of rocks to enable the passive movement of the bird.
[14] Note that if all efforts are exhausted and it is not physically possible to access the penguin, rocks will be carefully removed following the method outlined in Section 5.1.
[15] Gloves must be worn as the oil on a person's hands can interfere with the waterproofing of penguin feathers.
[16] Approximate dimensions: 40 cm length, 30 cm width, 35 cm height. The boxes are ventilated.

To catch a kororā that is on the surface of the breakwater, the handler will slowly and quietly approach it from behind, making sure that they are standing between the sea (the penguins escape path) and the bird. If the kororā is within the rock revetment, rocks around the bird will be carefully removed by hand if possible, or if the rocks are too large, they will be very slowly and carefully removed by an excavator under the supervision and guidance of a penguin expert (as outlined in Section 5.1).

When accessible, the penguin will be caught from behind by grasping it around its body and pinning its flippers against its sides. The penguin will be held firmly but care will be taken to not exert too much pressure otherwise it may be injured. The penguin will be held approximately 30 cm away from the handler's body (with its head facing away from the handler) so that it cannot bite the handler and it will be immediately placed into the carrier box. Only one penguin will be housed per box. To minimise stress to the penguin, the maximum amount of time a penguin will be kept in a carrier box is two hours (immediate relocation and release will be prioritised) and the box will be kept in the shade. The carrier box will be securely closed and the box will be handled carefully, ensuring that it remains upright at all times. The same handling technique will be implemented when releasing the penguin.

Data collected from all previous kororā surveys on the breakwater will be used in the first instance to identify areas within the release site (identified in Map 6) where birds have not been recorded. At those locations, the rock will be inspected by the penguin expert to determine an appropriate crevice in which to release the bird. The crevice must be above MHWS and provide a pathway for the bird to the water. Prior to releasing the bird, the crevice will be checked to ensure that it is not already occupied by other birds. If it is found to be vacant, the bird will be released into the crevice and the GPS co-ordinates of release site taken. A different crevice will be used each time, to ensure that multiple birds are not placed into the same release site on different occasions. Only in instances where two birds are being translocated from the same burrow will two birds be placed in a translocation crevice together.

If at any time a kororā is injured as part of the translocation process, DOC will be immediately contacted to receive advice on what actions to undertake.

Records of all kororā movements will be kept including: date and time found, if the bird is banded, the number of penguins moved, the handler, where they were relocated to, the time of release, and if any birds are captured more than once. This information will be entered into an excel spreadsheet.

As per condition 24A(d) (refer to Appendix 1), kororā monitoring information must be reported to the Team Leader, Compliance Monitoring. In addition, this information will be provided to DOC on request, or as required by any conditions of a WAA issued for the project.

5.2 Habitat management measures

As a precautionary measure to discourage kororā from re-entering burrows ahead of the rock-removal and pile installation works on the breakwater, an exclusion material may be placed over the wharf construction footprint outside of the kororā nesting and moulting period (refer to Figure 1). The remainder of the breakwater (outside of the construction footprint) would remain available for any kororā excluded from the construction footprint to seek refuge/rest in.

Map 6: Proposed sites for penguin translocation and nest box installation

Legend

Proposed Location for Nesting Boxes

Proposed Kororā Release Site

Map 6: Proposed sites for penguin translocation and nest box installation.

0 25 50 100 150 m

Client: Kennedy Point Boatharbour Limited
Project Code: AA1921
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Author: CD
Approved: PW

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This habitat management would involve placing material such as bidum cloth, or tight mesh fabric to block access to the potential nesting / moulting habitat within the construction footprint. This process would be supervised and directed by a SQEP and would involve securely fastening the fabric at the top, sides and bottom of the rock revetment to minimise the chances of kororā entering the area through a gap below the crevice. The material used to block access to the burrow sites must not create a strangling / suffocating risk to kororā and the integrity of the fabric needs to be checked on a daily basis to check for wear and tear (if a hole or tear is detected the material must be replaced).

5.3 Piling & associated construction

In order to assist with determining the most appropriate piling techniques to avoid adverse noise effects[17] on kororā that may be present in the breakwater during construction works, Marshall Day (2021a) predicted likely noise emissions (underwater and airborne) from the piling equipment to be used for pile installation. Marshall Day (2021b) then undertook tests on site to measure noise emissions from the drill rig and vibro hammer to verify the appropriateness of the setbacks provided in their earlier assessment and provided an updated report (Marshall Day, 2021d). This report was further clarified following peer review by Styles Group Limited (Marshall Day, 2021c)

The outcomes of Marshall Day's assessment and investigations were:

- Regarding underwater noise:
  - The ambient underwater noise levels at the proposed construction site are already close to or above the behavioural response threshold of penguins as a result of Sealink ferry and other permitted vessel movements, and natural sources including snapping shrimp;
  - Vibro piling, drilling, engine noise and movement of tracked equipment all produced underwater noise at relatively low levels. The loudest was vibro piling, which was at the behavioural response onset threshold (SNR = 10 dB) at a distance of around 100m from the pile. Other sources, including drilling and engine noise, contributed less than 10dB to the ambient noise level over the frequencies of interest at 45 m from the equipment.
- Regarding airborne noise:
  - There is no risk of temporary or permanent hearing damage from drilling or vibro-piling;
  - Both drilling and vibro driving of the closest piles (12 m) were measured to be 79 dB $L_{Aeq(1s)}$ at the breakwater, which is just below the 80 dB $L_{Aeq(1s)}$ threshold for behavioural response. Other sources such as engine noise and movement of tracked equipment were below 75 dB L_{Aeq} for the closest piles;
  - Marshall Day recommend the implementation of effective source screening for both drilling and vibro piling, which could achieve a 3–5 decibels reduction in source level.

[17] Based on the available scientific literature, Marshall Day (2021) report 80 dBA LAeq to be the behavioural response threshold for penguins. Dr Bull advised MD on the ecology of the penguin species for which relevant studies have been published in order to assist with understanding any behavioural differences that may be relevant to interpreting the results and application of the threshold to kororā.

Other sound sources on-site, such as generator, excavators and cranes, should be screened as far as practicable.

Based on these findings, Table 3 summarises the setback distances required for the 80 dB L_{Aeq} penguin response threshold not to be exceeded with respect to airborne noise.

In terms of vibrations, Marshall Day (2021c) noted that ground vibrations from vibro method were not perceptible at 12 m, and negligible / undetectable for the drilling method.

Table 3: Received airborne sound levels (dB LAeq) per piling methodology, per set-back distance (excluding barriers)

DISTANCE	VIBRO-PILING	DRILLING	ENGINE NOISE	TRACKED EQUIPMENT MOVING
10 m	81	81	78	74
15 m	77	77	74	70
20 m	75	75	72	68
25 m	73	73	70	66
30 m	71	71	68	64
40 m	68	68	65	61
50 m	66	66	63	59

A number of the piles for the marina wharf are within 10-20 m of MHWS on the breakwater. Specific measures will be employed to ensure noise from wharf piling works does not exceed the acoustic design behavioural response threshold (**BRT**) for kororā identified by Marshall Day (80dB), and does not disturb the breakwater armour rock within 20 m of an Active Burrow. This will be achieved as follows:

1) Piles 1–6, 8, 23 and 24: Not to be installed prior to 1 April 2022 and then only if SAM (Section 6.2.2 below) confirms no Active Burrows within 12 m. The best practicable option (**BPO**) shall be employed to minimise noise received at the breakwater surface during pile installation.

2) Piles 14, 16, 18, 20-22 [18] (all >15 m of MHWS on the breakwater): To be installed using the vibro hammer and drilled method, with BPO to be employed to minimise noise received at the breakwater surface during pile installation.

3) Piles 7, 9–13 and 19[19] (all <15 m MHWS on the breakwater): To be installed using the vibro hammer and drilled method, with BPO to be employed to minimise noise received at the breakwater surface during pile installation, provided that:

    (i) Noise monitoring during installation of piles 16, 18 and 22 (being the next three piles (@ >15m from MHWS) to be installed) confirms that the BRT will not be exceeded at 12 m from MHWS and vibration is minimal and Council thereafter approves installation of piles within 15m of MHWS; and

[18] Note, pile casings for pile 17 has already been installed.

[19] Note, pile casings for pile 15 has already been installed.

(ii) For those piles that are <12 m to MHWS, a pre-piling SAM (Section 6.2.2 below) confirms no Active Burrows within 12 m of the pile.

Table 4 sets out the proposed piling construction programme and the conditions on works to avoid adverse effects on kororā from wharf construction activities.

Table 4: Wharf piling construction programme and management

PILE #'s	No. OF PILES	TIMING OF WORK	ROCK REMOVAL REQUIRED	ROCK REINSTATEMENT REQUIRED	CONDITIONS ON WORK
STAGE 1 WORKS[18,19]					
11 (<15m from MHWS)	1	From June 2021 onwards	Yes	Yes	• Rock removal/reinstatement by non-mechanical means only or by mechanical means if results of SAM (Section 6.2.2) confirm no Active Burrows within 20m of works. • Only proceed if noise testing (per (3) above) confirms BRT can be met. • Only proceed if results of SAM (Section 6.2.2) confirm no Active Burrows within 12 m of works. • Pile installation to employ BPO for noise minimisation (including source and receiver attenuation).
7, 9, 10, 12, 13 and 19 (<15m from MHWS)	6		No	No	• Only proceed if noise testing (per (3) above) confirms BRT can be met. • Only proceed if results of SAM (Section 6.2.2) confirm no Active Burrows within 12 m of works. • Pile installation to employ BPO for noise minimisation (including source and receiver attenuation).
14, 16, 18, 20-22 (>15m from MHWS)	6		No	No	• Pile installation to employ BPO for noise minimisation (including source and receiver attenuation).
STAGE 2 WORKS					
1 – 6, 8, 23 & 24	9	Not before 1 April 2022 and completed before 1 July 2022	Yes	Yes	• Rock removal may only proceed if results of SAM (Section 6.2.2) confirm no Active Burrows within 20m of works and then only in accordance with the Rock Removal Methodology (Sections 4.2.2 and 5.1). • Rock removal work only to proceed if permit to handle penguins under s.53 of the Wildlife Act 1953 is held and SQEP present during rock removal. • Habitat Management Measures (Section 5.2) to be deployed under supervision of SQEP. • Pile installation by BPO to be employed for noise minimisation

PILE #'s	No. OF PILES	TIMING OF WORK	ROCK REMOVAL REQUIRED	ROCK REINSTATEMENT REQUIRED	CONDITIONS ON WORK
					(including source and receiver attenuation). SAM (Section 6.2.2) to be undertaken immediately prior to initial installation to confirm no Active Burrow within 12 m of pile. • Rock reinstatement to incorporate Local Habitat Enhancement (Section 7.0) under the supervision of SQEP. SAM (Section 6.2.2) to be undertaken immediately prior to rock reinstatement.

With respect to underwater noise, Marshall Day (2021c) recommends an underwater penguin effect zone (for behavioural response) to be a 100 m radius from the piling location, but that this could be reduced by effective underwater noise mitigation such as bubble curtaining or isolation casing. Condition 61 of the Consent limits construction activity on site to daylight hours, measured by reference to nautical dawn and dusk. Kororā not remaining on land during the day are expected to leave their burrows prior to dawn to forage for food at sea and not return until after dusk, and this is the pattern of behaviour documented at Kennedy Point since daily records commenced. As such, there is a very low risk of kororā being active in the water within the 100 m effects zone during daily construction activity.

In the event that kororā are observed within 100 m of construction works during the day, works will be paused until the animal has left the area, or has come onto land and entered a burrow, unless specific underwater noise mitigation is being used.

5.4 Water based construction works

Daily work site inspections in accordance with Section 6.2.1 shall be undertaken for the duration of all construction works and any kororā discovered or observed in the vicinity of working areas shall be recorded and reported. Although kororā are not expected to be present in the water in the bay during daytime construction activities (i.e., within the construction hours specified by condition 61), the construction and support crew will regularly inspect the area of works during the day for kororā. Any observations shall be recorded and any kororā observed shall be managed in accordance with the protocol in Section 6.2.1.

5.5 Minimising effects during breeding season

Condition 61 requires that during the kororā breeding season (identified in the consent condition as 1 July to 31 December) all water-based construction activity should be reduced to the greatest extent practicable. As it is not possible to avoid all construction activity in the water, the effects of construction activities will be kept to a minimum during this period by limiting equipment in operation, specifying the type of equipment and minimising the extent of construction activities adjacent to the breakwater as follows:

- The items of equipment to be used to construct the wharf have been kept to a minimum (1 x jack-up platform; 1 x support barge). This keeps the amount of water-based construction equipment on site to a minimum and minimises the number of movements in the area.
- The jack-up platform sits out of the water and this assists to reduce the extent of equipment at water level. The equipment in operation on the platform is also generally between 3 to 5m above the height of the rock breakwater, ensuring the noise of operating equipment is as distant from the rock wall as is possible.
- The construction programme has been sequenced so that the wharf construction stage and the installation of the floating carpark pontoons (which will be piled in place along their seaward edge approximately 32+ m from the breakwater) will not occur simultaneously.

In addition, the mussel buoys (currently used for Health & Safety reasons to demarcate the construction zone) will managed to minimise the potential obstruction of kororā movement between land (breakwater) and sea.

5.6 Ongoing expert advice

Ongoing advice and guidance will be sought from a SQEP throughout the construction phase as required. For example, mussel buoys have been installed to demarcate the water-based construction area; KBPL sought advice regarding measures to ensure that these did not impact on kororā (e.g., ensuring they were not installed over identified burrows and that the land components were higher than 40 cm, that being the average height of a kororā).

Such advice will also be sought in relation to innovative methods for construction that may further minimise impacts on kororā, or in response to monitoring information. Any proposed new methods or changes to the certified plan will be submitted for review to Auckland Council.

6.0 Kororā Construction Monitoring

6.1 Monitoring methods

There are a number of techniques to monitor for the presence of kororā in burrows in the Kennedy Point Construction Monitoring Area as shown on Map 1.

1) A **specialist conservation dog** trained to detect seabirds.
2) **Surveillance cameras** on site, with the field of view set up to cover the construction footprint on the breakwater. These cameras have been installed and are set to record 24 hours a day and the video footage can be viewed live or checked at a later date. Photo 6 below shows an image of two kororā that was captured using the surveillance cameras. This method is useful for monitoring the specific area where wharf construction works are proposed, because of the positioning of the cameras, but is unable to provide real time imaging of the full extent of the PCMA (per Map 1).
3) **Reporting** of overnight observations by security guards at the site in their daily report sheets. As part of their nightly security shifts, guards are recording observations of all kororā they see or hear on a standardised data sheet. These observations are undertaken one hour prior to sunrise and one hour after sunset. This method is useful to form a general picture of kororā activity in the breakwater (number of sightings, time, location), but has its limitations.
4) Careful placement of a **burrowscope** down the entrance of any potential or known burrow.
5) **Visual check** of the breakwater to identify the presence of any penguins or their sign (e.g., feathers or fresh guano (excrement)).

Photo 6: : Video surveillance footage capturing two penguins (red elipse) traversing the construction footprint on the breakwater immediately below burrow 27 (yellow arrow), recorded on 3/5/21 at 18:37 hrs).

6.2 Defined monitoring programmes

The area of the breakwater to be monitored for kororā during construction is shown on Map 1 (page 2). Along that area, the following three types of monitoring are proposed:

1) Daily inspections over the PCMA. Details of this monitoring are provided in Section 6.2.1 below.
2) Site Area Monitoring (**SAM**): Wharf piling area specific monitoring focussing on construction activities impacting directly on the breakwater (10 piles) (refer Table 4). Details of this monitoring are provided in Section 6.2.2 below.
3) Ongoing Breakwater Monitoring (**OBM**): Encompassing the whole of the penguin construction monitoring area (Map 1). Details of this monitoring method are provided in Section 6.2.3. below.

6.2.1 Daily inspections

During construction, at the start of each working day, the PCMA (Map 1) and adjacent water-based construction equipment will be inspected by the Site Manager (or their delegate) for stranded or trapped kororā. In the event of discovery, the following protocols shall be followed:

- All obstructions to be removed to allow re-entry to open water, or the kororā is passively guided past them. A distance of 5 m should be maintained from any bird.
- Confirm that the bird enters open water before moving away and take appropriate steps to ensure it does not try to relocate to the same spot.
- Care will be taken at all times not to cause unnecessary stress to trapped or stranded birds.
- A simple logbook will be maintained (and provided to Team Leader Monitoring on request) of daily observations and actions taken.
- The SQEP must be informed within 24 hours of the discovery.

At the end of each construction day, all potential trapping sites (e.g., holes), must be covered or closed to ensure kororā cannot become trapped during the night. If holes are too large to be covered, an escape route should be put in place This can be done by placing a wide wooden board against the side. Additionally, care must be taken to remove all obstructions from the construction site that lie between the sea and burrow sites and may prevent access to open water beyond the construction area. There should be no continuous vertical barrier of >25 cm between a burrow and the water.

Any kororā mortality observed must be reported to the local DOC office and the SQEP immediately. Notification will also be provided to the to Team Leader Monitoring. Any carcass found must be recorded and photographs taken, however it can only be handled following instructions from DOC.

6.2.2 Site Area Monitoring (SAM)

In order to determine whether there are any active burrows that may be directly or indirectly affected by physical piling works, specific Site Area Monitoring (SAM) will be undertaken in the following circumstances:

- Ahead of works to be undertaken on the breakwater to determine the presence of burrows within 20 m of the proposed works (Work Area) and their status.
- If the vibro-piling method is proposed for piles closer than 33 m to the breakwater to determine the presence of burrows within 33 m of the proposed works (Work Area) and their status.

The methods described at Section 6.1 shall be used for this monitoring. Proposed works in the Work Area will only be able to proceed if a SQEP determines that either:

1) there are no active burrows within the Work Area; or
2) there are burrows or potential burrows within the Work Area but they contain either:
   (i) kororā that are not moulting; or
   (ii) kororā with eggs that are not viable.

If an active burrow is identified, this will be clearly marked using dazzle spray (so as to be visually identifiable from no less than 5m away, as required by consent condition 24Ab). If an active burrow is identified, works cannot commence as proposed, SAM will need to be repeated in order to ensure that the status of the burrow(s) is not active before works can commence. The frequency of this repeat monitoring will be advised by the SQEP as it will be dependent on the time of the breeding season.

6.2.3 Ongoing Breakwater Monitoring (OBM)

For the duration of the construction works, ongoing monitoring of previously identified burrows in the PCMA (shown in Map 1) shall be undertaken by a SQEP using a subset of the monitoring techniques described in Section 6.1 above. Due to the difficulties in being able to observe kororā burrow contents within breakwater structures (refer to Section 3.2.3), as well as determining factors affecting reproductive success (refer to Section 3.2.1), the purpose of this monitoring will be to confirm the ongoing habitation of the breakwater by kororā during the construction phase of the marina. Should birds cease to inhabit the breakwater, particularly during the breeding season (refer to Figure 1), these changes can then be investigated relative to construction activity to determine, as far as is reasonably possible, whether marina construction activities may be the cause. Construction programme and/or methodology can then be adapted in response (refer to Section 6.2.3.1 below).

Table 5 outlines the schedule and monitoring methods for the OBM. As noted in Section 3.3, a full survey of the PCMA (per Map 1) using a specialist conservation dog was undertaken in October 2016, October 2017 and April 2021. In order, to obtain the most comparable data about kororā activity in the breakwater this survey method will be used at similar times for the duration of construction, that is, in October 2021, April 2022, October 2022 and April 2023, providing a specialist dog and handler are available to conduct the survey. [20] On current programming, construction of the marina is expected to be completed in early 2023. Future monitoring can then use these same dates to set the frequency and time of post-construction monitoring.

[20] Note that there are currently very few specialist conservation dogs trained to detect penguins in New Zealand. As such the ability to undertake this survey method is dependent upon the availability of the dog and handler.

In addition to monitoring previously recorded burrows, any new locations of kororā activity observed within the PCMA will also be recorded.

Table 5: Calendar schedule and monitoring methods for OBM during construction of the marina

MONTH	MONITORING METHODS
July	Visual inspection and use of burrowscope (Section 6.1 methods 4 & 5)
August	Visual inspection and use of burrowscope (Section 6.1 methods 4 & 5)
September	Visual inspection and use of burrowscope (Section 6.1 methods 4 & 5)
October	Conservation dog, visual inspection and use of burrowscope (Section 6.1 methods 1, 4 & 5)
November	Visual inspection and use of burrowscope (Section 6.1 methods 4 & 5)
December	Visual inspection and use of burrowscope (Section 6.1 methods 4 & 5)
January	Visual inspection and use of burrowscope (Section 6.1 methods 4 & 5)
February	Visual inspection and use of burrowscope (Section 6.1 methods 4 & 5)
March	Visual inspection and use of burrowscope (Section 6.1 methods 4 & 5)
April	Conservation dog, visual inspection and use of burrowscope (Section 6.1 methods 1, 4 & 5)
May	Visual inspection and use of burrowscope (Section 6.1 methods 4 & 5)
June	Visual inspection and use of burrowscope (Section 6.1 methods 4 & 5)

6.2.3.1 Reporting & Management Responses

OBM results will be recorded onto a device using GIS Collector during each monitoring session, and will include:

- Geographical location (GPS coordinates);
- Any sign observed (e.g. feathers and / guano);
- Burrow contents if possible to see.

All monitoring data collected should be entered into a data base with the time of the survey and its results. This data set will then be correlated with the expected life-cycle stage (refer to Figure 1) for kororā at the time of data collection. Construction activity (proximity, construction equipment used, etc), occurring adjacent to the monitoring area for the weeks prior to the survey shall also be tabulated, as well as any kororā observations recorded during Daily Inspections (Section 6.2.1) or during daily works under Section 5.4.

The purpose of OBM is to establish a data set of information about kororā activity and burrow usage in the area of interest in order to inform adaptive responses in construction programme and methodology in order to avoid any identified adverse effects of construction activities on kororā as far as is reasonably possible.

Following each OBM session, a report will be prepared which will include:

- Methodology used;
- A description, activity status, and locations of all identified burrows (including a GIS map to present spatial information of the identified burrows);
- Any detected impacts of the construction works on korora;

- Any recommended changes to the construction programme to further avoid those impacts on kororā.

As part of the OBM reporting, the combined information shall be analysed by a SQEP and any unexpected variability in the data or changes relative to previous surveys conducted at the same time that indicate likely adverse effects on kororā from adjacent construction activities identified and explained. If it is considered that any unexplained variability or changes indicate likely adverse effects due to adjacent construction activity associated with the marina, the SQEP shall make recommendations to the Site Manager as to how the construction programme and/or methodology should be adapted to address any identified adverse effects. Such recommendations may include, but not limited to:

- Changing the construction methodology or equipment (type, location, set-up).
- Further limiting daily work hours.
- Installing measures to reduce effects at the breakwater during works.
- Pausing some or all construction activities on site.

Each OBM report will be submitted to Team Leader Monitoring within two weeks of the survey session. Any recommendations on changes / improvements to the construction programme will need to be reviewed and certified Team Leader Monitoring.DOC would also be advised of any such recommendations.

7.0 Local Habitat Enhancement

Consent condition 22(e) requires artificial burrows or nest boxes for kororā to be incorporated into the reinstated rock seawall over which the wharf will be constructed.

In the first instance, the reinstatement of rocks removed from the breakwater will be undertaken in the presence of a penguin expert, who will work with the digger driver to maximise the amount of suitable nesting habitat that can be achieved within this area for kororā.

In addition, wooden nest boxes will be installed several meters apart under the board walk (refer to Photo 7 and Map 6). The nest boxes will be designed as per the DOC guidelines[21] (provided in Appendix 2) and will be constructed using treated timber. After their construction, the nest boxes will be left exposed to the elements for a minimum period of 3 months with the lids off on a diagonal to allow rain to flow over them. The boxes will be installed on soil (not concrete) to enable the birds to scrape and make their nest on this substrate (see Photo 8). It is estimated that approximately five nest boxes will be installed at the proposed location (refer to Map 6), however the final number will be determined on site to ensure suitable separation and access is achieved. It is likely that shifting of some small rocks will be required to maximise nesting opportunities. This nest box establishment work will be undertaken in the presence, and under the guidance, of a SQEP.

Photo 7: Kennedy Point breakwater showing boardwalk on the left of the photo.

[21] https://www.doc.govt.nz/globalassets/documents/conservation/native-animals/birds/nest-box-design.pdf

Photo 8: Area under boardwalk where nest boxes are proposed to be installed. Note soil substrate can be seen under the smaller rocks.

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Appendix 1: Resource Consent (R/REG/2016/4270) conditions relating to kororā

22.	**(Wharf Construction).** The wharf construction component of the CMP is to ensure that construction activity in the inter-tidal area is managed in a manner that avoids or minimises adverse effects on water quality and coastal processes, avoids adverse effects on Little Blue Penguins, and incorporates opportunities to enhance Little Blue Penguin nesting, roosting and moulting habitat. This component of the CMP shall include the following: a. A detailed description of the construction methodology including type of plant and equipment to be used; b. Measures to manage increased levels of suspended sediments or turbidity during marina construction activity; c. Details of any temporary storage of material during construction; d. Details of how any active burrows and nests in the section of existing seawall to be rebuilt as part of the connection of the wharf to Donald Bruce Road will be managed to avoid disturbing breeding and nesting penguins during their breeding season; and e. Details of how artificial burrows or nest boxes for Little Blue Penguins are to be incorporated into the reinstated rock seawall over which the wharf will be constructed. *Advice Note: Management methods for (d) above may include a detailed inspection of this section of seawall by a suitably qualified and/or experienced penguin expert prior to construction and outside the breeding season to identify any active burrows and nests.*
24A	**(Little Blue Penguin Monitoring).** This part of the CMP is to be prepared by a suitably qualified and experienced person and shall set out the programme for the monitoring of Little Blue Penguins (*Eudyptula minor*) within or adjacent to the construction area during the construction works. The monitoring programme shall provide, as a minimum, for: a. A pre-construction inspection of the area by a penguin expert (as agreed with the Team Leader) to detect active Little Blue Penguin burrows and nests; b. The clear marking (so as to be visually identifiable from no less than 5m away) of any active burrows and nests identified in the pre-construction inspection; c. Details of the monitoring of identified burrows and nests to be undertaken during construction (i.e., frequency; personnel; type of data collection); d. The reporting of monitoring information to the Team Leader. The objective of the monitoring programme is, as far as is reasonably possible, to detect any impacts of the construction works on Little Blue Penguins at the site, and the construction programme thereafter adapted to avoid any detected impacts from construction works.
61	**(Limits on Construction).** Construction work and associated noise generating activities shall only be carried out between the hours of 7:30a.m.to 6:00p.m. from Monday to Saturday, except that any driving of piles shall occur only between the hours of 8.00a.m.to 5.00p.m. Monday to Friday and Saturday 8.00a.m.to 1.00p.m, and during the breeding season of Little Blue Penguins (1 July to 31 December), all water based construction activities shall occur no earlier than 1 hour after nautical dawn and no later than 1 hour before nautical dusk. No construction work shall be undertaken on Sundays or public holidays and the construction work within the penguin breeding season will be reduced to the greatest extent practicable.

Appendix 2: DOC kororā nest box design guidelines

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

BEFORE YOU START!!!

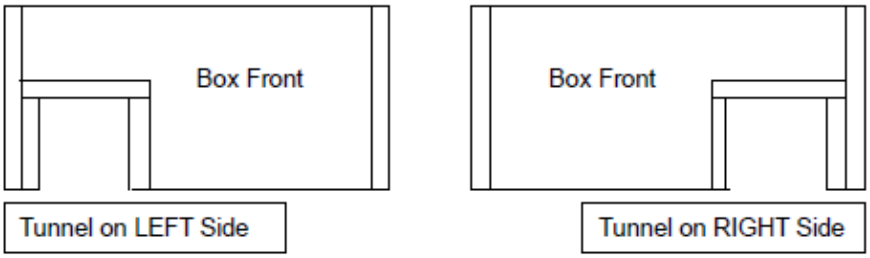
- READ these instructions CAREFULLY before you put EACH box together, and re-read them BEFORE you move to the next Step.
- Do NOT move to the next step until you have checked the one you have just completed to make sure it is correctly finished.
- Check you have these materials:
  - Box pieces (9): 1 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!!!

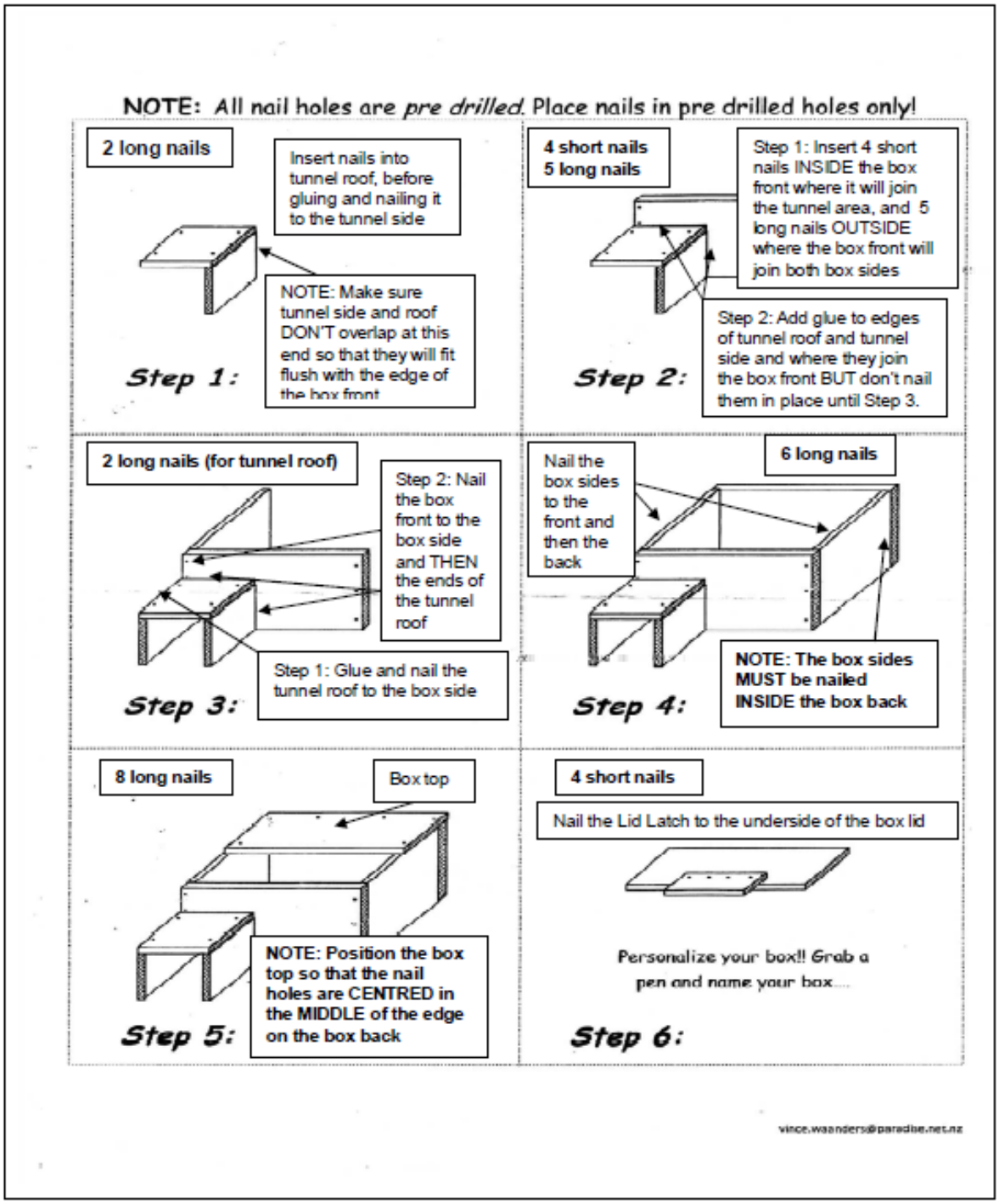
Get your box checked as soon as you finish building it
then give your box a NAME and add a SHORT story or a picture

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 in IS placed INSIDE the box. The box packs also have been set up to help achieve that requirement.

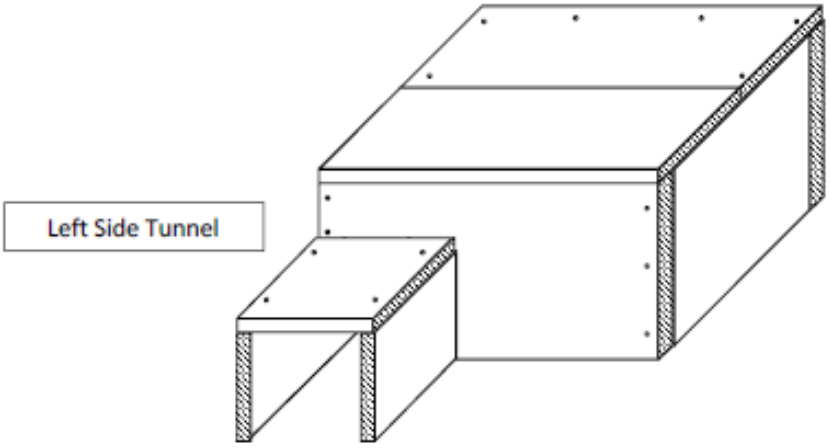
Gluing and Nailing
The Tunnel Sides and Tunnel Roof are the only parts where GLUING and NAILING is required

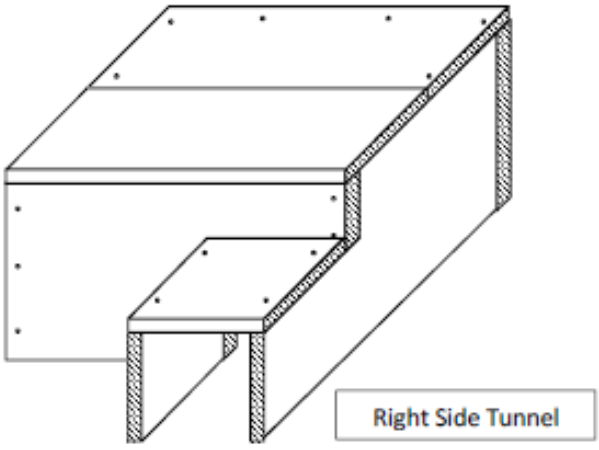



NOTE: All nail holes are pre drilled. Place nails in pre drilled holes only!
2 long nails
Insert nails into tunnel roof, before gluing and nailing it to the tunnel side
NOTE: Make sure tunnel side and roof DON'T overlap at this end so that they will fit flush with the edge of the box front
Step 1:
4 short nails
5 long nails
Step 1: Insert 4 short nails INSIDE the box front where it will join the tunnel area, and 5 long nails OUTSIDE where the box front will join both box sides
Step 2: Add glue to edges of tunnel roof and tunnel side and where they join the box front BUT don't nail them in place until Step 3.
Step 2:
2 long nails (for tunnel roof)
Step 2: Nail the box front to the box side and THEN the ends of the tunnel roof
Step 1: Glue and nail the tunnel roof to the box side
Step 3:
Nail the box sides to the front and then the back
6 long nails
NOTE: The box sides MUST be nailed INSIDE the box back
Step 4:
8 long nails
Box top
NOTE: Position the box top so that the nail holes are CENTRED in the MIDDLE of the edge on the box back
Step 5:
4 short nails
Nail the Lid Latch to the underside of the box lid
Personalize your box!! Grab a pen and name your box....
Step 6:
vince.waanders@paradise.net.nz

Little Penguin Nest Box

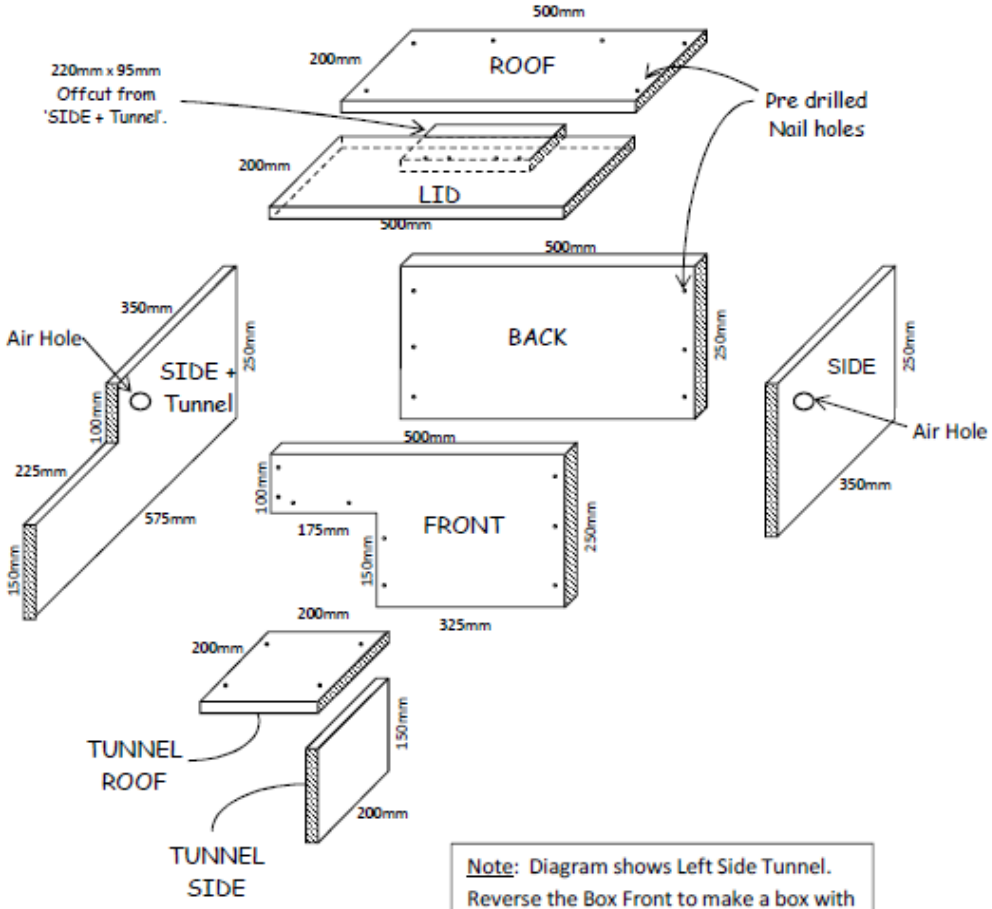
Modified design as used on Matiu/Somes Island
Modifications developed by Vince Waanders March 2011





Little Penguin Nest Box

Modified by Vince Waanders March 2011



Note: Diagram shows Left Side Tunnel. Reverse the Box Front to make a box with a Right Side Tunnel

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

TIMBER REQUIREMENTS:		
	Timber for 1 Box:	Timber for 30 boxes:
250mm x 25mm	2025mm	60.75 meters
200mm x 25mm	1300mm	39.00 meters
150mm x 25mm	220mm	06.60 meters

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)

About Boffa Miskell

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

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