BEFORE THE ENVIRONMENT COURT **ENV-2016-AKL-000118**

AT AUCKLAND

I MUA I TE KOOTI TAIAO

I TĀMAKI MAKAURAU ROHE

IN THE MATTER	of the Resource Management Act 1991 (RMA or the Act)
AND	
IN THE MATTER	of an appeal pursuant to Clause 14 of the First Schedule to the RMA
BETWEEN	**Northern Land Property Limited**
	Appellant
AND	**Thames-Coromandel District Council**
	Respondent

STATEMENT OF EVIDENCE OF LEIGH SANDRA BULL ON BEHALF OF NORTHERN LAND PROPERTY LIMITED

(ECOLOGY)

ATKINS | HOLM | MAJUREY

Helen Atkins/Rowan Ashton
PO Box 1585
Shortland Street
AUCKLAND 1140

Solicitor on the record	Helen Atkins	Helen.Atkins@ahmlaw.nz	(09) 304 0421
Contact solicitor	Rowan Ashton	Rowan.Ashton@ahmlaw.nz	(09) 304 0425

INTRODUCTION

Qualifications and experience

1. My name is **DR LEIGH SANDRA BULL**, and I am a Senior Ecologist / Associate Partner at Boffa Miskell Limited (**BML**), a national firm of consulting planners, ecologists and landscape architects.

2. I hold the qualifications of Bachelor of Science (Zoology), Masters of Science with Honours (Ecology) and Doctor of Philosophy (Ecology). I am a Certified Environmental Practitioner (**CEnvP**) Ecology Specialist with the Environment Institute of Australia and New Zealand (**EIANZ**) and a member of the New Zealand Ornithological Society.

3. I have over 15 years of experience working (not including 11 years studying) in the field of ecology, during which time I have held positions at the Department of Conservation (**DOC**), Université Paris Sud XI and as a consultant ecologist.

4. During my time at DOC I worked in the Biodiversity Recovery Unit (**BRU**) as a Species Protection Officer and later as a Senior Technical Support Officer in the Marine Conservation Unit. Now disbanded, BRU was a national unit within DOC which focused solely on the recovery of New Zealand's threatened species and habitats. During my time in BRU I was a co-author of the New Zealand threat classification list (2007[1]), a role which contributed significantly to broadening my knowledge of New Zealand's native biota. Also while working in BRU I was involved in the review and production of a number of threatened species recovery plans.

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[1] Hitchmough, R., Bull, L.S., Cromarty, P. (2007). New Zealand Threat Classification System lists-2005. ***DOC stand-alone publication*** 236. Department of Conservation, Wellington. 194p.

5. I have conducted ecological surveys and monitoring of a variety of ecosystems in New Zealand (mainland, offshore and sub-antarctic islands), New Caledonia, Tonga and France; especially in regards to coastal environments.

6. Since 2008, I have been the lead-ecologist on a long-term coastal project (Te Arai, north of Auckland) which is situated adjacent to several areas of very high conservation value.

7. As part of resource consent requirements for the Te Arai project, I authored the Te Arai – Tara-Iti Comprehensive Site Management Plan (**CSMP**) which provides for the management of the land within the Te Arai North precinct, which, in effect, operates as a structure plan. The purpose of the CSMP is to manage the use and development of the rural residential sites and balance area to ensure, over the site as a whole, the protection and enhancement of archaeological, landscape and amenity values, ecological values including indigenous biota, soil conservation and reinstatement of sustainable native cover having regard to biota habitat requirements. Since 2014, the management techniques outlined in that CSMP have been implemented successfully on the Te Arai North precinct site.

8. I also have experience in assessing the biotic attributes of natural character studies, having worked on the Wellington – Hutt Coastal Natural Character assessment for Greater Wellington Regional Council, Wellington City Council and Hutt City Council. The study team for that project comprised landscape planners (BML), terrestrial ecologist (myself) and marine scientists (NIWA).

9. I have appeared as an expert witness before Council hearings, Environment Court hearings, Board of Inquiry hearings and at a Decision-Making Committee hearing for marine consents associated with Exclusive Economic Zone and Continental Shelf (Environmental Effects) Act 2012.

Expert Witness Code of Conduct

10. I have been provided with a copy of the Code of Conduct for Expert Witnesses contained in the Environment Court's Practice Note dated 1 December 2014. I have read and agree to comply with that Code. This evidence is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

11. As a CEnvP, I am also bound by the EIANZ's code of ethics.

Involvement in project

12. My involvement in Te Punga Station for Northern Land Property Limited dates back to 2014 and has included:

    (a) Conservation Lots (2014): Preparation of a report for the ecological certification of the proposed revegetation strategy for the conservation lots following the relevant provisions (Rules 752.4.1.2 and 752.4.2) of the Thames Coromandel District Plan.

    (b) 5 Lot subdivision (2014): Ecological review of the Landscape Management Plan prepared as a condition of consent RMA20010030 for a 5 Lot subdivision at Te Punga Station.

    (c) Thames Coromandel District Council (**TCDC**) District Plan appeals relating to the Natural Character overlay (2017): Attended expert conferencing and site visit with relevant parties.

    (d) Te Punga Structure Plan (**Structure Plan**) (2018): Prepared a report outlining the ecological values and constraints identified on the site to inform the Te Punga Structure Plan (attached in Appendix 1).

13. I am familiar with the Te Punga Structure Plan site, having visited it on multiple occasions for the purpose of ecological investigations associated with the above.

14. As part of the Te Punga Station Structure Plan process, I have participated in two ecology expert conferencing sessions (4 December and 7 December 2018) to assist the parties at mediation, and attended the Environment Court mediation (10 December 2018).

Purpose and scope of evidence

15. The purpose of my evidence is to assess the ability of the proposed Structure Plan to avoid potential significant impacts on the ecological values of the Te Punga Station and surrounding environment.

16. My evidence begins by providing a summary of the existing environment, identifying areas and species of ecological value on the site and in the wider landscape.

17. I will then outline the provisions within the Structure Plan that seek to provide protection, restoration and enhancement to these values, as well as amendments that have occurred through the mediation process.

Summary of conclusions

18. Areas of ecological value and sensitivity have been identified on Te Punga Station that either provide habitat for *Threatened* and *At Risk*[2] species, or have been classified as regionally or nationally significant sites. The areas and species of

[2] As defined by Townsend *et al.* (2008) New Zealand Threat Classification System Manual. Department of Conservation, New Zealand.

ecological value were agreed at the expert ecology conferencing.[3]

19. At a broad scale, such areas (and associated biota) include the vast stands of native forest, the freshwater streams and adjacent beaches and estuaries.

20. The identification of defined 'house sites' and access ways in the Te Punga Structure Plan provides a level of certainty in regard to the location of development relative to areas of ecological value and sensitivity. House sites and access ways have been located to avoid potential ecological effects by clustering within areas of pasture and weeds, while avoiding existing areas of ecological value and areas that are proposed to be revegetated.

21. It is my expert opinion that based on the Structure Plan provisions and the subsequent consenting processes required for any development (including assessment criteria), there are appropriate mechanisms in place to ensure the protection, maintenance, enhancement, and restoration of the of the ecological values, species and habitat at the Te Punga Station and the surrounding environment.

[3] Refer to paragraphs 10 and 11 in the Ecology JWS dated 4 December 2018.

EXISTING ENVIRONMENT

22. To date, numerous investigations have been undertaken to identify and characterise the ecological values, threats and constraints associated with Te Punga Station.[4,5,6,7]

23. The site contains a combination of hill country pasture and weedland, indigenous forest remnants and regenerating forest, as well as a portion of forested coastal escarpment.

24. Vast tracts of areas of indigenous vegetation have been identified[8,9] as Significant Natural Areas (SNA) and these are considered to be of high ecological (flora and fauna) value (refer to **Appendix 2** for a description and map of the SNAs). These areas include all of 50.76 ha New Chum's forest (TC132), the majority of the 81.91 ha Pungapunga forest (TC133) and a portion of the 657.31 ha Hapapawera (TC120).

25. In terms of avifauna, North Island kaka (classified as *At Risk*) have been recorded on the site.[10] To date the New Zealand

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[4] Boffa Miskell Limited 2018. Te Pungapunga Structure Plan: DRAFT Ecological Values & Constraints. Report prepared by Boffa Miskell Limited for Northern Land Property Limited.

[5] Wildlands. (2014). Ecological assessment of a proposed four lot subdivision at Wainuiototo farm, Whangapoua. Contract Report No. 3160a prepared by Wildlands for Ross and Dee Mear.

[6] Kessels & Associates. (2010). Significant Natural Areas of the Thames-Coromandel District: terrestrial and wetland (No. Environment Waikato Technical Report 2010/36) (p. 120). Report prepared by Kessels & Associates for Environment Waikato.

[7] BML. (2010). Te Pungapunga / New chums Beach Subdivision: Assessment of Ecological Effects (No. A08340_Ecology_180310). Report prepared by Boffa Miskell Ltd for Coastal Land Trust Holdings Ltd, dated March 2010.

[8] Kessels & Associates. (2010). Significant Natural Areas of the Thames-Coromandel District: terrestrial and wetland (No. Environment Waikato Technical Report 2010/36) (p. 120). Report prepared by Kessels & Associates for Environment Waikato.

[9] Waikato Regional Council. (n.d.). Significant natural heritage of the Thames-Coromandel District: Volume II Appendices. Report prepared by Kessels & Associates Ltd, Natural Solutions and Red Admiral Ecology for the Waikato Regional Council.

[10] Refer to Section 3.4.3.2 of the report attached to Appendix 1 for further details.

pipit (*At Risk*) has not been recorded on site, but is likely to occur there in association with the pastureland.[11] In addition, North Island brown kiwi (*At Risk*) are present in nearby habitat and as such I consider it likely that they may be present on the site.

26. While not confirmed through field surveys, based on the habitat available, copper skink (*Not Threatened*) and Pacific gecko (*At Risk*) are likely to inhabit Te Punga Station.[12]

27. Adjacent to the site, New Chums beach provides roosting and foraging habitat for a number of shorebirds species. In addition, the *At Risk* northern New Zealand dotterel and variable oystercatcher breed at this location.[13]

28. A number of perennial streams[14] occur within the project site which are likely to provide habitat for *At Risk* fish species. The forested streams flowing through the site are also likely to provide habitat for the *At Risk* Hochstetter's frog.

29. On the property, kauri dieback has been confirmed present within the Hapapawera (TC120) and Pungapunga (TC133) forest SNAs.

30. Additional values identified during expert conferencing[15] include:

    (a) Potential Cook's, grey-faced petrel and little blue penguin breeding habitat within the SNAs.

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[11] Refer to Sections 3.4.1 and 4.0 of the report attached to Appendix 1 for further details.

[12] Refer to Sections 3.3 and 4.0 of the report attached to Appendix 1 for further details.

[13] Refer to Section 3.4.2 and 4.0 of the report attached to Appendix 1 for further details.

[14] Refer to Map 2 of the report attached to Appendix 1 for stream locations.

[15] Paragraph 10(a) of the Ecology JWS dated 4 December 2018.

(b) Pateke have been reported on the Pungapunga River and have attempted to breed over the last 6 years. This species may utilise the tributaries on the structure plan area.

31. The table below summarises the broad-scale habitat values (also shown in the map provided in **Appendix 3**):

HABITAT	ECOLOGICAL VALUE
Hapapawera forest (SNA)	VERY HIGH - Botanically diverse and providing significant habitat for native fauna (including North Island kiwi and Hochstetter's frog)
Pungapunga forest (SNA)	VERY HIGH - Botanically diverse, incorporating a stream and associated riparian margin, and providing significant habitat for native fauna (including *Threatened* and *At Risk* species).
Kanuka-kauri forest (SNA)	HIGH - botanically rich and providing significant habitat for native fauna (including *Threatened* and *At Risk* species).
Coastal scarp shrub- & treelands (SNA)	HIGH - Good botanical diversity including some old growth forms, and provides good habitat for native fauna (including *Threatened* and *At Risk* species).
Pasture weedlands	Vegetation value LOW but likely to provide MODERATE habitat value for NZ pipit (*At Risk*) and terrestrial native lizards. Scattered kanuka treelands within the pasture weedlands also likely to provide MODERATE habitat value for arboreal Pacific gecko (*At Risk*).
New Chums Beach (SNA) and estuary	VERY HIGH – Coastal dune system providing breeding habitat for northern NZ dotterel and other *At Risk* shorebird species.
Waterways	HIGH – Includes perennial streams with extensive riparian vegetation and likely presence of *Threatened* and *At Risk* fish species. Hochstetter's frog (*At Risk*) also likely to be present occur in the forested streams flowing through the site.

PROPOSED STRUCTION PLAN

32. The purpose of the Structure Plan is to enable sustainable land use change of the Structure Plan area in a manner that recognises and provides for the protection, enhancement, maintenance and restoration of the special values of the area.

33. The Structure Plan identifies and establishes a framework to preserve the natural character values of the area, protect the areas of outstanding natural features and landscape, protect and enhance or restore the priority areas for protection of significant indigenous vegetation and habitats and protect sites of significance to Māori.

34. The 25 house sites have been located to avoid potential ecological effects by clustering within areas of pasture and weeds, while avoiding existing areas of ecological value and areas that are proposed to be revegetated.

35. Through the mediation process and associated expert witness conferencing, a number of amendments to the structure plan have been adopted to strengthen ecological outcomes.

36. Based on the Structure Plan provisions attached to the evidence of Mr Hall, measures to protect, enhance, maintain and restore the ecological and biodiversity values on, and adjacent to the Structure Plan area include:

    (a) Conservation areas will be avoided (Policy 3a, Rule 1.b)), legally protected (Policy 3b, Rule 1.c)i), Rule 1.d)i))[16] and fenced (Rule 1.e)i)). These conservation areas include the areas of SNAs located within the structure plan area (as identified in paragraph 24 above);

    (b) Active revegetation of areas totaling 34.72ha identified in the Vegetation Management Plan Concept diagram (Rule 1.e)i)); this will replace areas which are currently weedfields and expand the native vegetative cover on the site and thereby provide additional habitat for forest species, as well as buffering the edges of several SNAs

[16] This Policy and Rules also includes the legal protection and management of "areas planted for ecological enhancement or visual mitigation purposes".

and creating stronger ecological linkages across the wider landscape;

(c) Use of eco-sourced plants (Rule 1.e)i)) and prohibition of planting species that are known to cause harm to native forests (Rule 1.e)i));

(d) A weed and pest control programme (Rule 1.e)i));

(e) Exclusion of domestic cats, dogs, mustelids, goats and deer (Rule 1.e)i));

(f) Locating walking tracks in areas that avoid kauri forest on the property (for the purpose of isolating an area of kauri dieback) and recognition of the need to manage the use of those tracks (Objective 5, Policy 5b, Rule 1.e)ii));

(g) Restrictions on use of a proposed access to Wainuiototo / New Chums Beach during the shorebird breeding season (Objective 5, Policy 5b, Rule 1.e)ii));

(h) Ensuring the management of indigenous species to minimise adverse effects pre- and during construction (Rule 1.e)i));

(i) Restricting grazing animals to defined areas (Rule 1.e)i));

(j) Ensuring that ecologically harmful diseases, pathogens and pest species are not brought on to the site or spread through construction and ongoing land-owner activities (Rule 1.e)i)); and

(k) Minimising any native vegetation clearance required to establish house sites, access and services to the house sites, access and services to the house sites and to establish the house sites (Rule 1.e)i)).

37. In my opinion these measures will be met by the Structure Plan requirements for the Biodiversity Management Plan ((Rule

1.e)i)), the Public Access Management Plan (Rule 1.e)ii)) and the Landscape and Ecology Management Plan (Rule 1.e)iii)), to be submitted at the time of application for subdivision consent, and the Structure Plan subdivision assessment criteria. Those documents are a component of the proposed CSMP and establish an ecological enhancement and management approach similar to that which has been successfully achieved at Te Arai North as part of subdivision activities there.

38. In addition to the above provisions, all future subdivision and residential use of the land will remain subject to a later land-use consent application and assessment criteria (outlined in Rule 3) against which such applications are to be considered. Those assessment criteria include:

(a) Criteria 2. b) - The extent to which the walkways are generally aligned with the walkways shown on the Structure Plan, noting that the final position of the walkway can be altered from that shown on the Structure Plan to protect the landscape and biodiversity values of the area, including for the purpose of minimising the spread of kauri dieback.

(b) Criteria 4. a) – Whether subdivision, use and development:

(i) Adequately identifies the biodiversity and habitat values within and adjacent to the Structure Plan area;

(ii) Avoids significant adverse effects on coastal habitats with significant indigenous flora and fauna values within and adjacent to the Structure Plan area;

(iii) Avoids, remedies or mitigates adverse effects on the values and characteristics of priority areas

identified in the District Plan in the Structure Plan area, and on significant indigenous vegetation and habitats of significant flora and fauna within and adjacent to the Structure Plan area;

(iv) Contains appropriate measures to ensure that the biodiversity and habitat values within the Structure Plan area will be protected, maintained, enhanced and/or restored.

(c) Criteria 5. g) – Whether earthworks will be undertaken in a manner that avoids the discharge of sediment or contaminants into waterways or the coastal marine area adjoining and in the Structure Plan area.

(d) Criteria 5. h) – Whether stream crossings over permanent water courses are limited to existing locations to avoid or minimise potential impacts on *Threatened* and *At Risk* freshwater species, including not restricting migratory fish movement.

(e) Criteria 5. I) - Whether the earthworks minimise the introduction and spread of new and existing pests (weeds and animals) and pathogens.

(f) Criteria 6. a) – Whether stormwater and wastewater from future development will be managed and appropriate management measures are in placed to avoid the discharge of sediment or contaminants into waterways or the coastal marine area adjoining the Structure Plan area.

(g) Criteria 10. a) – Whether adverse effects on birds are avoided by ensuring that there are no streetlights.

CONCLUSIONS AND RECOMMENDATIONS

39. It is my expert opinion that, based on the Structure Plan provisions listed above and the subsequent consenting

process (including assessment criteria) required for any development, there are appropriate mechanisms to not only avoid any potential effects on the ecological values of the site and surrounding environment, but to substantially protect, enhance, maintain and restore these values. In my experience those provisions can be effectively employed to ensure those outcomes as part of rural-residential subdivision of the land while at the same time avoiding effects on those values from future dwellings on the land.

LEIGH SANDRA BULL

25 January 2019

APPENDIX 1 – TE PUNGA STATION ECOLGOICAL VALUES & CONSTRAINTS REPORT

Te Pungapunga Structure Plan: Ecological Values & Constraints

Prepared for Northern Land Property Limited
23 March 2018

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Prepared by:	Dr Leigh Bull Senior Ecologist / Senior Principal Boffa Miskell Limited	
	Georgia Cummings Ecologist Boffa Miskell Limited	
	Dr Lee Shapiro Ecologist Boffa Miskell Limited	
Reviewed by:	Dr Vaughan Keesing Senior Ecologist / Associate Partner Boffa Miskell Limited	
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1.0 Introduction

The proposed Te Punga Station Structure Plan covers an area of approximately 480 ha of land (the '*project* site') located north of the settlement of Whangapoua, Coromandel Peninsula (see Map 1). The structure plan covers land owned by both Northern Land Property Limited (*NLPL*) and Gault.

The purpose of the Te Punga Station Structure Plan is to recognise and provide for the protection, enhancement, maintenance and restoration of the special values of the area, and the community interest in the area and provide a comprehensive framework to manage subdivision, use and development.

NLPL engaged Boffa Miskell Limited to identify the current ecological values and constraints on the project site, and therefore guide the appropriate development of the site that will allow for the protection, enhancement, maintenance and restoration of those values.

Previous ecological site investigations have been undertaken on both NLPL and Gault properties as part of assessment of ecological effects for earlier resource consent applications (BML, 2010; Wildlands, 2014). That information is presented here, along with additional site investigations which were undertaken in late 2017 to further inform the baseline investigations.

This report begins (Section 2.0) with an outline of the methods used to collect information pertaining to the ecological features present, the results of which are then described (Section 3.0) and summarised (Section 5.0). The ecological habitats and characteristics identified on site are then assessed against the Waikato Regional Council Regional Policy (Waikato Regional Council, 2016) Section 11A criteria for areas of significant indigenous biodiversity (Section 4.0). The final section (6.0) of this report provides recommendations for the Structure Plan in regards to possible measures to protect, enhance, maintain and restore the special values of the area that have been identified, and the community interest in the area.

2.0 Methods

A combination of desk top and field investigations have been undertaken to inform this report.

2.1 Vegetation

A literature review was undertaken to identify any sites within or in close proximity to the site that have been formally recognised as being of ecological significance.

On NLPL land, aerial photographs were inspected to identify the range of habitat and vegetation types likely to be present on the property. Field surveys were then undertaken in 2009 within the large bush blocks in the southern, central and northern portions of the property (BML, 2010).These included the dense young kanuka shrublands that dominate in the northern catchments, the extensive and good quality kauri-broadleaved forests of the Pungapunga forest in the south, and

the smaller and more degraded kauri-broadleaved forest patches within the central valley area. The smaller pockets of riparian bush scattered along the farm stream margins were also specifically surveyed. All species of flora observed were recorded.

Wildlands (2014) undertook field surveys on the Gault properties in June, July and December 2013 and April, May and July 2014. These surveys included walk-through surveys of the vegetation and habitat, from which descriptions and maps were produced.

The land use of the properties has not changed since these earlier surveys, and as such vegetation surveys were not repeated in 2017.

2.2 Herpetofauna

2.2.1 Database review

The Department of Conservation (DOC) herpetofauna database was searched for lizard and frog records on 30 November 2017. These records were used as an indication of lizard species known or likely to be present within 15 km of the site.

2.2.2 Nocturnal field surveys

Nocturnal visual encounter surveys ('spotlight surveys') for gecko were undertaken over three nights (30 and 31 October and 14 November 2017; Table 1). Surveys consisted of slowly walking segments of the bush margins across the site and systematically visually searching trees for geckos using headlamps, hand torches and binoculars. Across the three survey nights, four transects (refer to Map 2) were walked along bush edges comprising of kānuka forest or coastal broadleaf scrub.

Table 1: 2017 survey effort during nocturnal surveys for geckos across the project site.

DATE	SURVEY PERIOD	SURVEY EFFORT
30 October 2017	20:15 - 23:25	6.3 person hours
31 October 2017	20:15 - 20:30 (surveys abandoned due to inclement weather)	0.5 person hours
14 November 2017	21:45 - 22:45	2 person hours

2.3 Avifauna

Data from the Ornithological Society of New Zealand's (OSNZ) atlas (C. J. R. Robertson, Hyvonen, Fraser, & Pickard, 2007) was collated from the 10 km x 10 km grid square (274, 649) which encompass the site and surrounding terrestrial and coastal environment (refer to Map 2).

The primary and secondary habitats for each of the species recorded within these grid squares was obtained from Heather & Robertson (2005), along with each species' New Zealand threat status according to Robertson *et al*. (2017). The species list obtained from the OSNZ atlas data served as a

base list of avifauna species recorded in the wider landscape and therefore potentially present at, or near, the project site.

For onsite field investigations, the main avifauna focus was on *At Risk* or *Threatened* species which may potentially be using habitat within or immediately adjacent to the site. Such species are generally considered to be of higher ecological value and would potentially require some form of longer-term management if there is any impact on the existing habitat as a result of the proposed structure plan.

2.3.1 Shorebirds

The northern part of the site extends down to New Chums Beach which has suitable high-tide roosting and nesting habitat for shorebirds. The beach and surrounding coastal habitat was surveyed on two consecutive days (30 and 31 October 2017) using a pair of binoculars (Bushnell 10 × magnification, 42 mm objective lens). Surveys were undertaken at high tide during which time all shorebird species observed were recorded.

2.3.2 Terrestrial birds

2.3.2.1 Kiwi

The Coromandel Peninsula is one of the few strongholds for North Island brown kiwi. There are records of kiwi within the Whangapoua area and more specifically within the production pine forestry on the land immediately adjacent to the site (DOC, 2010).

A site survey was undertaken in an effort to determine whether North Island brown kiwi were present within the property boundary or habitat immediately adjacent to the property. The survey included the deployment of acoustic recording devices (ARDs) as well as listening for kiwi calling during night time surveys for geckos (refer to Map 2 and Section 2.2.2).

2.3.2.2 Acoustic surveys

ARDs were used to monitor for North Island brown kiwi and other nocturnal bird species or those that may sporadically be active or call at night. Eight ARDs (Version B.2) were set out across the site (Map 2) during the survey (30 and 31 October 2017) and each unit was attached to a tree at chest height. The positioning of ARDs was a balance of ensuring an even spread across the site, using sites that had increased potential of capturing calls from a large area e.g. at the top and bottom of gullies, and within habitat deemed likely to be utilised by kiwi if present. From previous kiwi monitoring projects we have found that this model of ARD has an effective detection radius of up to 500 m for kiwi subject to background noise.

ARDs were programmed to record each day from 21:00 – 03:00 hrs and were left in place for 14 consecutive nights (31 October to 14 November 2017). A total of 672 hours of acoustic files were analysed using the software package RavenLite (Version 2.0) and the location and time of all *At Risk* or *Threatened* species were recorded.

2.3.2.3 Incidental observations

Wildlands (2014) recorded all bird species seen and heard during the 2013 and 2014 surveys on the Mears property.

During the 2017 daytime deployment of ARDs and night time spotlight surveys for gecko, all bird species observed or heard were recorded. Bird species were observed using a pair of binoculars (Bushnell 10 × magnification, 42 mm objective lens).

2.4 Bats

2.4.1 Database review

Information was obtained from the DOC bat database in December 2017 (M Pryde 2017, pers. comm., 1 December).

2.4.2 Acoustic surveys

Acoustic surveys were undertaken to detect the presence of native bats across the site. Automatic bat monitors (ABMs) were deployed in eight locations across the site (Map 2). ABMs passively record both long-tailed bat (*Chalinolobus tuberculatu*) (40 kHz) and lesser short-tailed bat (*Mystacina tuberculata*) (28 kHz) echolocation calls on two concurrently operating frequency channels. They operate remotely by recording and storing each echolocation call (bat pass), along with the date and time of occurrence.

As short-tailed bats are limited to areas containing large tracts of native old growth forest, they are unlikely to occur in the site and placement of the ABMs focussed on key habitat features for long-tailed bats. Such features include forest edges, clearings and along watercourses (Map 2).

ABMs were set to record from 30 minutes before sunset to 30 minutes after sunrise and deployed for a period of two weeks from 31 October to 14 November 2017.

Long-tailed bat activity is influenced by overnight temperatures and rainfall (O'Donnell, 2000). Weather data from the survey period was analysed to ensure conditions were suitable for bats to be active and therefore detectable via acoustic recordings. Suitable conditions are henceforth referred to as 'fine weather nights' and are defined for the purpose of this report as nights where the temperature was above 10°C at sunset and there was less than 5 mm of rainfall during the night.

Acoustic data from fine weather nights was analysed using BatSearch 1.03, a programme designed by the Department of Conservation.

2.5 Freshwater

During the 2009 field investigations, the waterways located on Te Pungapunga Station were visited and general physical habitat observations recorded.

In December 2017, the NIWA Freshwater Fisheries Database was searched for records of waterways on the project site and surrounding catchments.

To date, no field surveys have been undertaken for freshwater fauna (ie. fish and aquatic macro-invertebrates).

3.0 Results - Ecological Features

A series of representative photos taken during visits to the project site between 2015-2017 are provided in Appendix 1.

The project site is located within the Colville Ecological District (ED), which forms part of the Coromandel Ecological Region (McEwen, 1987). McEwen (1987) describes the climate within the ED as mild, moist oceanic, with 1250-2500 mm rainfall per annum and summer droughts.

3.1 Significant Natural Areas

A number of Significant Natural Areas (*SNA*s) occur within or adjacent to the project site (Map 4) (Kessels & Associates, 2010; Waikato Regional Council, n.d.). Details of the ecological values attributed to these features are provided in Table 2.

The pathogen *Phytophthora agathidicida* which causes kauri dieback has been confirmed present within the Hapapawera (TC120) and Pungapunga (TC133) forest SNAs on the property.

Table 2: Significant Natural Areas (SNAs) within or adjacent to the project site (see Map 4)

SNA	Description	Significance
Hapapawera (TC120)	• The 657.34ha site is located at the southern end of Kennedy Bay. A variety of habitats including small dunelands, coastal and lowland forest with an unusual pohutukawa-kowhai-puriri forest that grades into tawa-kohekohe association with emergent rata and podocarps. Scrublands and kauri-tanekaha associations are also present. • Threatened species include Hochstetter's frog, reef heron and possibly kiwi which are known to be in the wider area.	National
New Chums Recreational Reserve (TC120a)	• Coastal cliffland and modified duneland. Pingao and *Pomaderris rugosa*. NZ dotterel. • Under-represented coastal forest supporting threatened flora. • Modified dunes at the NW end of New Chum's Beach.	Regional
Wainuiototo (New Chums) Beach (TC121)	• Sand habitat above MHWS. Terrestrial sandfield. Northern NZ dotterel occupy and defend this site each breeding season. Buffers terrestrial SNA.	National
New Chum's forest (TC132)	• The New Chum's forest site covers 50.76ha of mixed habitat including duneland, coastal pohutukawa forest with nikau understorey and manuka/hardwood scrubland association in area bounding farmland to the west. Induced scrub with pockets of coastal forest found in farm outliers. Spinifex is dominant in dunelands and utilized as a refuge area by northern NZ dotterel chicks. • Originally rare sand dunes and under-represented coastal forest. Duneland represents habitat uncommon prior to settlement.	National
Pungapunga forest (TC133)	• The Pungapunga forest site covers 81.91ha of coastal pohutukawa broadleaved forest, kauri-tanekaha, induced manuka and kanuka scrub. The area is bounded by induced scrub, production pine forest, farmland and includes the Pungapunga RAP which is fenced.	Regional
Pungapunga Alluvial Outlier (TC134)	• Coastal totara-puriri forest. Nationally under-represented coastal forest. One of the few examples of alluvial forest in the Colville ED.	Regional

SNA	Description	Significance
Pungapunga wetland (TC135)	• Raupo wetland. Regionally under-represented wetland. Links to other SNA's.	Regional
TCDC Recreational Reserve to New Chum's (TC137)	• Coastal forest. Pohutukawa dominated cliffland community. Kauri-tawa broadleaved association in main gully to south. *Senecio scaberulus*. • Under-represented coastal forest supporting threatened flora.	National
New Chums Recreational Reserve (TC137a)	• Nationally under-represented coastal forest. • Privately owned coastal pohutukawa forest, QEII covenant.	Regional
New Chums Recreational Reserve (TC137b)	• Nationally under-represented coastal (pohutukawa) forest.	Regional

3.2 Vegetation

The Te Pungapunga Station has been farmed for more than a century. The property is adjacent to extensive commercial pine forestry operations to the west, farmland to the south, the ocean to the east and a large area of secondary regenerating native bush to the north.

The site contains a combination of hill country pastureland, exotic weedlands (e.g. gorse and woolly nightshade), indigenous forest remnants and regenerating forest, as well as a portion of forested coastal escarpment. Descriptions of the vegetation communities occurring within the site are provided in the following sections and are mapped on Map 5.

3.2.1 Hapapawera

At the very north of the structure plan area, this large extensive SNA (TC120; Map 4) comprises a sequence of indigenous habitats from the coastal inland to tall forest (Wildlands, 2014). The forest is bounded by the sea to the north (southern end of Kennedy Bay), Nga Whenua Rahui and commercial pine plantation forest. Dunelands, coastal and lowland forest (with pōhutukawa-kōwhai-pūriri and tawa-kohekohe combinations) and scrublands (of kauri-tānekaha) associations are also present (Wildlands, 2014).

3.2.2 Pungapunga Forest

A large proportion of the site comprises an extensive and significant stand of mature podocarp-broadleaved-kauri forest in the south which is identified by Environment Waikato as an SNA (Pungapunga forest TC133).

The Pungapunga forest is comprised of two distinct forest types, being kauri forest (occupying the ridges, spurs and upper hillslopes) and podocarp-broadleaved forest (occupying the gullies, valleys and lower hillslopes).

The podocarp-broadleaved forest has a canopy dominated by a wide variety of species, including puriri (*Vitex lucens),* northern rata (*Metrosideros robusta)*, tawa (*Belischmiedia tawa)*, rewarewa (*Knightia excelsa)*, kanuka (*Kunzea ericoides)*, totara (*Podocarpus totara)*, rimu (*Dacrydium*

cupressinum), taraire (*Belischmiedia tarairi)* and matai (*Prumnopitys taxifolia)*. These for the most part are mature specimens and provide a representative example of this type of mixed podocarp-broadleaved forest.

The Pungapunga forest is fenced (although this is derelict in places), and as a result the understorey is dense and diverse. The mid-tier is characterised by an abundance of nikau (*Rhopalostylis sapida*) at a range of size classes. Additional species in the understorey include *Coprosma rhamnoides*, pigeonwood (*Hedycarya arborea)*, mapou (*Myrsine australis)*, ponga (*Cyathea dealbata)*, karaka (*Corynocarpus laevigatus)*, mahoe (*Melicytus ramiflorus)*, kohekohe (*Dysoxylum spectabile)*, white maire (*Nestegis lanceolata)*, hangehange (*Geniostoma ligustrifolium)*, kahikatea (*Dacrycarpus dacrydioides)*, rangiora (*Brachyglottis repanda)*, mamaku (*Cyathea medullaris)*, wineberry (*Aristotelia serrate)*, tanekaha (*Phyllocladus trichomanoides),* kauri (*Agathis australis)* and akepiro (*Olearia furfuracea)*.

Ferns, sedges, grasses and herbs are abundant within the ground tier, and include maidenhair fern (*Adiantum*), thread fern (*Blechnum filiforme*), hounds tongue (*Microsorum pustulatum*), fragrant fern (*Microsorum scandens*), shining spleenwort (*Asplenium oblongifolium*), kiokio (*Blechnum novae-zelandiae*), kidney fern (Cardiomanes reniforme), hook sedge (Uncinia spp.), fine-leaved hook sedge (*Uncinia filiformis*), hairy fern (*Lastreopsis hispida)*, *Lastreopsis microsora*, *Blechnum membranaceum*, gully fern (*Pneumatopteris pennigera*), bordered panic grass (*Entolasia marginata*), *Nertera dichondrifolia*, Piripiri *Hymenophyllum demissum* and rasp fern (*Doodia australis)*.

Epiphytes, lianes and climbers are also well represented, and include *Tmesipteris* spp., sickle spleenwort (*Asplenium polyodon*), bush lawyer (Rubus spp.), supplejack (*Ripogonum scandens*), kiekie (*Freycinetia banksii*), mangemange (*Lygodium articulatum*), hanging spleenwort (*Asplenium flaccidum*), perching lily (*Astelia solandri*), kahakaha (*Collospermum hastatum*), NZ jasmine (*Parsonsia spp.*) and rata vine (*Metrosideros spp*).

The kauri forest has a canopy dominated by kauri, together with lesser amounts of kanuka, rewarewa and northern rata. The height of this bush is variable but includes extensive areas of large trees.

The understorey is not particularly dense (as is typical of many kauri forests), nor particularly diverse (again, as is typical of many kauri forests). The most abundant species present in this tier include ponga, *Coprosma rhamnoides*, *Coprosma rigida* and tanekaha. Other species occurring less commonly include, mapou, mahoe, pigeonwood, *Gahnia lacera*, kauri grass (*Astelia trinervia*), *Gahnia xanthocarpa*, white maire, miro (*Prumnopitys ferruginea*), mingimingi (*Leucopogon fassiculatus*), prickly mingimingi (*Leptecophylla juniperina*), *Coprosma spathulata*, mamangi (*Coprosma arborea*), matai, rimu, Hall's totara (*Podocarpus cunninghamii*) and shining karamu (*Coprosma lucida*).

The occasional broadleaved species is also encountered within the understorey of the kauri forest, including specimens of tawa, taraire, puriri, kohekohe, karaka and nikau. However, these are represented only as scattered individuals.

The ground tier is also relatively open, being characterised by an abundance of fallen kauri leaf litter (together with much tanekaha leaf litter in places). Species observed within this tier included hook sedge, narrow-leaved hook sedge, kidney fern, thread fern, shrubby rata vine, kiekie, hounds

tongue, leather leaf fern (*Pyrrosia eleagnifolia*), bordered panic grass, shining spleenwort, maidenhair fern, rosy maidenhair fern (*Adiantum hispidulum*) and Carex sp.

This vegetation community and area has very high ecological values, being botanically diverse, incorporating a stream and associated riparian margin, and providing significant habitat for native fauna.

3.2.3 Kanuka-Kauri Forest

Kanuka-kauri forest typifies the bush located between the northern shrublands (at the north of the Te Pungapunga property) and the Pungapunga forest to the south (refer to Map 5). This vegetation type occupies a large proportion of the catchment of the stream that discharges directly to the Whangapaoua Estuary, as well as extensive areas of hillslope (non-riparian) within the wider catchment of this stream

The canopy of this vegetation type is in the order of 15-18m in height, and is dominated by mature kanuka with conspicuous amounts of emergent kauri (<20m high). Additional species in this tier include rimu, tanekaha and rewarewa, together with some pohutukawa and puriri in the gullies.

The terrain occupied by this forest type is generally very steep. While the understorey of this forest is open to stock and is browsed it is nevertheless in reasonably good condition and is, for the most part, generally intact (although it is noteworthy that the more accessible areas are far more compromised by browse damage than elsewhere).

The mid-tier is comprised of much ponga together with hangehange, *Coprosma rhamnoides*, prickly mingimingi, tanekaha, nikau, mingimingi, rangiora, kohekohe, mahoe, tawa, *Coprosma spathulata,* miro, white maire, pigeonwood, heketara, *Coprosma rigida* and Hall's totara.

Epiphytes, lianes and climbers are well represented, and include bush lawyer, supplejack, shrubby rata vine, kiekie, mangemange, hanging spleenwort, perching lily and rata vine. Ferns, sedges, grasses and herbs are also common, and include kiokio, *Lastreopsis hispida*, *Lastreopsis microphylla, Blechnum membranaceum*, gully fern, hounds tongue, bordered panic grass, *Nertera dichondraefolia*, *Hymenophyllum demissum, Hymenophyllum dilatatum*, maidenhair fern and pukupuku.

3.2.4 Coastal Scarp Shrub- & Tree-lands

The eastern boundary of the property adjoins the Pacific Ocean and is characterised by coastal treeland and shrublands (with emergents) (refer to Map 5). The dominant species are pohutukawa and younger kanuka. The occasional emergent kauri, mamaku, rewarewa and wilding pine (*Pinus radiata*) are also present.

Coastal shrublands occupy the Esplanade Reserve of the New Chums headland which separates New Chums Beach from that of Whangapoua. Pohutukawa dominates this part of the coastal frontage. The occasional taraire, tawa, rewarewa, puriri, kohekohe and kauri are also to be found sharing the canopy in the more sheltered spots.

Beneath these the shrublands are a mix of species, including mamaku, flax (*Phormium tenax*), *Gahnia lacera*, houpara (*Pseudopanax lessonii*), rangiora, kawakawa (Piper excelsum), mahoe,

manuka, rewarewa, ponga, kiokio, hangehange, kanuka, mapou, akepiro, koromiko (Hebe stricta), nikau, karo (*Pittosporum crassifolium*), coastal astelia (*Astelia banksii)* and *Morelotia affinis.*

Several stands of mature coastal treeland punctuate the property, being relicts of the former old growth coastal forest long since cleared. Many of the individual trees that comprise these stands are very large specimens, with pohutukawa and puriri being the most commonly occurring species. The land adjacent to the present driveway into the property supports some of the larger specimens of these, along with other trees including kowhai (Sophora spp.), kanuka, Hall's totara, lowland totara, rewarewa and kohekohe.

3.2.5 Pasture & weedlands

The central, coastal and south-eastern portions of Te Pungapunga station are in a cover of pasture (kikuyu mainly) (refer to Map 5). In some of the steeper and isolated areas there are relatively heavy infestations of gorse and woolly nightshade.

3.3 Herpetofauna

3.3.1 Desktop review

Herpetofauna records (lizard and frog) within 15 km of the site include observations of two native (one skink and one gecko) and one exotic lizard species, and two native frog species (Table 3).

While no terrestrial lizard field surveys were undertaken, given the matrix of bush edge, grassland and weedfield in combination with the sites proximity to large tracts of native forest, ground-dwelling skinks such as copper skink could occur within the site. The most likely habitats are the native bush remnants, the interface of these remnants with open habitats, and the retired pastureland that is reverting to weedfield.

McEwen (1987) notes that within the Colville Ecological District, Archey's frog is known from most of the higher ridges, especially the Moehau Range. It is unlikely that Archey's frog inhabit the site as the majority of the site is below 200 m in elevation and the plantation pine to the west has fragmented the site from the Coromandel Ranges where Archey's frogs occur. The closest Archey's frog record in the DOC database is approximately 6.5 km from the site boundary and was recorded in 2007 (Table 3).

Hochstetter's frog occurs throughout much of the Colville ED. This species is likely to occur in the forested streams flowing through the site, with multiple records in the DOC database (Table 3) for individuals in the adjacent Whangapoua Forest from surveys undertaken in 2008. The closest record from this survey is less than 200 m from the site boundary.

Table 3: Species and habitat details for lizard species recorded within 15 km of the project site in the DOC database. Database records were limited by distance (within 15 km of the Site) and record date (within 15 years).

SPECIES		THREAT CLASSIFICATION[1]	HABITAT & BEHAVIOUR[2]	NUMBER RECORDED
Copper skink	*Oligosoma aeneum*	Not Threatened	Forest and open areas with suitable cover (e.g., logs). Generalist. Terrestrial.	1
Pacific gecko	*Dactylocnemis pacificus*	At Risk - Relict	Forest and scrub, ground vegetation including flax. Generalist. Arboreal and terrestrial.	1
Plague skink	*Lampropholis delicata*	Introduced & Naturalised	Generalist. Invasive species often occupying transitional habitats.	20
Archey's frog	*Leiopelma archeyi*	Threatened – Nationally Vulnerable	Forest. Arboreal and terrestrial.	14
Hochstetter's frog	*Leiopelma hochstetteri sensu stricto*	At Risk – Declining	Rocky-bottomed streams and seepages in forest (both native and exotic). Semi-aquatic.	145 (6 individuals located < 200 m from site boundary in 2008)

3.3.2 Nocturnal searches

Weather conditions recorded during the nocturnal searches were suitable for lizard surveys, being sunny during the day with moderate temperatures at night. However, surveys were abandoned early on 31 October due to rain (Table 1).

No lizard species were recorded during the nocturnal searches. However, it should be noted that lizard survey methods currently available may have poor detection rates as a consequence of typically low population densities, species' cryptic colouration, difficulty in surveying preferred habitats and behaviour/activity patterns. As such, even an intensive lizard survey is unlikely to detect all individuals in the population or, possibly, all species present.

The forest and scrub vegetation on the site are ideal for arboreal lizards, and we consider it likely that species such as the Pacific gecko would be present on the site.

3.4 Avifauna

3.4.1 Desktop review

A total of 72 species were recorded in the 10 km x 10 km grid square (274, 649; Map 3) which encompass the project site, as well as the surrounding terrestrial and coastal environment. The full species list is provided in Appendix 2. Forty-six of the 72 species are native, 20 are introduced and six are migrants. Of the 46 native species, 26 are classified as either *Threatened* or *At Risk* (Table 4). It is important to note that only a subset of those species for which appropriate habitats are

[1] Threat classification follows Hitchmough *et al*. (2016).

[2] Habitat and behaviour details provided by NZ lizards (Landcare Research) and (Jewell 2008)

present, are likely to occur on the structure plan area; that is, those species associated with native and exotic forest, scrub/shrubland and farmland/open country. Kaka and New Zealand pipit were the only two *Threatened* or *At Risk* native species recorded within the OSNZ data that associate with these habitat types (native forest and farmland / open country respectively) (Table 4). The remainder of the species are associated with freshwater/wetland habitats, coastal/estuary and oceanic.

Table 4: Threatened and At Risk species recorded within 10x10 km OSNZ atlas square which encompasses the project site.

SPECIES	THREAT CLASSIFICATION[3]		Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential
North Island kaka	At Risk	Recovering$^{CD\ PD\ RF}$	■	■						
NZ pipit	At Risk	Declining				■	■	■		
Australasian bittern	Threatened	Nationally Critical$^{DP\ Sp\ TO}$					■	■		
Black shag	At Risk	Naturally Uncommon$^{SO\ Sp}$					■	■		
Grey duck	Threatened	Nationally Critical^{SO}				■	■			
Little black shag	At Risk	Naturally Uncommon^{RR}					■	■		
North Island fernbird	At Risk	Declining^{DP}					■	■		
Pied shag	At Risk	Recovering					■	■		
Pied stilt	At Risk	Recovering^{SO}				■	■	■		
NZ pied oystercatcher	At Risk	Declining				■	■	■		
Spotless crake	At Risk	Declining$^{DP\ SO}$					■	■		
White heron	Threatened	Nationally Critical$^{OL\ SO\ St}$					■	■		
Banded dotterel	Threatened	Nationally Vulnerable^{DP}					■	■		
Banded rail	At Risk	Declining$^{DP\ RR}$					■	■		
Caspian tern	Threatened	Nationally Vulnerable$^{SO\ Sp}$					■	■		
Eastern bar-tailed godwit	At Risk	Declining^{TO}						■		
Lesser knot	Threatened	Nationally Vulnerable^{TO}						■		
Northern NZ dotterel	At Risk	Recovering$^{CD\ Inc}$					■	■		
Red-billed gull	At Risk	Declining				■	■	■		
Reef heron	Threatened	Nationally Endangered$^{DP\ SO\ Sp\ St}$						■		
Variable oystercatcher	At Risk	Recovering^{Inc}				■	■	■		
White-fronted tern	At Risk	Declining^{DP}						■		
Wrybill	Threatened	Nationally Vulnerable^{RR}					■	■		
Buller's shearwater	At Risk	Naturally Uncommon$^{OL\ St}$							■	
Fluttering shearwater	At Risk	Relict^{RR}							■	
Northern blue penguin	At Risk	Declining$^{DP\ EF}$						■	■	

[3] Robertson *et al.* (2017)

3.4.2 Shorebirds

Twenty-three species were recorded in the OSNZ atlas square encompassing the project site for which the primary habitat includes either coastal/estuarine and oceanic environments (refer to Appendix 2). Fourteen of these 23 species are classified as *Threatened* or *At Risk* (Table 4).

As noted in Table 2, New Chums Beach is identified as an SNA in part due to the presence of breeding northern NZ dotterel. DOC (2010) have also reported variable oystercatcher breeding at this location.

Wildlands (2014) recorded the following indigenous coastal shorebird species during the 2013 and 2014 field surveys: northern NZ dotterel, Caspian tern and variable oystercatcher.

During the high tide surveys in 2017, northern NZ dotterel, variable oystercatchers and red-billed gull were all observed roosting on the beach, while black-backed gulls and Australasian gannets were observed feeding close to shore (Table 5).

Table 5: New Chums beach high tide observations.

SPECIES		THREAT CLASSIFICATION[3]	NUMBER RECORDED
Northern NZ dotterel	*Charadrius obscurus aquilonius*	At Risk - Recovering	4
Variable oystercatcher	*Haematopus unicolor*	At Risk - Recovering	2
Red-billed gull	*Larus novaehollandiae scopulinus*	At Risk - Declining	2
Black-backed gull	*Larus dominicanus dominicanus*	Not Threatened	3
Australasian gannet	*Morus bassanus serrator*	Not Threatened	15

3.4.3 Terrestrial birds

3.4.3.1 Kiwi

While North Island brown kiwi are known to be present to the north of the project site, no kiwi were recorded on any of the ARDs during the monitoring period (31 October to 14 November 2017). However, we note kiwi are generally more conspicuous between April to June during the breeding period. Due to the presence of kiwi in nearby habitat, we consider it likely that kiwi may be present on the site.

3.4.3.2 Incidental observations / records

Wildlands (2014) recorded the following indigenous terrestrial species during the 2013 and 2014 field surveys: bellbird, kereru, North Island fantail, harrier and tui. All of these species are classified as *Not Threatened.*

North Island kaka were recorded calling during the hours of darkness on six separate occasions (Table 6) at ARD locations 3 and 6 (Map 2). On each occasion, a single kaka was recorded calling. It is unknown whether the kaka detected are resident within the site or local area, transient or accessing a localised food source for a short period. No other *At Risk* or *Threatened* native bird species were detected on ARDs over the survey period.

No *At Risk* or *Threatened* native bird species were observed or heard during the site survey. Within the Pungapunga forest as well as the other main bush stands, the following native species were seen and heard: grey warbler, tui, kereru, shining cuckoo, kingfisher and silvereye.

The most commonly observed birds were predominantly introduced species, including chaffinch, skylark, house sparrow, starling, eastern rosella, peacock, spur-winged plover and song thrush. Australasian harrier and paradise shelduck were the most commonly occurring native birds recorded in or over the pasture.

Table 6: Date, time and location of kaka calls recorded on ARDs

ARD	Date	Time
3	11/11/2017	2:00 am
6	31/10/2017	9:00 pm
6	05/11/2017	10:00 pm
6	06/11/2017	11:45 pm
6	07/11/2017	12:30 am
6	08/11/2017	12:30 am

3.5 Bats

3.5.1 Bat database records

A review of the DOC bat database shows that the closest bat records are approximately 40 km away from the site on the eastern slopes of the Hunua Ranges, which are separated from the Coromandel Peninsula by the Firth of Thames. There are no records of long-tailed bats on the Coromandel Peninsula, however survey data for the peninsula is limited.

3.5.2 Acoustic surveys

During the period of ABM deployment, the minimum overnight temperature averaged 11.4°C and it dropped below 10°C on four nights. The average temperature at sunset (20:00 hr) was 14.6°C and did not fall below 10°C during the survey period. Rainfall was limited during the survey period with an average of 1 mm cumulative throughout the night (19:00 – 06:00 hr). Cumulative nightly rainfall measured above 5 mm on two nights during the survey period. Based on the above temperature data, there were 12 fine weather nights[4] during the survey period. This amounts to 1104 hours of survey effort across all eight ABMs, during which no bat calls were recorded.

[4] For the purposes of this report a fine weather night is defined as a night where the dusk temperature is above 10°C at sunset and there is less than 5 mm of rainfall during the night.

3.6 Freshwater

The Pungapunga Stream is the dominant fluvial feature within the local catchment; the NLPL property includes perennial tributaries of this river (refer to Map 6). In addition, there are several other relatively sizeable streams that meander across the valley floors of the property.

Some of the streams on the property are presently crossed by the existing farm roads. The largest crossing is at the farm entrance, where the farm road crosses the Pungapunga Stream by way of a large concrete topped culvert. Wairiri Stream, emanating from the Pungapunga forest SNA, is also crossed close to the entranceway by way of culvert. Just below the intersection of the main farm road and the small coastal road the main central stream of the property is crossed by a small bridge.

The final existing crossing is at the northern end of the pastureland, where the stream is forded by a concrete slab close to its discharge point to the coast. This slab is perched above the downstream receiving waters by way of a vertical lip, which is likely to be restricting fish passage up into the higher reaches of this stream.

The streams flowing within the property generally have a boulder and cobble-stone bed with sandy sediment evident in places, and have steeply incised banks. The Pungapunga Stream is relatively uniform and characterised by a relatively homogeneous depth (0.4 – 0.6m), width (4 – 5m), flow type (run-riffle) and substrate (cobble and stone).

However, the perennial streams within the property are more variable, and include multiple boulder-cobble jumbles, exposed lenses of bedrock, soft sediment substrates (in places) and a mix of runs, riffles and pools.

An unnamed stream flows through the hill country at the northern end of the Gault property, and from adjacent land, and then through the property to empty into the sea at the northern most point where the property meets the coast (Wildlands, 2014). Most of the stream catchment is within indigenous rewarewa-tānekaha/kānuka forest and scrub (Wildlands, 2014).

No freshwater surveys were carried out as part of the recent site investigations. While there are no FFDB records from the project site, records were found for nearby catchments (refer to Table 7 and Map 6). A number of *At Risk* species have been recorder in the wider area and some or all of these are likely to occur within the project site waterways.

Table 7: Freshwater fish species recorded in the NIWA Freshwater Fish Database (FFDB) from surrounding catchments

SPECIES		THREAT CLASSIFICATION[5]	FFDB CATCHMENT
Bluegill bully	*Gobiomorphus hubbsi*	At Risk - Declining^{DP}	Kennedy (111)
Longfin eel	*Anguilla dieffenbachii*	At Risk – Declining^{CD}	Harataunga (110) Kennedy (111) Waitekuri (112) Whangapoua (113)

[5] Goodman *et al.* (2014) for fish and Grainger *et al.* for (2014) for koura.

SPECIES		THREAT CLASSIFICATION[5]	FFDB CATCHMENT
Koura	*Paranephrops planifrons*	Not Threatened	Kennedy (111) Waitekuri (112) Whangapoua (113)
Banded kokopu	*Galaxias fasciatus*	Not Threatened	Harataunga (110) Kennedy (111) Waitekuri (112)
Redfin bully	*Gobiomorphus huttoni*	At Risk - Declining^{PD}	Harataunga (110) Waitekuri (112) Whangapoua (113)
Torrent fish	*Cheimarrichthys fosteri*	At Risk - Declining	Harataunga (110)
Shortfin eel	*Anguilla australis*	Not Threatened	Harataunga (110) Whangapoua (113)
Common smelt	*Retropinna retropinna*	Not Threatened	Harataunga (110) Whangapoua (113)
Lamprey	*Geotria australis*	Threatened – Nationally Vulnerable$^{S?O}$	Harataunga (110)
Common bully	*Gobiomorphus cotidianus*	Not Threatened	Whangapoua (113)
Inanga	*Galaxias maculatus*	At Risk – Declining^{CD,SO}	Whangapoua (113)
Giant bully	*Gobiomorphus gobioides*	Not Threatened	Whangapoua (113)
Yelloweye mullet	*Aldrichetta forsteri*	Not Threatened	Whangapoua (113)

4.0 Summary of Ecological Values and Threats

The following ecological values have been identified, or are likely to occur, within or immediately adjacent to the Te Pungapunga structure plan area:

- The site contains a combination of hill country pasture and weedland, indigenous forest remnants and regenerating forest, as well as a portion of forested coastal escarpment.
- A number of regionally and nationally significant natural areas occur within or adjacent to the site. These areas contain flora and fauna values.
- Vast tracts of areas of indigenous vegetation have been identified as SNA's and these are considered to be of high ecological value.
- On the property, kauri dieback has been confirmed present within the Hapapawera (TC120) and Pungapunga (TC133) forest SNAs.
- While not confirmed, based on the habitat available, copper skink (*Not Threatened*), Pacific gecko (*At Risk*) are likely to inhabit the project site.
- Areas of native forest and scrub provide habitat and resources for a variety of native avifauna species, the majority of which are classified as *Not Threatened*.
- Kaka was the only *At Risk* species recorded during field surveys on the site, but it is likely that NZ pipit occur there in association with the pastureland.

- While no kiwi were recorded on the site during the spring 2017 survey, the surveys were not conducted during the breeding period (April to June) when kiwi are more conspicuous. Thus, given the presence of kiwi in nearby habitat, we consider it likely that kiwi may be present on the site.
- Adjacent to the site, New Chums beach provides roosting and foraging habitat for a number of shorebirds species. In addition, the *At Risk* northern New Zealand dotterel breeds at this location.
- No bat calls were recorded during the spring 2017 surveys, and we consider it very unlikely that they occur on the site.
- A number of perennial streams occur within the project site which are likely to provide habitat for *At Risk* fish species.
- The forested streams flowing through the site are also likely to provide habitat for the *At Risk* Hochstetter's frog.

While further investigations would be required to determine the presence or absence of several species, the overall ecological values assigned based on the information collected to date for the habitats identified within or adjacent to the Te Pungapunga Structure Plan are summarised in Table 8 below.

Table 8: Ecological values of habitats within or adjacent to the Te Pungapunga Structure Plan area.

HABITAT	ECOLOGICAL VALUE
Hapapawera forest (SNA)	VERY HIGH - Botanically diverse and providing significant habitat for native fauna (including North Island kiwi and Hochstetter's frog)
Pungapunga forest (SNA)	VERY HIGH - Botanically diverse, incorporating a stream and associated riparian margin, and providing significant habitat for native fauna (including *Threatened* and *At Risk* species).
Kanuka-kauri forest (SNA)	HIGH - botanically rich and providing significant habitat for native fauna (including *Threatened* and *At Risk* species).
Coastal scarp shrub- & treelands (SNA)	HIGH - Good botanical diversity including some old growth forms, and provides good habitat for native fauna (including *Threatened* and *At Risk* species).
Pasture weedlands	Vegetation value LOW but likely to provide MODERATE habitat value for NZ pipit (*At Risk*) and terrestrial native lizards. Scattered kanuka treelands within the pasture weedlands also likely to provide MODERATE habitat value for arborea Pacific gecko (*At Risk*).
New Chums Beach (SNA) and estuary	VERY HIGH – Coastal dune system providing breeding habitat for northern NZ dotterel and other *At Risk* shorebird species.
Waterways	HIGH – Includes perennial streams with extensive riparian vegetation and likely presence of *Threatened* and *At Risk* fish species. Hochstetter's frog (*At Risk*) also likely to be present occur in the forested streams flowing through the site.

5.0 Waikato RPS Significance Assessment

The ecological characteristics identified in the previous sections have been considered as a whole when assessing the Te Pungapunga site against the WRPS Section 11A criteria for identifying areas of significant indigenous biodiversity (Table 8). Note that to be identified as significant, an area needs to meet one or more of the criteria identified in the table below.

Table 9: Assessment of Te Pungapunga ecological characteristics against the WRPS Section 11A significance criteria

WRPS SECTION 11A SIGNIFICANCE CRITERIA		TE PUNGAPUNGA SITE ASSESSMENT
Previously assessed site		
1	It is indigenous vegetation or habitat for indigenous fauna that is currently, or is recommended to be, set aside by statute or covenant or by the Nature Heritage Fund, or Ngā Whenua Rāhui committees, or the Queen Elizabeth the Second National Trust Board of Directors, specifically for the protection of biodiversity, and meets at least one of criteria 3-11.	Yes - New Chums Recreational Reserve (TC137a) Privately owned coastal pohutukawa forest, QEII covenant.
Ecological values		
2	In the Coastal Marine Area, it is indigenous vegetation or habitat for indigenous fauna that has reduced in extent or degraded due to historic or present anthropogenic activity to a level where the ecological sustainability of the ecosystem is threatened.	Yes - Areas of spinifex and pingao duneland
3	It is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are: • classed as threatened or at risk, or • endemic to the Waikato region, or o at the limit of their natural range.	Yes - Northern NZ dotterel in dunes and kaka in native forest. Potential for Hochstetter's frog, Pacific gecko and kiwi.
4	It is indigenous vegetation, habitat or ecosystem type that is under-represented (20% or less of its known or likely original extent remaining) in an Ecological District, or Ecological Region, or nationally.	Yes (refer to Table 2)
5	It is indigenous vegetation or habitat that is, and prior to human settlement was, nationally uncommon such as geothermal, chenier plain, or karst ecosystems, hydrothermal vents or cold seeps.	No
6	It is wetland habitat for indigenous plant communities and/or indigenous fauna communities (excluding exotic rush/pasture communities) that has not been created and subsequently maintained for or in connection with: • waste treatment; • wastewater renovation; • hydro electric power lakes (excluding Lake Taupō); • water storage for irrigation; or • water supply storage; unless in those instances they meet the criteria in Whaley et al. (1995).	No
7	It is an area of indigenous vegetation or naturally occurring habitat that is large relative to other examples in the Waikato region of similar habitat types, and which contains all or almost all indigenous species typical of that habitat type. Note this criterion is not intended to select the largest example only in the Waikato region of any habitat type.	Yes (in part, Hapapawera (TC120))
8	It is aquatic habitat (excluding artificial water bodies, except for those created for the maintenance and enhancement of biodiversity or as	Yes - coastal area breeding habitat for northern NZ dotterel.

WRPS SECTION 11A SIGNIFICANCE CRITERIA		TE PUNGAPUNGA SITE ASSESSMENT
	mitigation as part of a consented activity) that is within a stream, river, lake, groundwater system, wetland, intertidal mudflat or estuary, or any other part of the coastal marine area and their margins, that is critical to the self sustainability of an indigenous species within a catchment of the Waikato region, or within the coastal marine area. In this context "critical" means essential for a specific component of the life cycle and includes breeding and spawning grounds, juvenile nursery areas, important feeding areas and migratory and dispersal pathways of an indigenous species. This includes areas that maintain connectivity between habitats.	
9	It is an area of indigenous vegetation or habitat that is a healthy and representative example of its type because: • its structure, composition, and ecological processes are largely intact; and • if protected from the adverse effects of plant and animal pests and of adjacent land and water use (e.g. stock, discharges, erosion, sediment disturbance), can maintain its ecological sustainability over time.	Yes
10	It is an area of indigenous vegetation or habitat that forms part of an ecological sequence, that is either not common in the Waikato region or an ecological district, or is an exceptional, representative example of its type.	Yes – coastal – inland forest sequence.
Role in protecting ecologically significant area		
11	It is an area of indigenous vegetation or habitat for indigenous species (which habitat is either naturally occurring or has been established as a mitigation measure) that forms, either on its own or in combination with other similar areas, an ecological buffer, linkage or corridor and which is necessary to protect any site identified as significant under criteria 1-10 from external adverse effects.	Yes

6.0 Recommendations for Structure Plan

It is recommended that the Structure Plan incorporates the measures set out below.

A Biodiversity Management Plan

That a Biodiversity Management Plan should be prepared and implemented with any subdivision, use or development under the Structure Plan. The Biodiversity Management Plan could be a subset of other management plans for the Structure Plan area but should integrate with those plans to achieve comprehensive site management.

The Biodiversity Management Plan should have as its objective the enhancement, maintenance and restoration of the biodiversity of the Structure Plan area.

The Management Plan should specify the following:

i) The key biodiversity and ecological enhancement objectives to be met;

ii) The ongoing management measures required to achieve these objectives, including any ongoing plant/animal pest control, fencing, and enhancement planting to protect existing areas of native vegetation and the riparian margins of streams;

iii) Domestic animal restrictions (including prohibition on domestic cats, dogs and mustelids);

iv) Restrictions on planting of species, including in the domestic curtilages, that are known to cause harm to native forests.

v) The ongoing monitoring methods to ensure the success of the implementation of the management methods.

vi) Measures to be taken should the objectives not be fulfilled.

vii) Methods that are legally binding on current and successive owners to ensure the above outcomes are met.

Structure Plan implementation

Subdivision, use or development, and associated works shall ensure the following:

i) That house sites, associated domestic curtilages and internal roading and infrastructure avoid identified SNAs on the property.

ii) Stream crossings should be limited to existing locations as a precautionary measure to avoid potential impacts on *Threatened* and *At Risk* freshwater species that have been recorded in the wider area (some or all of these are likely to occur within the project site waterways).

iii) Stormwater shall be managed and earthworks undertaken in a manner that avoids the discharge of sediment or contaminants into waterways or the coastal marine area adjoining and in the Structure Plan area.

Public Walkway Management

The public walkways shall be designed, implemented and managed to achieve the following:

i) Access restrictions shall be put in place and signposted at the public carpark during the shorebird breeding season (in particular the northern NZ dotterel) to prevent public access from the walkway to the beach at the northern end of New Chums Beach.

ii) The walkway shall be positioned and constructed to avoid the existing kauri forest on the property so as to isolate that area from public access and thereby prevent the spread of kauri dieback by users of the walkway.

7.0 References

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Appendix 1: Representative site photos

View west: vegetation sequence of kanuka-kauri forest (foreground), pasture-weedland and Pungapunga forest (background).

Example of pasture-weedland with scattered kanuka.

View of New Chums beach with Hapapawera Forest to the north.

View south-east over pasture of Whangapoua settlement.

Kanuka-kauri forest adjacent to farm road.

Te Pungapunga Station ford crossing over Pungapunga Stream.

View north of Hapapawere Forest.

Northwest view of kanuka-kauri stand surrounded by pasture-weedland.

Interface between pasture and coastal scarp forest.

Pungapunga Stream mouth exit over Whangapoua Beach.

View east of Pungapunga Stream mouth

Wairiri Stream

View westward over southern edge of Pungapunga forest

Appendix 2: OSNZ avifauna data

The OSNZ data presented in the table comprises one 10 km x 10 km atlas square (274, 649) which encompass the site and surrounding terrestrial and coastal environment. Threat classification rankings (H. A. Robertson et al., 2017)are provided for each species, along with primary (dark green) and secondary (light green) habitat preferences (Heather & Robertson, 2005).

SPECIES		THREAT CLASSIFICATION		Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential
Tui	*Prosthemadera n. novaeseelandiae*	Not Threatened	Not Threatened[OL St]								
Shining cuckoo	*Chrysococcyx l. lucidus*	Not Threatened	Not Threatened[DP]								
Pied tomtit	*Petroica macrocephala toitoi*	Not Threatened	Not Threatened								
North Island kaka	*Nestor meridionalis septentrionalis*	At Risk	Recovering[CD PD RF]								
North Island fantail	*Rhipidura fuliginosa placabilis*	Not Threatened	Not Threatened[EF]								
Morepork	*Ninox n. novaeseelandiae*	Not Threatened	Not Threatened								
Kingfisher	*Todiramphus sanctus vagans*	Not Threatened	Not Threatened								
Kereru	*Hemiphaga novaeseelandiae*	Not Threatened	Not Threatened[CD Inc]								
Bellbird	*Anthornis m. melanura*	Not Threatened	Not Threatened								
Blackbird	*Turdus merula*	Introduced	Introduced & Naturalised[SO]								
California quail	*Callipepla californica*	Introduced	Introduced & Naturalised[SO]								
Eastern rosella	*Platycercus eximius*	Introduced	Introduced & Naturalised[SO]								
Grey warbler	*Gerygone igata*	Not Threatened	Not Threatened								
Pheasant	*Phasianus colchicus*	Introduced	Introduced & Naturalised[SO]								
Silvereye	*Zosterops lateralis lateralis*	Not Threatened	Not Threatened[SO]								
Canada goose	*Branta canadensis*	Introduced	Introduced & Naturalised[SO]								
Chaffinch	*Fringilla coelebs*	Introduced	Introduced & Naturalised[SO]								
Dunnock	*Prunella modularis*	Introduced	Introduced & Naturalised[SO]								
Goldfinch	*Carduelis carduelis*	Introduced	Introduced & Naturalised[SO]								
Greenfinch	*Carduelis chloris*	Introduced	Introduced & Naturalised[SO]								
House sparrow	*Passer domesticus*	Introduced	Introduced & Naturalised[SO]								

SPECIES		THREAT CLASSIFICATION		Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential
Magpie	*Gymnorhina tibicen*	Introduced	Introduced & Naturalised[SO]								
Myna	*Acridotheres tristis*	Introduced	Introduced & Naturalised[SO]								
NZ pipit	*Anthus n. novaeseelandiae*	At Risk	Declining								
Peafowl	*Pavo cristatus*	Introduced	Introduced & Naturalised[SO]								
Skylark	*Alauda arvensis*	Introduced	Introduced & Naturalised[SO]								
Song thrush	*Turdus philomelos*	Introduced	Introduced & Naturalised[SO]								
Spur-winged plover	*Vanellus miles novaehollandiae*	Not Threatened	Not Threatened[SO]								
Starling	*Sturnus vulgaris*	Introduced	Introduced & Naturalised[SO]								
Swamp harrier	*Circus approximans*	Not Threatened	Not Threatened[SO]								
Welcome swallow	*Hirundo n. neoxena*	Not Threatened	Not Threatened[Inc SO]								
Wild turkey	*Meleagris gallopavo*	Introduced	Introduced & Naturalised[SO]								
Yellowhammer	*Emberiza citrinella*	Introduced	Introduced & Naturalised[SO]								
Australasian bittern	*Botaurus poiciloptilus*	Threatened	Nationally Critical[DP Sp TO]								
Black shag	*Phalacrocorax carbo novaehollandiae*	At Risk	Naturally Uncommon[SO Sp]								
Black swan	*Cygnus atratus*	Not Threatened	Not Threatened[SO]								
Feral goose	*Anser anser*	Introduced	Introduced & Naturalised[SO]								
Grey duck	*Anas s. superciliosa*	Threatened	Nationally Critical[SO]								
Little black shag	*Phalacrocorax sulcirostris*	At Risk	Naturally Uncommon[RR]								
Little shag	*Phalacrocorax melanoleucos brevirostris*	Not Threatened	Not Threatened[Inc]								
Mallard	*Anas platyrhynchos*	Introduced	Introduced & Naturalised[SO]								

SPECIES		THREAT CLASSIFICATION		Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential
North Island fernbird	*Bowdleria punctata vealeae*	At Risk	Declining[DP]					■	■		
Paradise shelduck	*Tadorna variegata*	Not Threatened	Not Threatened				■	■			
Pied shag	*Phalacrocorax varius varius*	At Risk	Recovering					■	■		
Pied stilt	*Himantopus h. leucocephalus*	At Risk	Recovering[SO]				■	■	■		
Pukeko	*Porphyrio m. melanotus*	Not Threatened	Not Threatened[Inc SO]				■	■			
NZ pied oystercatcher	*Haematopus finschi*	At Risk	Declining				■	■	■		
Spotless crake	*Porzana t. tabuensis*	At Risk	Declining[DP SO]					■	■		
White heron	*Ardea modesta*	Threatened	Nationally Critical[OL SO St]					■	■		
Asiatic whimbrel	*Numenius phaeopus*	Non-resident Native	Migrant[SO]						■		
Banded dotterel	*Charadrius bicinctus bicinctus*	Threatened	Nationally Vulnerable[DP]					■	■		
Banded rail	*Gallirallus philippensis assimilis*	At Risk	Declining[DP RR]					■	■		
Black-backed gull	*Larus d. dominicanus*	Not Threatened	Not Threatened[SO]				■		■		
Caspian tern	*Hydroprogne caspia*	Threatened	Nationally Vulnerable[SO Sp]					■	■		
Eastern bar-tailed godwit	*Limosa lapponica baueri*	At Risk	Declining[TO]						■		
Lesser knot	*Calidris canutus rogersi*	Threatened	Nationally Vulnerable[TO]						■		
Northern NZ dotterel	*Charadrius obscurus aquilonius*	At Risk	Recovering[CD Inc]					■	■		
Pacific golden plover	*Pluvialis fulva*	Non-resident Native	Migrant[SO]				■	■	■		
Red-billed gull	*Larus novaehollandiae scopulinus*	At Risk	Declining				■	■	■		
Reef heron	*Egretta sacra sacra*	Threatened	Nationally Endangered[DP SO Sp St]						■		
Siberian tattler	*Tringa brevipes*	Non-resident Native	Vagrant[SO]						■		
Turnstone	*Arenaria interpres*	Non-resident Native	Migrant[SO]						■		

SPECIES		THREAT CLASSIFICATION		Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential
Variable oystercatcher	*Haematopus unicolor*	At Risk	Recovering[Inc]								
White-faced heron	*Egretta novaehollandiae*	Not Threatened	Not Threatened[SO]								
White-fronted tern	*Sterna s. striata*	At Risk	Declining[DP]								
Wrybill	*Anarhynchus frontalis*	Threatened	Nationally Vulnerable[RR]								
Arctic skua	*Stercorarius parasiticus*	Non-resident Native	Migrant[SO]								
Australasian gannet	*Morus serrator*	Not Threatened	Not Threatened[De Inc SO]								
Buller's shearwater	*Puffinus bulleri*	At Risk	Naturally Uncommon[OL St]								
Fluttering shearwater	*Puffinus gavia*	At Risk	Relict[RR]								
Northern blue penguin	*Eudyptula minor iredalei*	At Risk	Declining[DP EF]								
Pomarine skua	*Coprotheres pomarinus*	Non-resident Native	Migrant[SO]								

Boffa Miskell
www.boffamiskell.co.nz

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Data Sources: LINZ, Boffa Miskell

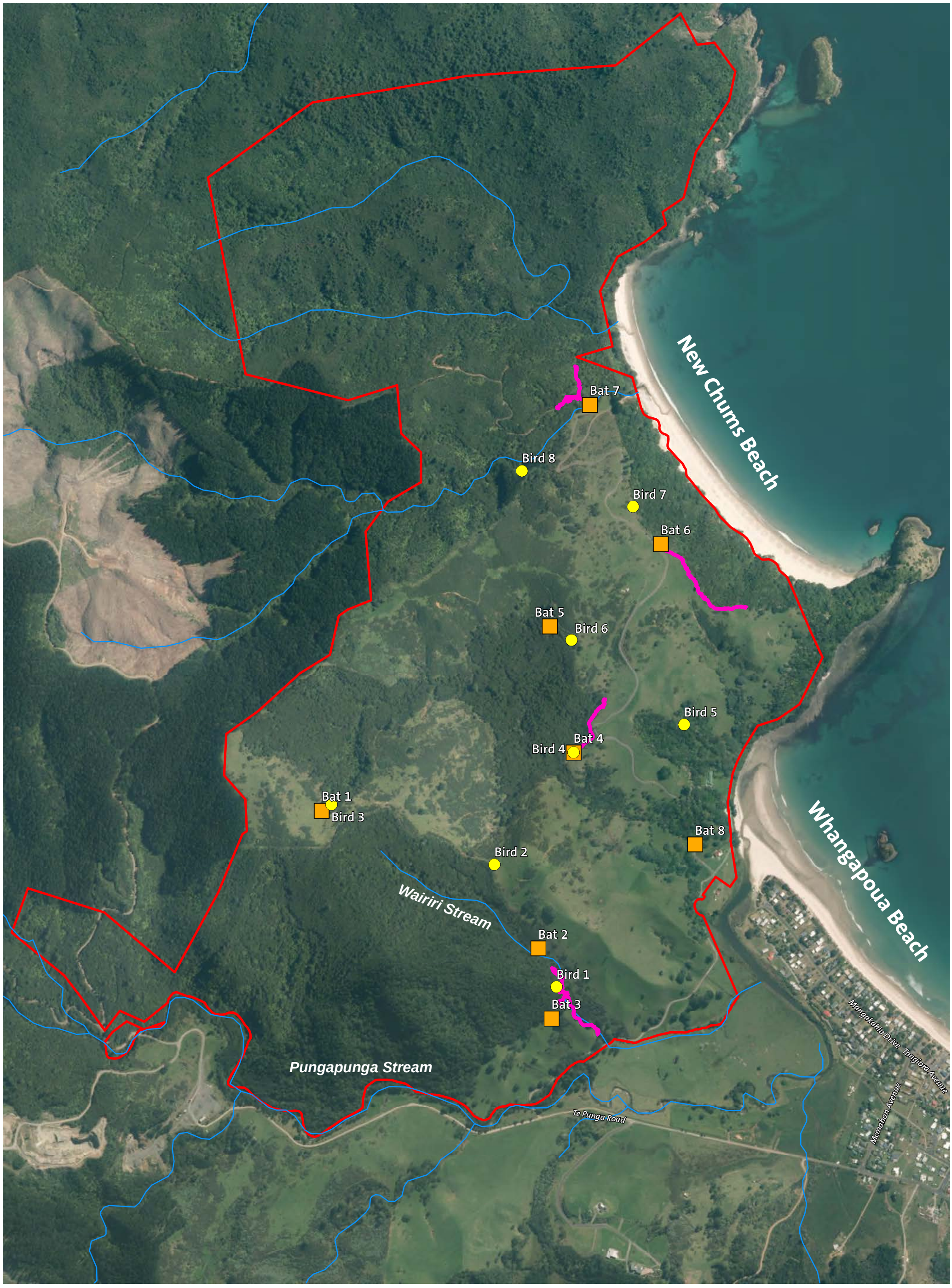
Projection: NZGD 2000 New Zealand Transverse Mercator

Legend
Area of Interest

A08340 NEW CHUMS AEE

Map 1, Regional Context

Date: 18 January 2018 | Revision: 0
Plan Prepared by Boffa Miskell Limited
Project Manager: leigh.bull@boffamiskell.co.nz | *Drawn:* MDu | *Checked:* LBu



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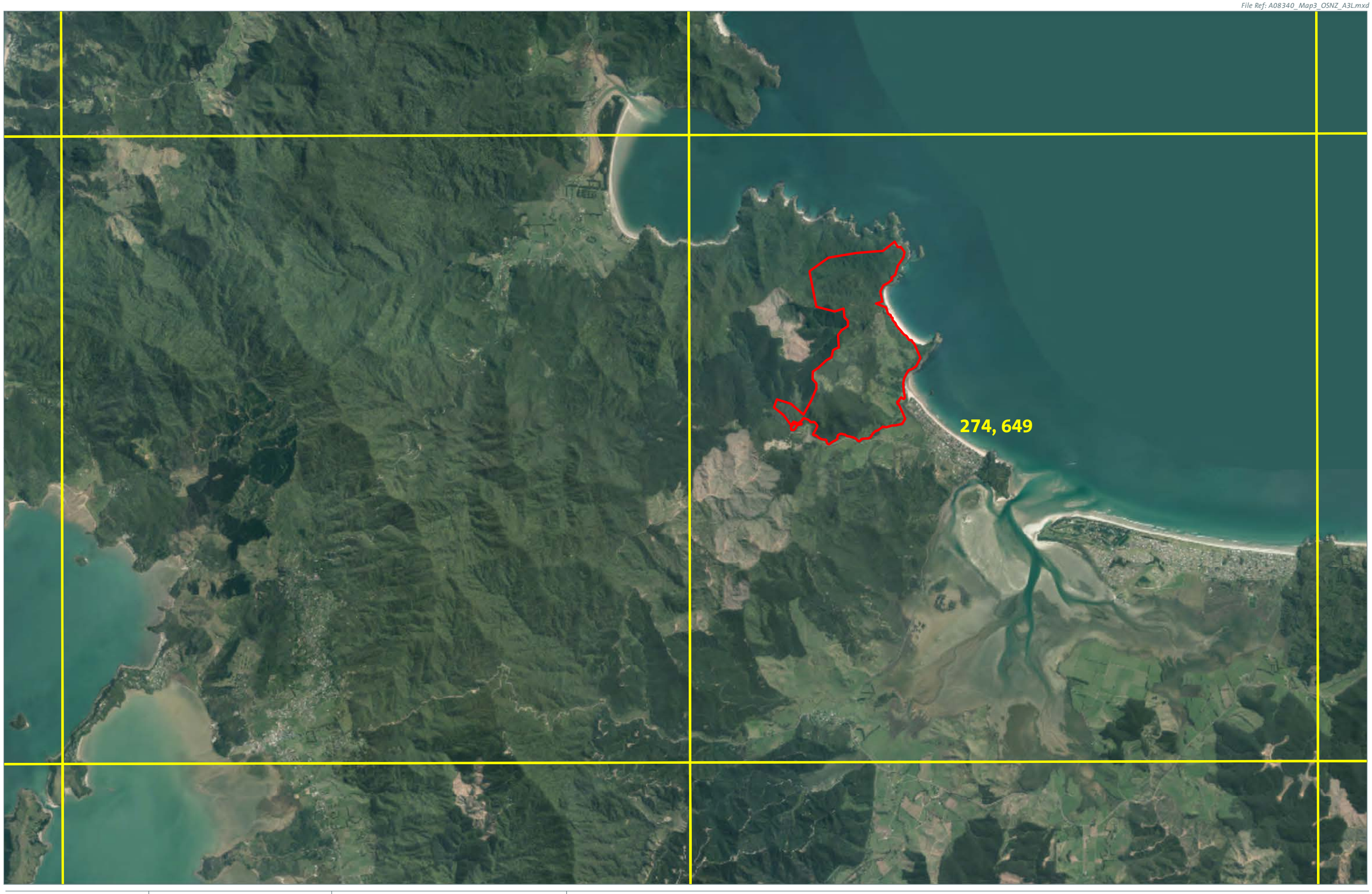
Data Sources: DigitalGlobe Aerials (2015), LINZ Cadastre, Boffa Miskell
Projection: NZGD 2000 New Zealand Transverse Mercator

Legend
- Bird Acoustic Recording Devices
- Acoustic Bat Monitors
- Gecko Spotlight Survey Locations
- River Centreline
- Area of Interest

A08340 NEW CHUMS AEE

Map 2, 2017 Bat, Bird & Gecko Survey Locations

Date: 18 January 2018 | Revision: 0
Plan Prepared by Boffa Miskell Limited
Project Manager: leigh.bull@boffamiskell.co.nz | *Drawn:* MDu | *Checked:* LBu



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Data Sources: LINZ, OSNZ

Projection: NZGD 2000 New Zealand Transverse Mercator

Legend
- Area of Interest
- OSNZ Atlas Grid

A08340 NEW CHUMS AEE

Map 3, OSNZ Atlas Grid

Date: 18 January 2018 | Revision: 0

Plan prepared by Boffa Miskell Limited
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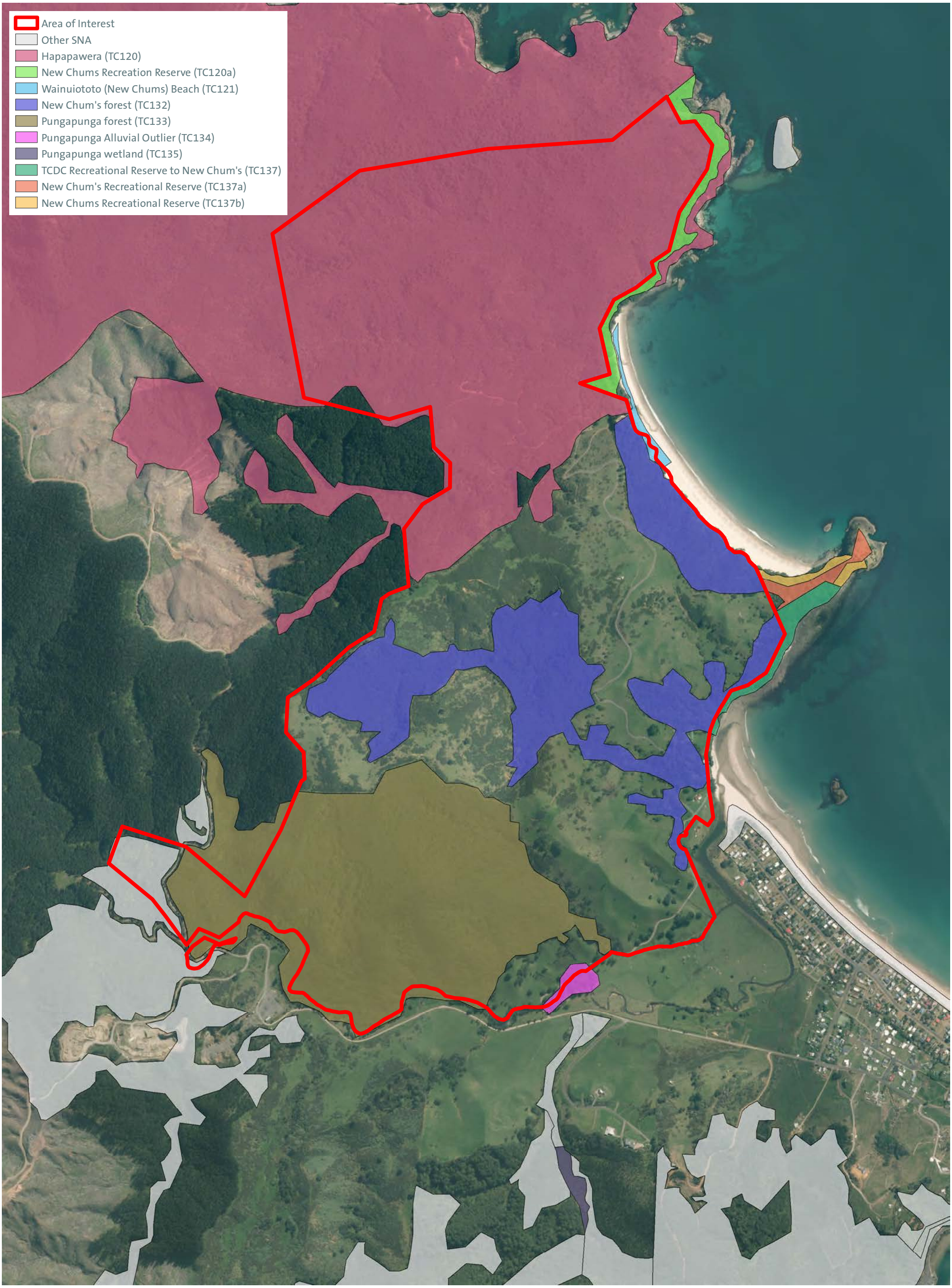

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Data Sources: LINZ, WRC

Projection: NZGD 2000 New Zealand Transverse Mercator

Legend

A08340 NEW CHUMS AEE

Map 4, Significant Natural Areas

Date: 18 January 2018 | Revision: 0
Plan Prepared by Boffa Miskell Limited
Project Manager: Leigh.Bull@boffamiskell.co.nz | *Drawn:* MDu | *Checked:* LBu

1. Hapapawera
2. Pungapunga forest
3. Kanuka - Kauri forest
4. Coastal scarp & treelands
5. Pasture & weedlands

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0 200 400 m
1:12,000 @ A3

Data Sources: LINZ, WRC

Projection: NZGD 2000 New Zealand Transverse Mercator

Legend
Area of Interest

A08340 NEW CHUMS AEE

Map 5, Vegetation Communities

Date: 18 January 2018 | Revision: 0
Plan Prepared by Boffa Miskell Limited
Project Manager: Leigh.Bull@boffamiskell.co.nz | *Drawn:* MDu | *Checked:* LBu

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0 1,000 m
1:50,000 @ A3

Data Sources: LINZ, NIWA

Projection: NZGD 2000 New Zealand Transverse Mercator

A08340 NEW CHUMS AEE

Map 6, NIWA Freshwater Fish Data

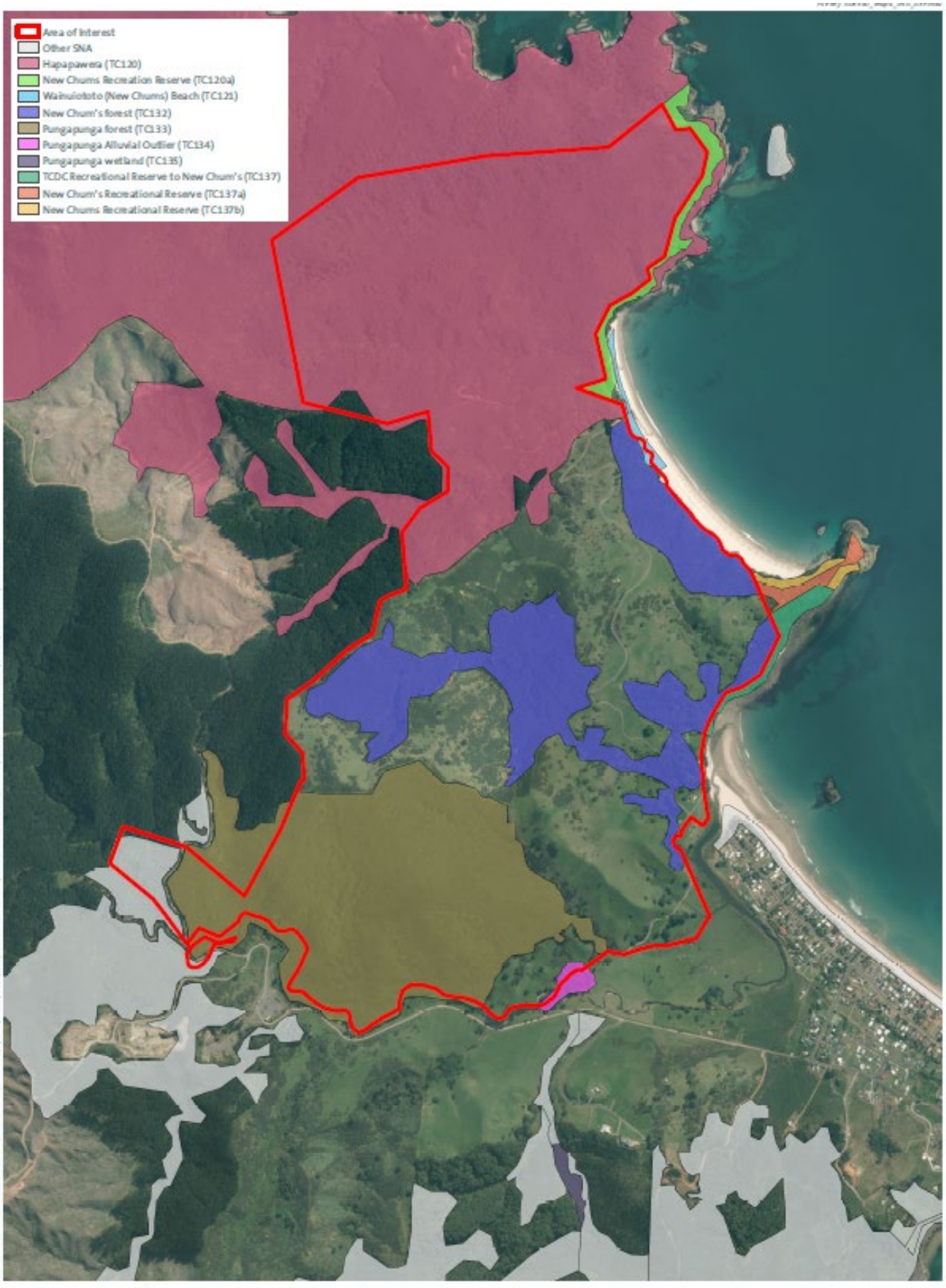
Date: 18 January 2018 | Revision: 0

Plan prepared by Boffa Miskell Limited
Project Manager: **leigh.bull@boffamiskell.co.nz** | *Drawn:* MDu | *Checked:* LBu

APPENDIX 2 – Significant Natural Areas

A description of the ecological values attributed to the SNAs located within and adjacent to the TPSSP area is provided in the table below. The location of these areas is shown in the attached map.

SNA	Description	Significance
Hapapawera (TC120)	• The 657.34ha site is located at the southern end of Kennedy Bay. A variety of habitats including small dunelands, coastal and lowland forest with an unusual pohutukawa-kowhai-puriri forest that grades into tawa-kohekohe association with emergent rata and podocarps. Scrublands and kauri-tanekaha associations are also present. • Threatened species include Hochstetter's frog, reef heron and possibly kiwi which are known to be in the wider area.	National
New Chums Recreational Reserve (TC120a)	• Coastal cliffland and modified duneland. Pingao and *Pomaderris rugosa*. NZ dotterel. • Under-represented coastal forest supporting threatened flora. • Modified dunes at the NW end of New Chum's Beach.	Regional
Wainuiototo (New Chums) Beach (TC121)	• Sand habitat above MHWS. Terrestrial sandfield. Northern NZ dotterel occupy and defend this site each breeding season. Buffers terrestrial SNA.	National
New Chum's forest (TC132)	• The New Chum's forest site covers 50.76ha of mixed habitat including duneland, coastal pohutukawa forest with nikau understorey and manuka/hardwood scrubland association in area bounding farmland to the west. Induced scrub with pockets of coastal forest found in farm outliers. Spinifex is dominant in dunelands and utilized as a refuge area by northern NZ dotterel chicks. • Originally rare sand dunes and under-represented coastal forest. Duneland represents habitat uncommon prior to settlement.	National
Pungapunga forest (TC133)	• The Pungapunga forest site covers 81.91ha of coastal pohutukawa broadleaved forest, kauri-tanekaha, induced manuka and kanuka scrub. The area is bounded by induced scrub, production pine forest, farmland and includes the Pungapunga RAP which is fenced.	Regional
Pungapunga Alluvial Outlier (TC134)	• Coastal totara-puriri forest. Nationally under-represented coastal forest. One of the few examples of alluvial forest in the Colville ED.	Regional
Pungapunga wetland (TC135)	• Raupo wetland. Regionally under-represented wetland. Links to other SNA's.	Regional
TCDC Recreational Reserve to New Chum's (TC137)	• Coastal forest. Pohutukawa dominated cliffland community. Kauri-tawa broadleaved association in main gully to south. *Senecio scaberulus*. • Under-represented coastal forest supporting threatened flora.	National
New Chums Recreational Reserve (TC137a)	• Nationally under-represented coastal forest. • Privately owned coastal pohutukawa forest, QEII covenant.	Regional
New Chums Recreational Reserve (TC137b)	• Nationally under-represented coastal (pohutukawa) forest.	Regional


Area of Interest
Other SNA
Hapapawera (TC120)
New Chums Recreation Reserve (TC120a)
Wainuiototo (New Chums) Beach (TC121)
New Chum's forest (TC132)
Pungapunga forest (TC133)
Pungapunga Alluvial Outlier (TC134)
Pungapunga wetland (TC135)
TCDC Recreational Reserve to New Chum's (TC137)
New Chum's Recreational Reserve (TC137a)
New Chums Recreational Reserve (TC137b)

APPENDIX 3 – Broad-scale vegetation communities