BEFORE THE ENVIRONMENT COURT

AT AUCKLAND

I TE KŌTI TAIAO O AOTEAROA

KI TĀMAKI MAKAURAU

IN THE MATTER	of appeals under Clause 14 of Schedule 1 of the Resource Management Act 1991
BETWEEN	**BOONHAM** **(ENV-2021-AKL-000061)** **MANGAWHAI MATTERS INCORPORATED & OTHERS** **(ENV-2021-AKL-000062)** **Appellants**
AND	**KAIPARA DISTRICT COUNCIL** **Respondent**

STATEMENT OF EVIDENCE OF GARY NEIL BRAMLEY

(AVIFAUNA)

17 December 2021

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INTRODUCTION

Qualifications and experience

1. My name is Gary Neil Bramley.

2. I hold the degrees of Bachelor of Science (1992) and Master of Science (First Class Honours in Ecology, 1995), both from Massey University, and a Doctorate of Philosophy in Biology from the University of Waikato (1999).

3. I have worked as a consulting ecologist since 2000. Since January 2016 I have operated my own company (The Ecology Company) which is based in Kaeo, Northland. Prior to commencing self-employment, I was a Senior Consultant at Mitchell Partnerships Limited (now Mitchell Daysh Limited) between 2008 and 2016, and prior to that Senior Ecologist at NZ Environmental Limited in Kerikeri.

4. My previous work experience includes working as an ecologist, working as a tutor in Biology at Waikato Polytechnic, and as a lecturer in Biology at the University of Waikato.

5. Since 2000, the majority of my relevant work experience has been to undertake, lead or contribute to a large number of ecological investigations, significance assessments and assessments of the ecological effects of developments on coastal, forest, wetland, gumland, geothermal, farmland and subalpine areas throughout New Zealand. This has included assessments of vegetation and habitats, birds, bats and terrestrial ecological values more generally, occasionally including invertebrates and lizards, as well as freshwater values. I have been involved in a variety of development projects in New Zealand between Nightcaps in the south and Ngataki in the north, including large-scale residential subdivisions, infrastructure projects and mining projects which have included the development of biodiversity offsets.

6. These projects have included private plan changes, subdivisions and retirement villages at a range of scales and in a variety of settings, quarries, gravel extraction from rivers, gold, coal and ilmenite mines, landfills, a monorail, windfarms, solar farms, (new and re-consenting

of) hydroelectricity dams, geothermal and gas-fired power stations, public works (such as roading projects, an airport extension, cycle trail and dune stabilisation works), marine farms, extension of a wharf and a marina, redevelopment of a ferry terminal, re-consenting of a chemical factory and land use changes (such as irrigation in the McKenzie District and establishment of avocado orchards near Houhora), as well as peer review of aspects of roading projects, wind farm proposals and two seabed mining proposals.

7. I have carried out assessments of the effects of such schemes on ecological values and have developed and managed the implementation of mitigation works including riparian, wetland and terrestrial restoration projects (ranging in size from a few square metres to hundreds of hectares and from a focus on individual plants of conservation concern to direct transfer of whole habitats and reestablishment of ecological corridors at a landscape scale), as well as pest management projects (ranging in size from a few hectares to more than 19,000ha). I have also prepared management plans for landowners, community conservation groups and hapū and undertaken compliance and other ecological monitoring. My clients have included Rūnanga, hapū and community groups, landowners, developers, private and public companies, district and regional councils and central government.

8. I have prepared and presented evidence on behalf of clients in council hearings and before the Environmental Protection Agency and the Environment Court. This evidence has covered a range of development projects, plan changes and policies.

9. I am a member of the New Zealand Ecological Society, the New Zealand Plant Conservation Network, Birds New Zealand (formerly the Ornithological Society of New Zealand) and the Environment Institute of Australia and New Zealand. I completed the "Making Good Decisions" programme in 2017 and am a certified Independent Hearings Commissioner.

10. I have published or contributed to eleven peer reviewed papers and more than 250 unpublished reports prepared for a variety of clients. I have been responsible for the preparation of Assessment of

Environmental Effects documentation, management plans and Department of Conservation Concession applications among other matters.

11. In 2004 I was awarded an "Old Blue" Conservation Award by the Royal Forest and Bird Protection Society followed in 2006 by a Northland Biodiversity Enhancement Group award for contribution to the conservation of Northland's natural heritage. In 2018 I was awarded Honorary Life Membership of the Puketi Forest Trust, which manages 19,500ha of public conservation land near Okaihau in Northland.

12. I first visited the PC78 site (the "Site") at Molesworth Drive in Mangawhai on 31 August 2017 when I was first asked to assess the terrestrial ecological values of the Site and contribute to the ecological report prepared by Freshwater Solutions Limited to inform the development of the Site. I have since returned to the Site several times to undertake bird monitoring and a range of ecological field work, including three times in 2018 and four times in 2020. I have also reviewed the bird monitoring reports prepared by David Wright[1] based on monitoring visits to the Site between 28 August 2020 and 31 January 2021, and 14 July and 27 November 2021, as well as reports detailing earlier monitoring undertaken by Rebecca Bodley[2] and myself. Both Mr Wright and Ms Bodley undertook this work at the Site under my instruction. This has included bird monitoring as well as implementation and monitoring of the Avian Mitigation Plan for the Site[3]. In total there have been sixteen monitoring reports produced (two by Ms Bodley, two by me and twelve by Mr Wright). In August of 2021 Mr Wright and I also updated the pest management[4] for the Site taking into account the findings of the 2020 monitoring.

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1 Mr Wright is a self-employed ecologist whose business is called Ecology North. He lives near Whangārei and was sub-contracted to undertake the regular monitoring.

2 Rebecca Bodley is employed by Freshwater Solutions Ltd, which is described in Mr Montgomerie's evidence.

3 An Avian Mitigation Plan is required in accordance with Condition 9 of the Kaipara District Council resource consents to complete bulk earthworks at the site (RM180243).

4 Section 6 of the Avian Mitigation Plan required by Condition 9 of RM1980243 requires a predator control programme targeting stoats, hedgehogs, and rats around any identified nests be initiated if nesting birds are detected.

Code of Conduct

13. I confirm that I have read the Code of Conduct for Expert Witnesses in the Environment Court Practice Note (2014) and I agree to comply with it. In that regard, I confirm that this evidence is within my expertise, except where I state that I am relying on the evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

SCOPE OF EVIDENCE

14. My evidence:

    (a) provides an executive summary of my key conclusions;

    (b) summarises the context of the Site with respect to avifauna;

    (c) summarises potential effects on avifauna generally, and specifically the New Zealand fairy tern (tara-iti, *Sternula nereis davisae*) and New Zealand bittern (matuku, *Botaurus poiciloptilus*);

    (d) summarises the relevant aspects of Plan Change 78 ("PC78") with respect to the effects on birds due to the development enabled by PC78;

    (e) sets out an assessment of PC78 with respect to anticipated effects on birds;

    (f) briefly addresses relevant matters raised in appeals and notices from s274 parties.

EXECUTIVE SUMMARY

15. The Mangawhai Estuary is an internationally recognised site for wading birds. Particular species of note are New Zealand fairy tern/tara-iti, tara puka/black-billed gull (*Larus bulleri*), tūturiwhatu/banded dotterel (*Charadrius bicinctus*), ngutuparore/wrybill (*Anarhynchus frontalis*), and matuku/Australasian bittern.

16. The Site is located between Mangawhai Heads and Mangawhai township and is already zoned for urban development. PC78 would

increase the intensity of that development, include mixed-use development and replace the Operative Plan's "green network" with a specific "Natural Environment" sub-zone 8 for the purposes of protection and enhancement of existing natural environment features. The area proposed for urban development under PC78 area has historically been farmed and generally has had low habitat values for birds.

17. Birds recorded using the Site during fieldwork include exotic and common native species typical of rural areas as well as three threatened[5] species and up to five at risk species. Threatened species recorded include matuku/Australasian bittern (nationally critical), huahou/lesser knot (*Calidris canutus rogersi*) and tūturiwhatu/banded dotterel (both nationally vulnerable). At risk species recorded include three species considered to be declining (tara punga/red-billed gull (*Larus novaehollandiae scopulinus*), pīhoihoi/New Zealand pipit (*Anthus novaeseelandiae*) and perhaps mātātā/North Island fernbird (*Bowdleria punctatus vealeae*)) and two species considered to be recovering (tūturiwhatu-pukunui/northern New Zealand dotterel (*Charadrius obscurus aquilonius*) and torea tai/variable oystercatcher (*Haematopus unicolor*).

18. Of these species, bittern and fernbird would be restricted to the natural habitat remnants (gumland, wetland) at the Site, whilst both species of dotterel, red-billed gulls and New Zealand pipit use open habitats including rough pasture. Variable oystercatcher and huahou are usually coastal species, associated with mudflats and the shoreline respectively, but have probably visited the disturbed soils at the site to feed or rest. To date seven nesting attempts by dotterel have been recorded (one by New Zealand dotterel in 2018, three in 2020 and two in 2021 and one by banded dotterel in 2020). There has also been one nesting attempt by torea tai (in 2021).

19. Dotterels, gulls and the like have increased at the Site to take advantage of temporary food abundance since earthworks commenced.

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[5] The conservation status of birds listed in Robertson, H.A., Baird, K., Dowding, J.E., Elliott, G.P., Hitchmough, R.A., Miskelly, C.M., McArthur, N., O'Donnell, C.F.J., Sagar, P.M., Scofield, R.P.,Taylor, G.A. 2017: Conservation status of New Zealand birds, 2016. New Zealand Threat Classification Series 19 Department of Conservation, Wellington. 23 pp.

20. The most significant change with respect to bird habitats at the Site will be the change from open pasture with few trees to an urban area with buildings, gardens, roads and amenity plantings. Changes in habitat type are enabled to occur irrespective of PC78 because of the Operative zoning of the Site and the habitat preferences of the birds concerned. In general terms, small passerine birds will benefit from this change, other groups of birds will not, although the number of affected individuals is small and adverse effects at the population level are unlikely. Gulls, dotterels and stilts in particular are highly mobile and would be expected to relocate to suitable open habitats elsewhere.

21. Habitats for birds which make use of the natural habitats at the Site would not be removed. Under PC78's sub-zone 8 provisions, natural habitats will be subject to enhancement and protection which would mitigate effects for bird species using them including bittern and mātātā.

22. Accompanying the change in habitat types will be an increase in predation pressure from domestic pets and an increase in human activity. To some extent these changes would also occur irrespective of the intensity of the development, and development will not preclude those species which have traits that make them resilient to these pressures from using the developed Site. Predation and human disturbance will also affect natural habitats at the Site. Predation will be mitigated by predator control and habitat enhancement via planting and weed control. Human disturbance will be mitigated via physical separation between habitats and the developed sites and restrictions on dogs using the walkway through Wetland 3.

23. Effects on habitat quality are not expected to extend beyond the Site and birds which use Mangawhai Estuary for feeding (including fairy terns) are very unlikely to be affected, including as a result of stormwater effects relating to sedimentation and other contaminants.

24. Overall, I consider that the proposed PC78 framework will be effective at managing effects on birds brought about by the proposed development. For the reasons outlined in my evidence, PC78 will avoid adverse effects on fairy tern and other threatened or at risk avifauna

species, in accordance with Policy 11(a) of the New Zealand Coastal Policy Statement 2010 ("NZCPS").

PC78: SUMMARY

25. PC78 proposes to amend Chapter 16 of the Operative Kaipara District Plan, specifically including adjusting the pattern of development identified within the Operative Estuary Estates Structure Plan (including roads, reserves, development areas, stormwater management areas and plantings).

26. The Site is already zoned for urban (business, service, residential) and countryside living/large lot residential development. PC78 would have the following broad effects of relevance to avifauna issues when compared with the existing zoning and structure plan for the Site:

    (a) Increased intensity of residential development in the residential subzones (3A – 3D);

    (b) Different provision for mixed use (residential, retail/business) development at some locations. Uses other than residential reduce the number of pets likely to occur within an area;

    (c) Increased extent of the area zoned urban by expansion of the residential subzones into areas previously zoned Countryside Living;

    (d) Less landscape planting across the Site;

    (e) Replacement of the Operative Plan's "green network" with a specific "Natural Environment" subzone (Subzone 8) covering 29.75ha. Subzone 8 provides for protection and enhancement of the vegetation and habitats within that Subzone including native bush, wetlands, streams and coastal margin vegetation. This includes specific management of Wetland 3 and other Subzone 8 areas via ecology management plan(s), pest management and planting and enhancement as outlined in the evidence of Mr Tollemache; and

    (f) PC78 also provides for replacing the Operative Plan's proposed online stormwater management devices and deletion of the

proposed road from Wetland 3 which is included in the Operative Chapter 16.

27. Since the Council hearing, the proposal has been revised, including in response to concerns raised by the NZ Fairy Tern Trust. In particular, Mangawhai Central Ltd has amended a portion of the 3A subzone adjacent to Mangawhai Estuary to be 3B subzone instead[6]. Subzone 3B enables medium-density residential development (1 dwelling per 500m²), as opposed to 3A which enables the highest-density residential development (1 dwelling per 350m²). This is in addition to other proposed PC78 provisions relating to the interface of the proposed development with the estuary, including the 30m yard requirement relating to the Coastal Marine Area as described by Mr Tollemache.

ECOLOGICAL CONTEXT

Wider estuary/harbour

28. Tara Creek and the Hakaru River together drain the valley situated northwest of the site and located approximately between the ridges on which Tara Road (Mangawhai) and Cullen Road (Waipu Cove) and the Langsview Track (accessed near the Robert Hastie Reserve) are located. Tara Creek and Hakaru River join and enter the Mangawhai Estuary near King Road north of the Site. The area approximately north of Cames Road drains to the southern arm of the estuary. The Site drains directly to the estuary. Thus, the majority of catchment contributing water to the estuary is outside the Site and would remain unaffected by PC78.

29. Mangawhai Estuary[7] enters the Mangawhai Harbour at the southern end of Mangawhai Heads. Mangawhai Harbour is an internationally recognised site for wading birds, probably because it includes a wide variety of habitats and ecotones which provides a variety of foraging

[6] Refer to the evidence of Mr Tollemache.

[7] I have used the term 'estuary' for the shallow areas where freshwater and seawater merge, parts of which are exposed for some of the day due to tidal movement (i.e., the upper harbour and lower river mouth areas). I have used the term 'harbour' for the area of permanent water, but I note that the terms are generally used interchangeably.

and roosting opportunities in close proximity for birds.[8] Habitats present include tidal mudflats, channels, mangroves, saltmarsh and dunes as well as freshwater wetlands, gumland and shrubland on adjacent land. Particular species of note are tara-iti/New Zealand fairy tern, tara puka/black-billed gull, tūturiwhatu/banded dotterel, ngutuparore/wrybill and matuku/Australasian bittern. Of those species, tara-iti/fairy tern, matuku/bittern and tara puka/black-billed gull have the highest possible threat status of 'nationally critical' whilst ngutuparore/wrybill and tūturiwhatu/banded dotterel are regarded as 'nationally vulnerable' (the third highest threat ranking[9]).

30. Tūturiwhatu-pukunui/Northern New Zealand dotterel are also present within the wider area. Northern New Zealand dotterel have a conservation ranking of 'Recovering' and populations are considered to be conservation dependent (i.e., the species ranking is dependent on effective conservation management (such as pest control) and the taxon is likely to move to a higher threat category if current management ceases).

31. The Mangawhai area is particularly important for tara-iti/New Zealand fairy tern because there are a very small number (tens) of known individuals and Mangawhai is one of only four known regular breeding sites, all located within the lower part of the Northland isthmus (Waipū, Mangawhai, Pākiri and the South Kaipara Head (Papakānui)). A fifth site, Te Arai, also in the lower Northland area, has been used occasionally over the last decade. Mangawhai is the largest of the known breeding sites with typically between three and seven breeding pairs present. This represents approximately 60-70% of the known pairs in any given year. Mangawhai Estuary has shell banks suitable for nesting in relatively close proximity to the sheltered harbour where their prey fish (predominantly gobies, but also elvers, flounder, whitebait and other small fish) are available in sufficient quantities to support egg production and to ensure chicks are fed post fledging. Fairy terns defend exclusive feeding territories which occupy most of Mangawhai Harbour and estuary. If any fairy tern pair is disturbed it will

[8] I note that the Mangawhai Harbour, including the estuary adjacent to the Site, is identified as a "Significant Bird Area" in the Proposed Northland Regional Plan.

relocate within that foraging territory, although territorial boundaries do change over time.

32. Tara-iti occur in New Zealand, Australia and New Caledonia with separate subspecies at each location. The New Zealand population is our most threatened bird and the population is threatened by introduced predators and disturbance or encroachment by humans.

33. Tara-iti nest on exposed sand spits clear of vegetation and large debris, and where shell accumulates above spring high tides. They forage in adjacent estuaries or a short distance out to sea. Immediately post-breeding, east coast birds are known to forage over Slipper and Spectacle Lakes (inland from Te Arai Point) and regularly roost at the Te Arai Stream-mouth. Birds of all ages frequent sheltered estuaries and harbours between Whangarei and Auckland, but mainly the Kaipara Harbour, where autumn and winter flocks can number 20-30 birds[10].

34. Fairy tern have not been recorded in the estuary/Tara Creek adjoining the Site during our surveys, although any low flying birds would probably be screened by vegetation near the estuary margins when looking from the Site. I would expect that fairy tern and similar birds have used the estuary and adjacent areas for foraging, at least in the past, and if they do not do so now, would do so in future if numbers recover and conditions allow.

35. The estuary is also important for migratory species such as turnstones (*Arenaria interpres*), huahou/lesser knots and kuaka/godwits (*Limmosa lapponica*) which feed on the mudflats during the austral summer before returning north to Alaska, Russia and Siberia to breed.

36. A range of other notable species of bird of conservation concern have been recorded in the vicinity of the Site by volunteer and professional ornithologists who have deposited their records with EBird.org, including eleven threatened species and twelve species thought to be either declining or recovering as shown in Table 1. Mātātā/North Island fernbird were recorded within the gumland at the Site in 1995 during

[10] Pulham, G.; Wilson, D. 2013 [updated 2017]. Fairy tern. In Miskelly, C.M. (ed.) New Zealand Birds Online www.nzbirdsonline.org.nz

the Protected Natural Area Programme surveys[11], but have not been recorded recently. They may still be present, but probably in only low or very low numbers.

Table 1: Notable bird species recorded within 7km of 83 Molesworth Drive, Mangawhai within the EBird.org database.

Threatened Species	
Nationally critical	Fairy tern (*Sternula nereis davisae*), grey duck (*Anas superciliosa*), black-billed gull (*Larus bulleri*), Australasian bittern (*Botaurus poiciloptilus*), kōtuku (white heron, *Ardea modesta*)
Nationally endangered	Pacific reef heron (*Egretta sacra*)
Nationally vulnerable	Banded dotterel (*Charadrius bicinctus*), Caspian tern (*Hydroprogne caspia*), wrybill (*Anarhyncus frontalis*), lesser knot (*Calidris canutus*), flesh-footed shearwater (*Puffinus carneipes*)
At risk species	
Declining	Red-billed gull (*Larus novaehollandiae*), bar-tailed godwit (*Limosa lapponica*), South Island pied oystercatcher (*Haematopus finschi*), New Zealand pipit (*Anthus novaeseelandiae*), white-fronted tern (*Sterna striata*), little blue penguin (*Eudyptula minor*), banded rail (*Gallirallus philipensis*)
Recovering	Variable oystercatcher (*Haematopus unicolor*), New Zealand dotterel (*Charadrius obscurus*), pied shag (*Phalacrocorax varius*), New Zealand dabchick (*Poliocephalus rufopectus*), brown teal (*Anas chlorotis*)

37. EBird.org is a free, open-source database maintained by the Cornell Laboratory of Ornithology which stores observations, photos and recordings of birds from anywhere in the world. Anyone with a user account can enter an observation in the eBird database electronically,

[11] Goldwater, N., Graham, P., Holland, W., Beadel, S., Martin, T., Myers, S. 2012. Natural areas of Rodney Ecological District (Northland Conservancy). Reconnaissance survey report for the Protected Natural Areas Programme. Published by the Department of Conservation, Whangarei.

but any unusual observations, such as rare species or unusually high numbers of birds, are automatically flagged and reviewed by knowledgeable local volunteers before being made publicly available. Some historical data have been added. Users include amateur ornithologists and professional researchers. Users can request data relating to species or locations and this is typically used for research, management and conservation purposes.

PC78 Site context

38. Threatened species seen at the Site during the field work include matuku/Australasian bittern, tūturiwhatu/banded dotterel and huahou/lesser knot. At Risk species seen at the Site during the field work include tūturiwhatu pukunui/northern New Zealand dotterel, pīhoihoi/New Zealand pipit, torea tai/variable oystercatcher and tara punga/red-billed gull.

39. A pair of New Zealand dotterel attempted to nest in the open pasture habitats of the Site in 2018 and more nesting attempts were made in 2020 and 2021 (the area was not monitored in 2019). The known breeding attempts at the Site are summarised in Table 2. Dotterel egg laying at the Site appears to commence in early October and birds have usually left the Site by January. Two stoats have been caught at the Site during 2021 so far.

Table 2: Summary of breeding attempts by birds of conservation interest at the Mangawhai Central Site 2018 – 2021.

Species	Year	Number of nests (eggs)	Duration	Outcome
New Zealand dotterel	2018	1 (3)	2 weeks	Nest failed (possibly due to disturbance due to grazing)
New Zealand dotterel	2020	3 (one nest with three eggs and two nests unknown)	One nest 2 weeks, and two nests unknown	Nests failed (one abandoned, others

				possibly due to predators)
Banded dotterel	2020	1 nest (3)	unknown	Failed (possibly due to predators)
New Zealand dotterel	2021	2 (3+3)	30 days, two weeks	3 chicks hatched, 1 alive late November. One nest failed (possibly due to avian predator)
Variable oystercatcher	2021	1 (3)	Ongoing (2 eggs)	1 egg disappeared late November.

40. The largest group of New Zealand dotterel recorded at the PC78 Site to date has been approximately 20. With respect to dotterel (both species), since 2018 there has typically been six to nine pairs of dotterel present at the Site at the start of the breeding season, at least one of which has attempted to breed at the Site. There has also been at least one pair of variable oystercatchers present each year. In addition, a pair of red-billed gulls may have tried to nest at the Site in 2021 (although they normally breed in large colonies).

41. No New Zealand fairy tern have been recorded within the Site itself. This is not surprising since the Site does not provide nesting or feeding habitat for fairy terns. However, as I have outlined in paragraph 34 above, I would expect fairy terns to have used the adjoining estuary for feeding. This is confirmed by Ball et al. (2021[12]) who mapped feeding territories during the 2020-2021 breeding season and recorded the bird with the band combination Nil-pGM as using the estuary area immediately either side of the bridge on Molesworth Drive, including

[12] Ball, J., Courtenay, S., and Wyles, A. 2021. Monitoring and Management of the New Zealand Fairy Tern (*Sternula nereis davisae*) and other shorebirds at Mangawhai for the 2020-2021 breeding season. Unpublished report published by the Department of Conservation, Whangārei.

the area east of the Site. I note Beauchamp[13] considered that the "Molesworth Arm" of the estuary was not used by fairy tern, indicating that perhaps this area was used for the first time in 2020-2021. Eight tara-iti feeding territories were recorded in 2020-2021.

POTENTIAL AVIFAUNA EFFECTS ASSOCIATED WITH PC78

42. With respect to avifauna, the biggest change to occur as a result of PC78 is the change from the remaining farmland, which provides habitat for predominantly exotic and common native species which prefer or opportunistically use open spaces or exotic vegetation, to a built environment, which provides habitat in the form of buildings, garden shrubs and trees and amenity planting. These types of built habitat are also favoured by predominantly exotic and common native species, but exclude species such as white-faced heron (*Egretta novaehollandiae*), New Zealand pipit and the like, which prefer open pasture for feeding, and species such as pied stilt and dotterel which will use open pasture on occasion. The change from a lower intensity development to a higher intensity one per se (as between the residential aspects of the Operative Chapter 16 versus the residential aspects of PC78) makes little practical difference to the effect, because the open space habitats will be lost at almost any residential intensity.

43. Development would permanently remove habitat for species which use open pasture such as New Zealand pipit, spur-winged plover (*Vanellus miles*), white-faced heron, pūkeko (*Porphyrio melanotus*), dotterels and pied stilts (*Himantopus himantopus*) and replace it with habitat for birds that use urban environments such as, for example, house sparrow (*Passer domesticus*), waxeye (*Zosterops lateralis*), grey warbler (*Gerygone igata*), chaffinch (*Fringella coelobs*) and perhaps tūi (*Prosthemadera novaeseelandiae*) and kūkupa (New Zealand pigeon, *Hemiphaga novaeseelandiae*). Some (generally introduced) birds, such as mynas (*Acridotheres tristis*) and starlings (*Sturnus vulgaris*) do well in both types of habitat. Red-billed and black-billed gulls would also likely continue to use the Site if developed in accordance with

[13] Statement of evidence of Dr A.J. Beauchamp on behalf of the Director General of Conservation Before the Independent Hearing Panel appointed by the Northland Regional Council under the Resource Management Act 1991 in the matter of an application for coastal permits to: Place, use and occupy space in the coastal marine area with a wharf facility inclusive of a wharf, a building, a gangway, pontoon and piles (APP.040213.01.01); and Disturb the foreshore in the coastal marine area during the construction of the wharf facility (APP.040213.02.01) by the Mangawhai Historic Wharf Trust. 11 September 2020.

PC78, provided there are food sources available there for them. Pūkeko and white-faced heron would continue to use the natural habitats retained at the site.

44. With respect to domestic pets, the threshold for detectable effects is very low (one animal can kill hundreds of vulnerable birds), and the increase in pets brought about by PC78 is unlikely to affect bird populations significantly beyond the existing situation or the planned situation in the Operative Plan because the area is already zoned for a high number of residences (and therefore most likely a high number of pets). In fact, the PC78 area is likely already subject to visitation by domestic pets at present and I have observed dog walkers using the Site. As a result, the Site is already subject to predation pressure from these pets and other feral animals as evidenced by the outcomes recorded at monitored nests which I have set out in Table 2. The type of birds that use urban and peri-urban environments are those which are best-adapted to deal with predation pressure (i.e., those with short life spans, high reproductive rates and breeding and other behaviours which minimise exposure to predation). These species are also comparatively tolerant of human disturbance.

45. Other relevant potential avifauna effects associated with PC78 include stormwater effects from construction and ongoing urban stormwater discharges.

46. I address below in more detail the key potential effects of PC78 on avifauna, including with respect to Fairy Tern (tara-iti) which is the focus of the s274 notice from the New Zealand Fairy Tern Charitable Trust.

Effects of construction on resident birds

47. The main activity of relevance to avifauna during construction of the Site is earthworks. Earthworks have the potential to mobilise sediment, with effects on water/habitat quality (which I address in my evidence below), and create noise and mechanical and human disturbance (which I address in this section of my evidence). They also often attract birds for feeding as I discuss in paragraph 58. District Council resource

consents allowing bulk earthworks[14], including Erosion and Sediment Control Management Plan requirements, have been granted for the Site and earthworks – and other consented development works – are currently occurring[15].

48. In order to protect birds from the effects of mechanical and human disturbance associated with earthworks, an Avian Mitigation Plan has been implemented at the Site since prior to the commencement of earthworks[16]. This Avian Mitigation Plan was prepared by Rebecca Bodley and myself based on similar management plans which have been implemented by Waka Kotahi NZ Transport Agency. These plans are recognised as industry best practice for managing effects on birds. The Avian Mitigation Plan for the Site includes regular survey (biweekly from 1 August until the onset of breeding or 14 September (whichever is earliest) followed by weekly from the onset of breeding until 31 January) of the Site and provides for any nesting birds to be protected via a fence to exclude people and machinery from within 50m as well as predator control in the form of trapping and bait stations. All staff at the Site are required to alert Site managers to any signs of potential nesting activity. If a nest is discovered during the Site monitoring walkover the following actions are implemented:

    (a) Minimise time spent by people near the nest to reduce the potential to attract rats and stoats via human smell;

    (b) Establish a safe 'no go' zone within approximately 50m of the nest using tape and markers;

    (c) If it is the first nest discovered, the appropriate supervisor is alerted to initiate a predator control plan immediately;

    (d) If a predator control program is in place, it is adapted to ensure baited traps are located just outside the 'no go' zone; and

    (e) After discovery, the area is monitored as part of weekly visits in order to assist in estimating the timing of fledging and maintain

[14] Kaipara District Council consent number RM180243.

[15] Regional Council bulk earthworks consents were also granted in November 2017 (AUT.039619.02.01 and AUT.039619.03.01) and August 2020 (AUT.042034.01.01-3).

[16] See condition 9 of RM180243.

the ‘no go’ zone until the after the chicks have fledged (typically approximately 4–8 weeks from when they hatched).

49. There are no provisions in the Mitigation Plan to manage avian predators at the Site (pūkeko, harriers (*Circus approximans*), gulls and the like), because such management would be impractical and, in some cases, unlawful.

50. As set out in Table 2, during 2018, when the area was being farmed and before earthworks were undertaken at the Site and the Avian Mitigation Plan protocols were being implemented, one pair of New Zealand dotterel attempted to nest at the Site, but the attempt was abandoned after cattle grazed the paddock where the nest was located and may have destroyed the eggs.

51. During 2020 nesting attempts recorded were unsuccessful, mostly due to predation. As a result, Mr Wright and I reviewed the Avian Mitigation Plan, which included starting predator control earlier, poisoning of rabbits to reduce alternative prey for stoats and wider coverage of the Site. So far in 2021 there has been one New Zealand dotterel nest which hatched three chicks, although only one of those chicks is still alive and it has not yet fledged. In my opinion the requirements of the Avian Mitigation Plan have been implemented since 2020.

52. With respect to the 2020 nesting failures, in the case of one of the New Zealand dotterel nesting attempts, it failed early on, most likely due to predation (perhaps by birds), despite predator control being in place. The banded dotterel attempt failed in late October/early November (after approximately two weeks of incubation). The cause of failure remains unknown, although it is likely to be predation because the eggs disappeared. After my Site visit on 22 October 2020 I recommended that the predator control be modified to better suit the position of the second nest and this was done immediately. I consider that the failure of these two nests is not a failure of the Avian Mitigation Plan, but an indication of the difficulty these birds face when nesting on the ground in areas with mammalian and other predators. I note that the number of dotterel chicks seen in areas being managed for fairy tern is also very low given the management effort in place.

53. I am of the opinion that the actions set out in the Avian Mitigation Plan are appropriate to protect birds, including nesting birds, using the Site during construction. Having witnessed the Mitigation Plan in operation I can confirm that it is being implemented as intended and that the construction team are aware of their responsibilities and have been proactive and responsive in reporting and protecting birds at the Site.

54. With respect to the land subject to the bulk earthworks consents, I am of the opinion that the effects of construction on birds can be avoided, remedied or mitigated (as required) by the consents as long as the Avian Mitigation Plan continues to be implemented effectively. I also consider that with respect to any future areas potentially subject to earthworks under PC78, adverse effects on birds can be appropriately avoided, remedied or mitigated (as required) through appropriate consent conditions and implementation of the same (or similar) management in accordance with an Avian Mitigation Plan.

Effects of urban development on birds

55. In my opinion, the main effect of the proposed PC78 development on birds is the permanent removal of habitat and its replacement with housing and other urban development. As described in paragraphs 43 and 44 above, the density of housing per se makes very little difference to the level of that effect, except that more houses bring more domestic pets and potentially more human activity within the natural areas of the Site, which are matters I return to from Paragraph 62 below.

56. The density of development can affect the amount of garden and amenity planting, which can reduce the available habitat for birds which use rural and urban areas, but this will be mitigated in this instance by the pest control intended for the natural areas of the Site (sub-zone 8), which will benefit those birds which are restricted to those habitats, and any generalists which also use them.

57. During the initial surveys of the Site in 2018, when it was still farmed, a number of species were recorded using the area (particularly the large flat and poorly drained pasture adjoining Molesworth Drive referred to as the "bowl").[17] Species recorded included New Zealand

[17] Refer to the evidence of Mr Munro.

pipit, pied stilt, white-faced heron, pūkeko and mallard (*Anas platyrhynchos*). Dotterel were not recorded during the first visits, but during the 2018 breeding season one pair of New Zealand dotterels were recorded which subsequently attempted to nest. The outcome of that nest is described in Paragraph 50 above.

58. Since the Site earthworks commenced, the number of birds using the Site has increased, particularly the number of pied stilts, dotterel (of both species) and red-billed gulls. These birds are responding to the freshly exposed soil which provides easily accessible earthworms and other food items in large numbers. Similar behaviour is observed when a farmer ploughs a paddock to sow a crop and such birds come, follow the tractor and gorge on invertebrates. The fact that these birds are using the Site to feed does not mean they are reliant (even seasonally) on it, although the Site will have formed part of the foraging and/or breeding range for a small number of individual birds. As the area becomes vegetated (prior to the construction of houses and other urban development), I expect that the number of birds present will decline as the birds move away to other, more productive, habitats elsewhere for feeding.

59. Once houses and other development is established, the number of such birds using the Site will decline further as the habitat becomes unsuitable and common native and exotic species typical of rural and urban areas will come to dominate. This permanent loss of open pasture habitat will occur at almost any residential density and is not affected by the proposed increase in intensity brought about by PC78 (compared with the Operative District Plan), as I have described in Paragraphs 43 and 44 above.

60. The potential for actions on Site to manage these effects is limited, but the number of birds affected is low (based on the pre-construction surveys) and for that reason effects at the population level would be negligible.

61. For birds that use the shrubland, gumland or wetlands at the Site for foraging and/or breeding, those habitats are separated from the construction works and will be protected and enhanced as part of PC78. Under PC78 these habitats would be managed to improve their

ecological value. Effects on those species would be avoided and I would expect to see an increase in the number of those birds (particularly mātātā if still present).

Effects of residential pets

62. Cats and dogs kept as residential pets are predators of native wildlife. Cats include both lizards and birds in their diet, as well as native invertebrates; whilst dogs, particularly unrestrained dogs, pose more of a threat to birds.

63. The Site is already zoned for urban development (including residential), and it is located between the township of Mangawhai and the Mangawhai Heads settlement, neither of which are pet free. The ranging of domestic pets, particularly cats and dogs that are not restricted to their yard or (in the case of dogs) kept on a leash, is such that the area is likely to already be subject to visitation by domestic pets from outside the Site and this would likely continue, even if any PC78 subdivision was made pet free.

64. The management of pets in residential subdivisions to protect birds is difficult. I have been involved in a number of "pet free" subdivisions, particularly in the Far North District, mainly intended to protect North Island brown kiwi (*Apteryx mantelli*). My experience with these subdivisions is that they have not worked as intended, particularly after the “first generation” of new homeowners, and work best when they are at a small scale (less than about six or eight lots) and there is a local "champion" for protection of kiwi who buys one of the lots and is prepared to police the consent conditions on the Council's behalf. I do not consider that pet free conditions would be likely to work as intended in the context of PC78 or Estuary Estates in the event PC78 is not approved.

65. Where I have seen the best protection of birds at a community scale is where the community has adopted a "pest free" or "predator free" stance. For example, in Picton, a group known as "Picton Dawn Chorus" has worked over many years to reduce the impact of pests in the township and surrounds. I have undertaken shore bird surveys in the wider Picton/Waikawa/Shakespeare Bay area which suggest they have been very effective.

66. Predator Free Miramar works similarly to restore bird life within the Miramar peninsula in Wellington. These groups are voluntary not-for-profits based in the community who have been effective at engaging with the wider community and recruiting them to the predator free cause.

67. At a landscape scale, Reconnecting Northland instigated the Kiwi Coast which is achieving similar outcomes for kiwi protection in Northland, now funded by the Northland Regional Council and coordinated by full-time staff.

68. I am aware that Shorebirds Trust has funding to develop a plan for a predator free buffer zone on public and private land from Mangawhai to Pākiri North and undertake baseline pest monitoring.

69. My point is that given its location and setting, actions within the Site to reduce the effects of domestic pets on birds would likely be very limited in their effectiveness and would need to be supported by the majority of the wider community (residents and visitors). In my experience, if such actions are not supported by the wider community, it is unlikely to directly benefit birds. I consider that the collaborative community approach I expect Shorebirds Trust will adopt across the landscape is more likely to be successful than conditions banning pets imposed on the Site. I also consider that pest and predator measures, as are proposed as part of PC78,[18] are more likely to achieve benefits for birds when implemented effectively.

70. Notwithstanding the above, I note that PC78 provides for a Remedial Management Plan relating to the existing Gumdigger's Track and Wetland 3/the manuka gumland,[19] which is intended to address a range of matters, including measures restricting or prohibiting the presence of dogs.[20] I consider this is an appropriate practical measure in the context of the use of the Gumdigger's Track, which will mitigate effects to some degree. The Gumdigger's Track is largely within Wetland 3 and/or adjacent to the estuary, both of which are important bird habitats. I consider that measures restricting or prohibiting dogs

[18] PC78 provisions relating to pest control include: 16.6.8.1 (Natural Environment Sub Zone 8 description); 16.7.5.1 a); 16.10.8.1 j) (ecology management plan); 16.10.8.2 i) (ecology management plan).

[19] PC78 16.7.5.

[20] PC78 16.7.5. 1 (d).

could include appropriate signage and perhaps a bylaw. Signage could form part of an Avian Management Plan for the Site.

New Zealand Fairy Tern Charitable Trust s274 notice

71. The New Zealand Fairy Tern Charitable Trust ('The Trust') is a s274 party. In summary, the Trust s274 notice states that it is interested in the following matters:

    (a) The proposed development being located close to the Mangawhai Harbour. The Trust is concerned that PC78's location risks long term adverse effects on the ecology of the harbour and downstream consequences for the feeding areas of New Zealand fairy tern.

    (b) Stormwater treatment. The Trust considers that a lack of adequate stormwater treatment could lead to deteriorating water quality within the estuary, including increased sedimentation of the harbour which could adversely affect the New Zealand fairy tern's ability to forage successfully there.

    (c) The accompanying increase in human population and use of the harbour. The Trust is concerned that this will put further pressure on New Zealand fairy tern habitat.

72. The Trust wishes to protect the harbour/estuary environment as a food source, and "training ground" for young birds.

73. I address issues raised in the Trust's s274 notice in more detail below.

Stormwater Treatment

74. Since development at the Site would be physically separated from the Tara Creek arm of the Mangawhai Estuary (including by Wetland 3 (the gumland) and other vegetation and/or land including the esplanade reserve, the proposed 30m yard setback and Molesworth Drive), the main way in which the estuary habitat could be affected during and after construction is via effects on water quality, i.e., discharge of sediment, contaminants or litter.

75. With respect to stormwater management and potential avifauna effects, a high standard of engineering and management will be important in disposal of stormwater. Any stormwater discharge will have to comply with the conditions of the Kaipara District Council's network discharge consent for discharges to the Mangawhai Harbour which include limits on contaminants, scour (sediment) and heavy metals.

76. The evidence of Mr Van de Munckhof and Mr Dufty sets out the approach to stormwater management and how contaminants (including sediment) will be managed and controlled. The evidence of Dr Kelly in relation to coastal habitats, and Dr Neal and Mr Montgomerie with respect to the freshwater habitats, describes the likely effects of the proposal on these receiving environments. I do not address these matters in detail, but summarise the key points in relation to water quality and quantity as they apply to tara-iti.

77. Mr Van de Munckhof's evidence is that the PC78 stormwater provisions and the Stormwater Management Plan for the Site align with best practice and provide a framework for appropriate stormwater management based on:

    (a) Management at source to reduce runoff and contaminants. This includes on-site retention, re-use of stormwater and use of infiltration devices to reduce peak flows and increase soakage on the developed parts of the site;

    (b) Stormwater treatment. This includes a "treatment train" approach using a variety of methods; and

    (c) Where possible, opportunities for infiltration approaches and groundwater recharge and enhancement of base flows to streams.

78. Overall, Mr Van de Munckhof and Dr Kelly conclude that PC78's proposed approach to stormwater management at the Site is consistent with current best practice and is appropriate: it considers the overall environmental context and seeks to minimise the potential effects associated with stormwater discharges through application of water sensitive design which considers the overall catchment and

integrated effects (this includes seeking to maintain peak flows and provide stormwater treatment to minimise discharges of contaminants). My experience at other coastal sites, such as at William Sanders retirement village, which is located on the edge of Ngataringa Bay at Narrow Neck (Devonport) in Auckland[21], is that where best practice is employed and actively managed, significant sediment discharges to marine environments can be avoided.

Preventing mobilisation of sediment and discharge of contaminants

79. Stormwater from the developed sites will pass through the engineered treatment train and/or a filter of natural vegetation cover before exiting from the natural wetlands to the estuary. This will filter sediment and residues and minimise nutrient and contaminant loadings in water entering the estuary. A similar approach is proposed at Fulton Hogan Land Development's Drury East site for which the receiving environment is the Manukau Harbour[22]. The Manukau Harbour is a site of international significance for wading birds which informed my assessment of the effects of that proposal.

80. As outlined in Mr Van de Munckhof's evidence, treatment of stormwater includes the use of vegetated swales and rain gardens for roadways and parking areas. This "treatment train" approach would ensure any residual effects due to contaminants are managed before the water is discharged from the Site.

81. Mr Montgomerie concludes in his evidence that, with the proposed stormwater management, PC78 is unlikely to result in any adverse ecological effects associated with altered water quality or hydrology within Wetland 3. Dr Neale also concludes that with PC78's proposed water sensitive design approach to stormwater management, together with the proposed re-vegetation, PC78 is unlikely to result in any negative stormwater related effects on the other streams or wetlands within the Site.

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21 Ngataringa Bay is recognized as a Significant Ecological Area (Marine), in in the Auckland Unitary Plan – Operative in Part. This designation is because of its importance as habitat for wading birds.

22 I have been the ecologist advising Fulton Hogan Land Development Limited and have worked with Woods and Partners in relation to stormwater management, stream retention and protection of riparian areas across that site.

82. Mr Van de Munckhof identifies the potential contaminants as being most likely to come from trafficable areas and include oil and grease, suspended solids and brake and tyre residues which contain a variety of environmentally toxic components including heavy metals and organic compounds. Dr Kelly identifies the potentially toxic chemical contaminants found in stormwater discharges, including heavy metals, particularly copper and zinc, and the range of other metals, non-metallic, microbiological and organic (i.e., natural or synthetic carbon-based compounds) contaminants which may also be present in stormwater runoff. Dr Kelly concludes that effects of diffuse stormwater contaminants arising from PC78 are likely to be localised and minor (possibly negligible).

83. Plastic litter causes a range of adverse ecological effects. Plastics injure and kill sea and shore birds through ingestion and entanglement. In addition, toxic additives which are used in the manufacture of some plastics, and organic contaminants which become concentrated on plastics, may also adversely affect birds. Mr. Dufty describes in his evidence methods for capturing and reducing litter from the high-generation areas at the Site, and PC78 includes several provisions addressing litter management.[23]

84. I have described above relevant conclusions in the evidence of Mr Dufty, Mr Van de Munckhof, Mr Montgomerie, Dr Neale and Dr Kelly regarding stormwater management and potential ecological effects from stormwater. On the basis of their evidence, and given the proposed retention/management of natural watercourses on the Site, including riparian planting and weed control (which is expected to improve water quality within them, particularly in comparison to when the property was farmed and livestock had access to these areas) and the best practice approach taken to stormwater management, I do not anticipate any adverse effects on aquatic and marine habitats to the extent that the bird fauna would be adversely affected.

85. Provided that best practice stormwater measures (including sediment and erosion control methods) continue to be employed, as is provided

[23] PC78 16.7.4.1 c) v); and 16.9.3.2.1 c).

for and required in PC78, I consider that the effects of sediment and contaminants on birds using the estuary would be negligible.

Water Supply to the Estuary

86. Water from the Site currently enters the estuary via baseflows or surface runoff. Important factors that will influence the quality of the water entering the estuary post-construction of the development enabled by PC78 include:[24]

    (a) Stormwater management (including the use of water sensitive design for stormwater); and

    (b) The level of vegetation cover and particularly the amount and quality of natural habitats on the riparian margins of the estuary and the watercourses that flow to the estuary.

87. In relation to water quantity, the site forms only a small part of the catchment which supplies the Mangawhai Estuary as I have discussed in paragraph 28.

88. There will be an increase in impervious surfaces at the Site. Mr Van de Munckhof has concluded that as a result of that increase there is likely to be an increase in the total volume discharged to Wetland 3 (the gumland wetland). Mr Montgomerie has recommended (and PC78 includes provisions for) monitoring of water quality and quantity in Wetland 3 because of its potential sensitivity. PC78 includes provision for a stormwater management plan for the catchments of Wetlands 1, 2 and 3, including to address the best practicable option to maintain surface flow hydrology.[25]

89. The catchments supplying the wetlands at the site are relatively small. The stormwater management approach provides for a degree of recharge to groundwater and infiltration will still occur within the natural habitats (which cover approximately 29.75ha) of the Site. Combined with management to maintain surface flow hydrology and the relatively small proportion of the catchment which is affected, I consider it is

[24] Refer to the evidence of Mr Van de Munckhof.
[25] PC78 16.10.8.2 ee) (see also 16.10.8.1 ee)).

unlikely that the water supply to the estuary would be affected to such a degree that avifauna are adversely affected.

Human interference

90. Human disturbance will presumably increase in proportion to the intensity of the proposed PC78 development, however it will be limited by physical separation of the proposed development from the upper part of the estuary nearest the Site. As shown on the PC78 Structure Plan map, the proposed urban development areas are separated from the estuary by a range of features, including Wetland 3, and the existing walking track and vegetation. A 30m building yard requirement also applies to the coastal marine area.[26] As shown on the Structure Plan Map, PC78 also proposes a 10m widening of the existing Tara Creek esplanade reserve to provide for proposed planting between the coastline and the existing walking track, and for the walking track to be relocated further inland. As outlined above, MCL has also recently amended PC78, including to respond to concerns raised by the Fairy Tern Trust, to change a portion of the 3A sub-zone adjacent to the estuary to the less intensive sub-sone 3B.[27]

91. Most birds will habituate to human disturbance that is not threatening, although habituation is highly species and individual specific with some birds (or species) tolerating a high degree of disturbance, and others not tolerating any. The policy direction of the national strategies is to maintain or enhance public walking access to the coastal marine area (e.g., Policy 19 (1) and (2) of the NZCPS), although Policy 19(3) recognises that access should be limited under certain circumstances including to protect threatened indigenous species.

92. The only threatened indigenous species likely to be nesting in the natural areas within or adjoining the Site (the esplanade reserve and/or coastal marine area) currently is the matuku/Australasian bittern (although fernbird may be present). Since bittern are likely to either escape human attention or move elsewhere if the disturbance bothers them, I remain unconvinced that excluding people is required (if that were possible), however the provision of education (e.g., signboards)

[26] PC78 16.8.2-1.
[27] Refer to the evidence of Mr Tollemache.

about the ecological values of the natural areas could be beneficial in raising the profile of the species present and contributing to public support for achieving effective protection.[28]

New Zealand Bittern

93. Submitters at the Council hearing specifically raised the matter of Australasian bittern. Bittern are known to use the Site, and one was seen there by Freshwater Solutions Ltd staff on 14 September 2020 during the dewatering of the farm pond.[29] At that time the water level was quite low (due to dewatering) and resident eels were concentrated within the remaining water. The bittern was able to take advantage of that for foraging.

94. Australasian bittern are secretive birds that live in dense wetlands and seldom draw attention to themselves. They occur throughout New Zealand, as well as parts of Australia and New Caledonia. They are occasionally seen feeding in flooded paddocks near cover, but such sightings are unusual. They are presumed to range over wide distances to forage because they are often found in very small wetland remnants which would be unlikely to provide for their dietary needs alone, and indeed radio-tracking studies in Hawkes Bay showed that birds made use of a network of wetlands within a 15km radius, although the maximum movement recorded by bittern in New Zealand is 140km[30].

95. In my opinion, bittern are most unlikely to have used the former pasture areas of the Site, and will not be using those areas that have now been highly disturbed. They will likely be restricting their activity to the gumland area (Wetland 3) and parts of the other wetlands at the Site, where the habitat is dense enough to provide the cover they seek. As such they are very unlikely to be affected by construction activities since the activities are taking place outside their habitat. Habituation, even by shy species, is likely, particularly when the noises are reasonably distant. The proposed enhancement and riparian planting

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28 Such initiatives could potentially be implemented (at least in part) as part of the Gumdigger's Remedial Management Plan outlined above (PC78 16.7.5).

29 I have reviewed video footage of that sighting.

30 Williams, E. 2013 [updated 2018]. Australasian bittern. In Miskelly, C.M. (ed.). New Zealand Birds Online. www.nzbirdsonline.org.nz

around the retained wetlands on the site would likely enhance the habitats for bittern.

New Zealand Fairy Tern (Tara-iti)

96. Tara-iti spend much of the winter on the Kaipara Harbour and then return to their breeding grounds (including Mangawhai) from August to February/March each year. Since they feed on the wing and nest on Mangawhai Spit approximately 2.5km west of the Site and separated by the open water of the estuary, the main risks to tara-iti from PC78 concerns effects on water quality in Mangawhai Harbour arising from any increase in mobilisation of sediment associated with the development at the Site, any ongoing discharge of sediment or contaminants once the development is completed, and any disturbance arising from the Site which might affect their feeding. Increased sediment would decrease habitat quality and food availability for birds feeding in the estuary, and contaminants may be toxic (or accumulate to toxic levels) such that survival or productivity is reduced. Disturbance affecting feeding would reduce their ability to successfully rear chicks.

97. Tara-iti have a conservation status of Threatened (nationally critical) and meet criteria A(1) which is that the population has fewer than 250 individuals (either naturally or not). Their status has the qualifiers RR, CD and St, i.e., range restricted (they occur over a restricted area), conservation dependent (their status is expected to worsen if active management ceases), and stable (the population is thought to be stable).

98. The qualifier "stable" is perhaps misleading because the population has been small for a prolonged length of time (since at least the 1980s). As such it is particularly prone to chance events and inbreeding depression may also be an issue, although this has not yet been quantified. Population modelling based on productivity and age-specific survival estimates by Ferreira et al. (2005[31]) predicted that the population should increase at c.1.5% per annum as a result of consistent management instigated at all the known breeding sites in

[31] Ferreira, S.M., Hansen, K.M., Parrish, G.R., Pierce, R.J., Pulham, G.A. and Taylor, S. 2005. Conservation of the Endangered New Zealand Fairy Tern. Biological Conservation 125: 345-354.

1991. The results predicted by the model are not supported by the observation of an approximately stable resident population. Ferreira et al. considered that this difference could be explained by the movement of individuals out of the area, but no banded New Zealand birds have ever been recorded elsewhere.

99. As described above, the Mangawhai Sandspit and Harbour is an important breeding site for tara-iti. Six pairs nested on the Mangawhai sandspit in the 2020-21 breeding season, fledging only two chicks from eleven nests[32]. During that season one pair nested at Pākiri (fledging one chick[33]) and one at Waipū[34] as well as two pairs (including the same female, but different males) at Papakānui[35]. The productivity at Mangawhai has the potential to affect the breeding performance of the entire population because such a high proportion of the birds breed there.

100. Female tara-iti are provisioned (fed) by their male in order to put on weight in preparation for laying. This takes place in feeding territories in the harbour and estuaries adjacent to breeding sites. Most pairs will lay 2 egg clutches where conditions permit and if early nests fail, will often attempt to re-nest. Three nesting attempts in a year have been recorded, but only if previous attempts have failed.

101. Males and pairs defend the feeding sites from other fairy terns and use them when females are putting on condition for laying eggs, for rearing the young and when the young first fledge (leave the nest site).

102. The Department of Conservation employs at least one ranger at each known breeding site for the majority of the breeding season each year and nests are monitored and intensively managed with the outcomes being recorded. Management takes the form of predator control (including avian predators such as harriers and Southern black backed gulls (*Larus dominicanus*)), creation of shell banks via importing shell

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32 Ball et al. 2021.

33 Hunt, A. 2021. Monitoring and Management of the New Zealand fairy tern/Tara iti (*Sternula nereis davisae*) and other shorebirds at Pākiri for the 2020 – 2021 Breeding Season. Unpublished report by the Department of Conservation, Whangārei.

34 Hartley, N. and Wiles, A. 2021. Monitoring and Management of the New Zealand fairy tern/tara iti (*Sternula nereis davisae*) and other shorebirds at Pākiri for the 2020 – 2021 Breeding Season. Unpublished report by the Department of Conservation, Whangārei.

35 Neilsen, J and Williams, D. 2021. Monitoring and Management of the New Zealand fairy tern/Tara iti (*Sternula nereis davisae*) and other shorebirds at Papakānui for the 2020 – 2021 Breeding Season. Unpublished report by the Department of Conservation, Whangārei.

from elsewhere, egg removal, candling, incubation and replacement or relocation (e.g., prior to a predicted bad weather event), provision of sandbags to reduce flooding and sand inundation and provision of chick shelters. In the past it has also included supplementary feeding at some locations in some years.

103. Given their conservation status, Policy 11(a) of the NZCPS applies to tara-iti. Policy 11(a) requires avoidance of adverse effects on threatened and at risk taxa. Given that they do not nest at the Site (nor are they likely to have in the past because of the type of habitats present), and do not feed extensively on land, the potential for fairy terns to be adversely affected by the PC78 proposal, except indirectly via adverse effects on aquatic and marine habitat quality, is very limited. I have discussed indirect effects on habitat quality in paragraphs 74 – 89 above, and also address these matters above in response to issues raised in the s274 notice of the New Zealand Fairy Tern Charitable Trust.

104. In summary, although tara-iti represent a very high ecological value, I consider that given their habits, adverse effects on them would be very unlikely to occur. In the context of Policy 11 of the NZCPS I consider that adverse effects on tara-iti would be avoided.[36]

Summary

105. The avifauna ecological values of Mangawhai Harbour are very high, and as such, high levels of stormwater and sediment management are required to ensure those values are sustained. In my opinion, and based on the evidence of the relevant experts, the engineering and other solutions proposed will be sufficient to maintain water quality and avoid adverse effects on feeding or habitat use by tara-iti. Given other actions proposed, such as separation between the estuary and the developed areas and effective implementation of the ecological enhancements proposed (such as riparian planting and pest control), I consider that the proposed PC78 framework will be effective at

[36] With respect to the NZCPS more generally, in my opinion PC78 will also avoid significant adverse effects and avoid, remedy or mitigate other adverse effects of activities on the matters listed in NZCPS Policy 11(b) (as they relate to avifauna).

managing effects on birds brought about by the proposed development.

GARY NEIL BRAMLEY
The Ecology Company Limited

17 December 2021