Boffa Miskell

Arataki Subdivision

Ecology Report
Prepared for CDL

15 July 2025

Boffa Miskell is proudly a
Toitū net carbonzero certified consultancy

Document Quality Assurance

This document may be cited as:
Boffa Miskell Limited 2025. *Arataki Subdivision: Ecology Report*. Report prepared by Boffa Miskell Limited for CDL.

For any information regarding this report please contact:
Eddie Sides | Ecology | Senior Principal | eddie.sides@boffamiskell.co.nz

Revision /version:	Issue date:	Prepared by:	Description:	Reviewed by:
Final V1	15/07/2025	Eddie Sides Senior Principal Ecology	Draft report issued to client / Revised after client review / Final report issued to client	Dr Ian Boothroyd Partner Ecology

Approved for issue:
Dr Ian Boothroyd | Ecology | Partner | 15 July 2025

Release and Reliance

This report has been prepared by Boffa Miskell Limited on the specific instructions of our Client. It is solely for our Client's use for the purpose for which it is intended in accordance with the agreed scope of work. Boffa Miskell does not accept any liability or responsibility in relation to the use of this report contrary to the above, or to any person other than the Client. Any use or reliance by a third party is at that party's own risk. Where information has been supplied by the Client or obtained from other external sources, it has been assumed that it is accurate, without independent verification, unless otherwise indicated. No liability or responsibility is accepted by Boffa Miskell Limited for any errors or omissions to the extent that they arise from inaccurate information provided by the Client or any external source.

File name & Project number: [Arataki Ecology Report Ver8.docx] BM240623

Template revision: 20230505 0000
Cover photograph: E. Sides, 2025

CONTENTS

Appendices

1.0 Introduction

1.1 Statement of Qualifications and Experience

Eddie Sides, Project Ecologist

I am a Senior Principal at Boffa Miskell Limited. Boffa Miskell is a multi-disciplinary consultancy specialising in planning, ecology and landscape architecture. I have been employed at Boffa Miskell since September 2001.

I hold the qualifications of Master of Science (Hons) from [University of Auckland, which I completed in 1994. I am a member of the New Zealand Freshwater Sciences Society.

I have 29 years of professional experience as a consulting ecologist. My experience includes assessment, management and monitoring of ecological effects of development activities including roads, subdivisions industrial and municipal projects. I have appeared as an expert witness on numerous occasions including resource consent hearings, Environment Court and Boards of Inquiry (e.g. Waterview Connection, East-West Link). Recent subdivision projects I have consulted on include Conmara Estate (Clevedon), Kahawai Point (Waiuku), Drury South (Manukau) and Pacific Heights (Orewa).

I confirm that, in my capacity as author of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

Dr Ian Boothroyd, Ecology Reviewer

I am a Senior Principal Ecologist at Boffa Miskell Limited. Boffa Miskell is a multi-disciplinary environmental consultancy specialising in planning, urban design, landscape design, ecology, biosecurity and engagement. I have been employed at Boffa Miskell since June 2014.

I hold the qualifications of BSc (Hons) Manchester University 1977), MSc Applied Hydrobiology (University of Wales, 1980) and DPhil (Waikato University, 1988). I am an appointed Fellow of the Royal Society of Biology (FRSB) and the Environment Institute of Australia and New Zealand (FEIANZ), a life member of the Freshwater Sciences Society, and a member of the Resource Management Law Association. I am a Certified Environmental Practitioner (CEnvP, Ecology).

I have 35 years of professional experience in the field of resource management, including roles such as manager environmental monitoring and compliance (Hawke's Bay Regional Council), researcher (NIWA), senior lecturer (University of Auckland, and consultant. I am also an experienced independent environmental commissioner and appointed as a Freshwater Commissioner by the New Zealand government. My experience includes environmental assessment and management and decision-making in the New Zealand environment, and I am familiar with environmental protocols, criteria and performance standards. I have led multidisciplinary teams for large and often complex projects.

My experience extends to large land management and subdivision projects, renewable energy, roading, mining, quarrying, water treatment, biodiversity management and offsets, multi-criteria assessments through to investigations and assessments, consent conditions, fast track

applications and presentation of expert evidence at hearings, Environment Court and Boards of Inquiry.

I confirm that, in my capacity as reviewer of this report, I have read and abide by the Environment Court of New Zealand's Code of Conduct for Expert Witnesses Practice Note 2023.

1.2 Description of Application Site

The site subject to this substantive application is located at 86, 108, 122 Arataki Road, Havelock North, Hawkes Bay (**site**). Comprising a total area of approximately 11ha, the site is held in three separate titles, all owned by CDL Land New Zealand Limited (**CDL**). The site is located at the eastern edge of the existing urban area of Havelock North, approximately 2.5 kilometres from the Havelock North Village Centre.

The site has a gentle crossfall from south to north and is currently used for grazing purposes. A scattering of buildings is present within the site. Vegetation (predominantly exotic species) is largely limited to garden areas around these buildings and a shelter belt alongside the eastern boundary. The site sits upon a natural terrace and the landform is elevated above the rural property to the east by approximately 6m.

The site is generally bounded by Brookvale Road to the north and Arataki Road to the west. The land to the south is used as an olive orchard, and the land to the east is used for rural and light industrial purposes. Access to the site is provided via five existing crossings along Arataki Road.

Figure 1. The Application Site, Arataki Road.

1.3 Description of the Proposal

This report is submitted in support of CDL's Substantive Application (**Application**) to the Environmental Protection Authority (**EPA**) to authorise the subdivision and development of the Arataki Extension land, located at 86, 108, 122 Arataki Road, Havelock North, Hawkes Bay (**Site**).

The proposal, which is also referred to as the '**Arataki Project**', will provide for the residential subdivision of the site to enable the development of 171 detached dwellings to contribute additional housing capacity to Havelock North and the Hawkes Bay region. The development will be supported by a local road network, pedestrian accessways, and required infrastructure. A planning design framework is proposed to facilitate residential built form development on the future lots.

The Arataki Project will comprise two phases of development. The first phase will realise the residential subdivision of the land and will be delivered by CDL. The residential subdivision and bulk earthworks phase will create 171 residential lots (average lot size 450m^2), one drainage reserve to vest, four roads to vest, three accessways to vest, 10 JOALs, bulk earthworks landform modification, infrastructure provision, buffer planting and external boundary fencing.

The second phase of development will deliver the residential built form in accordance with the planning design framework established for the site. This phase of development will be delivered by CDL's build partners and will involve house construction on individual lots and include vehicle access, parking, landscaping and fencing.

While the site is predominantly grazed pasture, the development will involve activities such as removal of trees, discharge of sediment laden water during construction and discharge of stormwater post construction to a nearby watercourse northeast of the site. It will also involve construction of stormwater treatment facilities, greenspaces and planting within the site that may have positive effects on ecological values.

The planning report prepared to support the substantive application under the FTAA provides a full description of the proposal.

The following **Ecological Report** will:

- Describe and evaluate the current ecological values of the site;
- Identify the effects of the proposed development on those values, including both adverse and positive effects;
- Assess the extent to which adverse effects will be avoided, remedied or mitigated;
- Recommend any management plans and consent conditions required for the Project.

1.4 Management Plans

We have prepared a draft Fauna Management Plan (Appendix 4) which will mitigate potential effects on native fauna. Threatened native species are unlikely to be present but could potentially utilise the trees and unmanaged areas around the margin of the site. The Fauna Management Plan comprises measures to be taken prior to vegetation removal, specifically:

- Avoidance of active native bird nests in the months November to March inclusive.
- Identification of potential bat roosting trees and acoustic checks of these prior to felling.
- Increased grazing and gradual removal of debris to reduce skink habitat suitability and encourage their movement to adjacent habitats.

2.0 Methods

2.1 Herpetofauna

Relevant data was retrieved (September 2024) from the Department of Conservation (DOC) administered BioWeb Database within a 50 km radius of the site and other resources (iNaturalist, community reports), which provides known records of herpetofauna species nationwide. We acknowledge that the absence of lizards within an area may reflect both a lack of survey effort and / or the low detectability of lizards, rather than lizards not being present.

A total of 24 tracking tunnels were deployed around the perimeter of the site on 15 April 2025. Tunnels were baited with pear/banana/apple baby food. Tunnels were placed in suitable habitats for herpetofauna, such as rank grasses and alongside wood debris. Tracking cards were replaced weekly for c. three weeks (24 days). Total survey effort was 576 tunnel/days. Cards were examined by Boffa Miskell terrestrial ecologists and the presence and frequency of herpetofauna (and also pest fauna) was recorded.

2.2 Bats

The DOC-administered BioWeb database was reviewed for records of both long-tailed and short-tailed bats within a 25 km radius of the site. However, absence of bat records in an area may be due to an absence of sampling, rather than an absence of bats.

A desktop study was undertaken which collated all observations and known distributions of avifauna within the wider landscape, and then sought to determine which of those species are likely to be residents within the site and frequent or infrequent visitors to the Site to forage or roosts.

2.3 Avifauna

Avifauna records were sourced from the Ornithological Society of New Zealand's (OSNZ) Atlas of Bird Distribution in New Zealand, grid square (6160.2840) that encompassed the site and surrounds (C. J. R. Robertson *et al*., 2007), and the eBird New Zealand Bird Atlas effort map grid squares (BH85) that shows bird records to date (Atlas Effort Map - New Zealand Bird Atlas (ebird.org). Accessed 06 September 2024). The grid square is 10 km x 10 km.

Data Limitations

The eBird New Zealand Bird Atlas effort map is a citizen science project, as such the data may be less reliable. While the accumulated observations can help confirm the presence of species in certain areas and indicate lower abundance in places with fewer observations, eBird data should be used cautiously. It's commonly used for the desktop component of avifauna assessments but shouldn't be the sole basis for these evaluations as eBird observations are generally opportunistic and tend to focus on publicly accessible areas like roads, parks, rivers, and beaches. Consequently, they often underrepresent bird abundance and distribution on private land. Additionally, the frequency of visits to each habitat varies, and the data may not cover all habitats, seasons, weather conditions, or times of day, and rarely includes night-time activity.

Boffa Miskell

www.boffamiskell.co.nz

0 250 m

1:10,000 @ A3

Data Sources: Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Proposed stormwater outfall location
- Site
- Tracking tunnels
- Stream sampling sites
- Permanent stream
- Intermittent stream

ARATAKI PLAN CHANGE

Site Overview (Ecology)

Date: 29 April 2025 | Revision: 0

Plan prepared by Boffa Miskell Limited

Project Manager: Emma.Todd@boffamiskell.co.nz | Drawn: HCo | Checked: ESi

Figure 1

Photo 1. Site, grazed with crop of turnips. 15 April 2025.

Photo 2. Debris at north end of site, potential lizard habitats.

Photo 3. Groundcover and debris under eucalypts on eastern boundary.

Photo 4. Fallen tree in eucalypt area, potential refuge habitat.

2.4 Site visits

Site visits were undertaken by Eddie Sides, Senior Ecologist at BML, on 4 September 2024 and 15 April 2025. On the first visit terrestrial ecological features within (and adjacent to) the site, and the receiving waterways downstream of the site, were observed and photographed. Vegetation and fauna habitats and potential streams and wetlands were investigated and incidentally observed avifauna species were recorded. On the second visit tracking tunnels were deployed and freshwater environments near the site were sampled.

2.5 Freshwater Ecology

Freshwater ecology surveys were undertaken at three sites on 15 April 2025 (Table 1). Habitats were described, including channel width, depth, velocity, substrate and macrophytes. Water quality parameters were recorded with a YSI Pro DSS meter. A macroinvertebrate sample was collected at each site (Protocol C2, processing protocol P3; Stark *et al*, 2001). Fish communities were surveyed using an EFM300 electrofishing machine, targeting different habitat features such as macrophyte beds, riffles, undercut banks and wood debris cover within each survey reach.

Table 1. Freshwater Survey Sites, Arataki Subdivision.

Site	**1**	**2**	**3**
Location	South of Brookvale Road	North of Brookvale Road	Thompson Road
Relation to proposed outlet	Upstream of proposed stormwater discharge	Immediately downstream of proposed discharge	Further downstream of proposed discharge
Coordinates	-39.656892, 176.902417	-39.656270, 176.901717	-39.650835, 176.897537

Photo 5. Site 1. Upstream of proposed discharge point, Brookvale Road.

Photo 6. Site 1. Upstream of proposed discharge point, Brookvale Road.

Photo 7. Site 2. Downstream of proposed discharge point, Brookvale Road.

Photo 8. Site 2. Downstream of proposed discharge point, Brookvale Road.

Photo 9. Site 3. Downstream of proposed discharge point, Thompson Road.

Photo 10. Site 3. Koura, Thompson Road.

Photo 11. Downstream of proposed discharge point at Davidson Road. Approximately 600 m downstream of site. (Google streetview).

Photo 12. Karamu Stream at Crosses Road, view downstream toward stream outlets. Approximately 2 km from site. (Google streetview).

3.0 Existing Environment

3.1 Terrestrial Vegetation and Habitats

The ecological features of the site comprise the following:

- pasture grasslands, covering most of the site (a turnip crop was present in April 2025);
- exotic trees (mainly eucalypts) on the eastern boundary and adjacent embankment;
- ornamental trees around the existing houses and driveways.

There are no wetlands on the site.

The large trees within the site provide habitat that supports general ecological values in the area. The removal of large trees could have a localised adverse ecological effect on bird populations, although effects on native species would be minor. Exotic trees are common in the surrounding landscape and while they provide ecological functions as habitat they have low indigenous biodiversity values. There are no exotic species classified as Endangered or Critically Endangered, or native species classified as threatened within the site.

The proposed stormwater outlet is located on the north side of Brookvale Road. Some ornamental shrubs and flaxes are present here.

3.2 Terrestrial Fauna

3.2.1 Herpetofauna

Bioweb[1] records were retrieved for a 50 km radius surrounding the proposed site. Within this radius, there are records for eight species of indigenous lizards, including four skink species[2] and four geckos.

No lizard species have been recorded within or adjacent to the site. Five species are known to be present within 15 km of the site (Table 2), including northern grass skink (*Oligosoma polychroma*), northern spotted skink (*O. kokowai*), Hawke's Bay skink (*O. auroraense*), ngahere gecko (*Mokopirirakau* 'southern north island") and barking gecko (*Naultinus punctatus*). In the wider area, lizard records were typically in areas of indigenous vegetation or around areas of recent infrastructure and in coastal areas. Outside these areas, herpetofauna records were scarce, likely reflecting both land use (much of the area is modified pastural grassland) and a lack of survey effort or lizard- specific investigations.

The invasive plague skink (*Lampropholis delicata*) which are classed as an "unwanted organism" (Biosecurity Act 1993), are commonly found throughout the upper North Island at high densities and are likely present within the Site. Introduced frog species, including southern bell frog and the southern brown tree frog are present in the wider area and may be present

[1] Bioweb database accessed September 2024.

[2] Hawke's Bay, Kupe and Newman's speckled skink are considered likely all the same species, part of the speckled skink complex.

within the Site. These species are non-native species and as such are not a constraint to the proposed development and are not further considered for this assessment.

Table 2. Lizard species potentially present within 15 km of the site.

Species	Common name	Threat class (National)	Nearest record	Preferred habitats
Oligosoma polychroma	Northern grass skink	Not Threatened	Cape Kidnappers	Dry open areas with low vegetation (e.g., grasslands) or debris such as logs or stones for cover
Oligosoma kokowai	Northern spotted skink	At Risk - Relict	Haumoana Beach	Boulder beaches, sand dunes, open coastal forest and scrub, as well as grassland, shrubland and scree slopes at inland sites
Oligosoma auroraense	Hawke's Bay skink	Threatened – Nationally Endangered	Cape Kidnappers/Te Mata Peak	Coastal dunes, grassland, shrubland, scrub, pasture, and the edges of coastal forest.
***Mokopirirakau* "southern North Island"**	Ngāhere gecko	At Risk - Declining	Cape Kidnappers	Forest and scrub, especially kānuka / mānuka
Naultinus punctatus	Barking gecko	At Risk - Declining	Cape Kidnappers	Forest and scrub, especially kānuka / mānuka.

The proposed development area is predominantly pastural land, subjected to grazing and ploughing. Grazed (low stature) pasture is not considered to provide cover and food resources suitable to support indigenous lizard populations. Within these areas, there are areas where stock may be unable to grazed and rank grass is present (e.g. along fencelines) and artificial and natural debris (e.g., around buildings, ornamental gardens, and wood piles). These areas can provide potential habitat for northern grass skink which are more tolerant of disturbance and modified habitat. Hawkes Bay skink has also been recorded in dense grass habitats throughout their known distribution in the North Island.

Vegetation present, including the eucalyptus trees and native and exotic garden/amenity plantings around the residential dwellings may provide some suitable habitat, however, is very unlikely to have arboreal geckos given its isolation from any known or suitable gecko habitat in the surrounding area. Unmanaged rank grass or leaf litter habitats under eucalyptus trees and amenity plantings provide potential habitat for northern grass skink, and potentially other species as noted above.

Based on this desktop assessment, there is low probability of herpetofauna species being present in the grazed areas; moderate probability of the common skink species (northern grass skink) being present in the ungrazed areas; and a low probability of threatened species such as Northern spotted skink or Hawke's Bay skink being present, because of their limited distributions.

Tracking tunnel results

A total of 72 cards were collected, each being deployed for one week. The fauna and frequencies are recorded in Table 3.

Table 3. Tracking tunnel results, fauna identified and their frequency.

	Lizard	Mouse	Rat	Hedgehog	Mustelid	Invertebrates
Week 1	0	9	3	1	0	20
Week 2	0	14	3	2	0	15
Week 3	0	16	6	0	0	15
Total	0	39	12	3	0	50
Frequency (n=72)	0.00	0.54	0.17	0.04	0.00	0.69

No lizards were detected over the three weeks of surveying. This indicates that lizards are unlikely to be present.

Predator species were also consistently detected, with mice being the most common followed by rats and hedgehogs. All are known to predate on lizards. The predator data was incidental to the lizard survey and did not use a standard pest survey methodology, so we cannot comment on predator density.

3.2.2 Bats

The closest long-tailed bat (*Chalinolobus tuberculatus*) records are c. 19 km to the south of the site at Mohi bush in 2016. The site is within the potential foraging range of populations recorded at this site. There are no short-tailed bat (*Mystacina tuberculata*) records within 25 km of the site. There is generally a lack of survey data for bats around the coastal Napier, Hastings and Havelock North areas, and suitable bat habitats may not have been surveyed.

Vegetation within the site includes a stand of eucalyptus trees along the eastern border of the site, and amenity planting around the two houses. There are several macrocarpa trees, which often contain suitable refuge features such as cavities that may provide roosting opportunities. Other large trees may also have roost features.

Considering the distance to known bat populations and the limited suitable habitats present within the site and the surrounding area, long-tailed bats are unlikely to be utilizing the site for roosting or foraging. The habitat is unsuitable for short-tail bats, which prefer indigenous forest habitats.

3.2.3 Avifauna

Habitats for avifauna within the site and the surrounding landscape include pasture and predominantly exotic trees and shrubs.

A total of 38 species of indigenous birds were identified within the local OSNZ and eBird grid-square. Native bird species observed during the site visit were kererū (*Hemiphaga novaeseelandiae*) and pūkeko (*Porphyrio m. melanotus*). An additional 19 species of exotic birds were recorded (Appendix 1).

Of the 38 indigenous bird species on record, 22 are classified as Not Threatened, 11 are classified as At-Risk and five are classified as threatened under the New Zealand Threat

Classification System (Robertson *et al*., 2021). The site is unlikely to provide habitat for these threatened species, although several of these species may traverse the site at times.

While habitats on the site are unfavourable for most native species, species such as cormorant and heron (due to proximity to the coast/Tukituki River) may utilise the large trees and during construction, banded dotterel (which are known to be present in the area) may potentially nest in the earthworks area.

3.3 Streams and Wetlands

There are no wetlands or streams within the site.

The downstream receiving environment for stormwater from the project site is a modified rural stream that originates as a drain along the toe of the batter slope on the eastern side of the site. It passes under Brookvale Road via a culvert and continues for approximately 750 m to join the Mangateretere Stream near Thompson Road. This stream then continues for about 1150 m to the Karamu Stream. There is also a connection (Crombie Drain) that runs westwards parallel to Brookvale Road, passing under Davidson Road (Photo 11) and Romanes Drive to join Karituwhenua Stream just before entering the Karamu Stream (Photo 12).

3.3.1 Literature Review

Fish

The Hawkes Bay Regional Council website shows records for brown trout (possibly misidentified rainbow trout; HBRC, 2013), inanga and shortfin eel in the Mangateretere Stream on the upstream side of Thompson Road sampled in 2004; and common bully, common smelt, inanga and longfin eel recorded on the downstream side of Thompson Road in 1990. This indicates habitat, water quality and accessibility were suitable for a wide range of fish species. This data is relatively old and may not reflect present values.

The Karamu Stream is an important lowland waterway that also contains a range of fish species (shortfin and longfin eels, common bully, common smelt, inanga and brown trout have been recorded; Hawkes Bay Regional Council website). Riparian planting has been undertaken along this stream to improve its ecological health.

Macroinvertebrate Communities

Hawkes Bay Regional Council (2013) reported data from 2004 for the Mangateretere Stream sampled near its confluence with the Karamu Stream, the MCI score being 72.

Hawkes Bay Regional Council (2016a, 2016b) carried out a study entitled "*Life Supporting Capacity in Lowland Streams With a focus on the Karamu Catchment*" in 2016.

Macroinvertebrates indicated consistently poor conditions in lowland streams in the area, with 13 out of 16 sampling sites being in the poor range for Macroinvertebrate Community Index and 15/16 for Quantitative Macroinvertebrate Community Index. The Herehere and Louisa Streams were the nearest and most similar sites to the receiving environment to the Arataki development and had MCI-sb scores of 65.7 and 49.8 respectively, and low values for other metrics.

This evidence indicates that water quality factors (probably associated with landuse activities) are having adverse effects on stream ecosystems including a reduction in sensitive species.

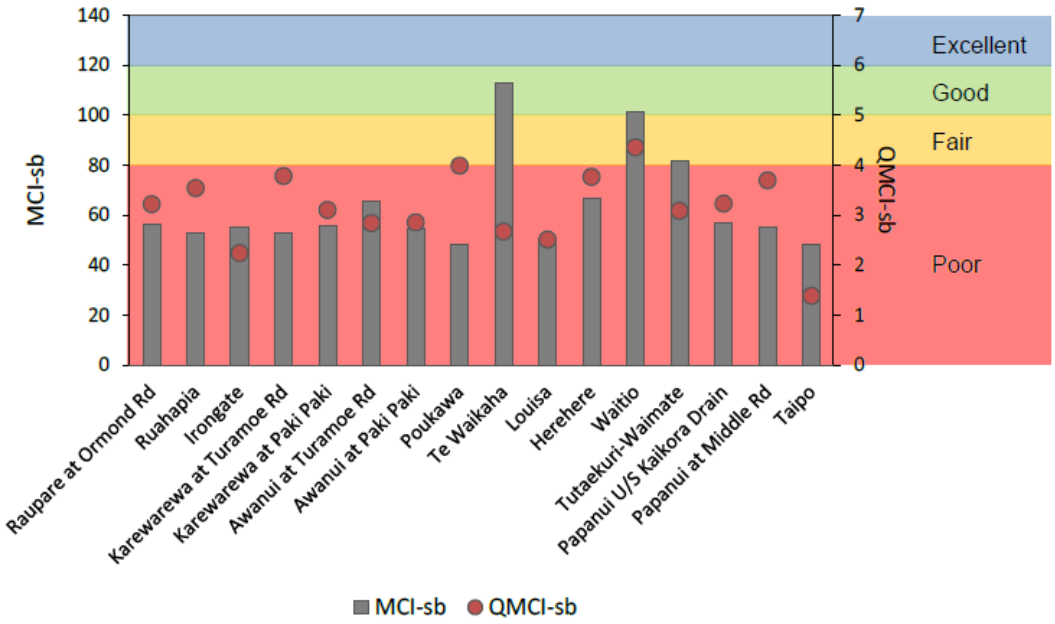


Figure 3. Macroinvertebrate community index results from Hawkes Bay Regional Council (2016).

3.3.2 Freshwater Ecology Surveys

Stream habitat at Site 1 (upstream of Brookvale Road; Photo 5 and 6) was limited, comprising only a pool above the culvert and about 30 m of wetted channel. Beyond this the channel did not have surface water but did have a defined channel that is likely to hold water seasonally. The watercourse here was a straight channel with a mud substrate, no flow velocity, some duckweed, and riparian vegetation comprising grasses and willows (Table 4). Water quality parameters were in the normal range and water clarity was high. Sediment appeared anaerobic. Several shortfin eels were recorded in the pool above the culvert. Only 12 macroinvertebrate taxa were recorded, no EPT and only 1.2% of individuals were insects (generally more sensitive than non-insect taxa; Table 4). Dominant fauna were snails (48%), followed by worms (33%) and Nematodes (13%)(Figure 4). The MCI-sb was only 51, indicating a pollution-tolerant macroinvertebrate community adapted to very poor conditions (see Appendix 2 for data).

Stream habitat at Site 2 (downstream of Brookvale Road; Photo 7 and 8) comprised a wide shallow channel largely overgown with water celery (*Apium* spp). The watercourse here had a mud substrate, no flow, some duckweed and green filamentous algae (<10% cover), and riparian vegetation consisting of grasses (Table 4). Water quality parameters were in the normal range and water clarity was high. Sediment appeared anaerobic. Shortfin eels were recorded but were rare. Only 13 macroinvertebrate taxa were recorded, no EPT and only 0.3% were insects (Table 4). Dominant fauna were ostracods (47%), followed by worms (25%) and Nematodes (22%). The MCI-sb was only 57, indicating a pollution-tolerant macroinvertebrate community adapted to very poor water quality conditions.

At Site 3 (Mangateretere Stream; Photo 9 and 10) the freshwater habitat was a large, moderate velocity stream with a sand and gravel bed and a range of macrophyte species including duckweed, *Apium*, *Ceratophyllum*, starwort, and pondweed (*Potamogeton* sp). Water quality parameters were in the normal range and water clarity was high. Fish recorded were shortfin eel, longfin eel, and inanga. Koura were abundant in the macrophyte beds. Only 14 macroinvertebrate taxa were recorded, no EPT and only 0.6% were insects (Table 4). Dominant fauna were amphipods (72%), followed by worms (17%). The MCI-sb was only 44, indicating a pollution-tolerant macroinvertebrate community adapted to very poor water quality conditions.

Table 4. Freshwater survey results, Arataki project area.

Site	**1**	**2**	**3**
Location	Upstream	Downstream	Mangateretere Stream
Habitat			
Width (m)	0.4	3.5	5
Depth (m)	0.2	0.1	0.3
Velocity	still	still	moderate
Substrate	mud	mud	Sand 80%, gravel 15%, cobble 5%
Riparian vegetation	grass, willows	Emergent plants	
%Shade	50	30	20
Macrophytes	duckweed	*Apium*, duckweed, green filamentous algae	Duckweed, *Apium*, *Ceratophyllum*, starwort, pondweed
Water Quality			
Temperature (°C)	17.2	16.0	15.8
DO (mg/L)	6.3	5.0	5.8
DO%	65	50	58
Conductivity (us/cm)	248	233	235
pH	7.2	6.9	6.7
Fish Communities			
Fish species and occurrence	Shortfin eel (c)	Shortfin eel (r)	Shortfin eel (o)
	-	-	Longfin eel (r)
	-	-	Inanga (c)
	-	-	Koura (a)
Macroinvertebrates			
No. of Taxa	12	13	14
EPT Richness	0	0	0
% Insecta	1.8	0.3	0.6
MCI-sb	51	57	44
Composition	Mollusca 48% Oligochaeta 33% Nematoda 13%	Ostracoda 47% Oligochaeta 25% Nematoda 22%	Amphipoda 72% Oligochaeta 17%

R= rare; O=occasional; C= common; A= abundant

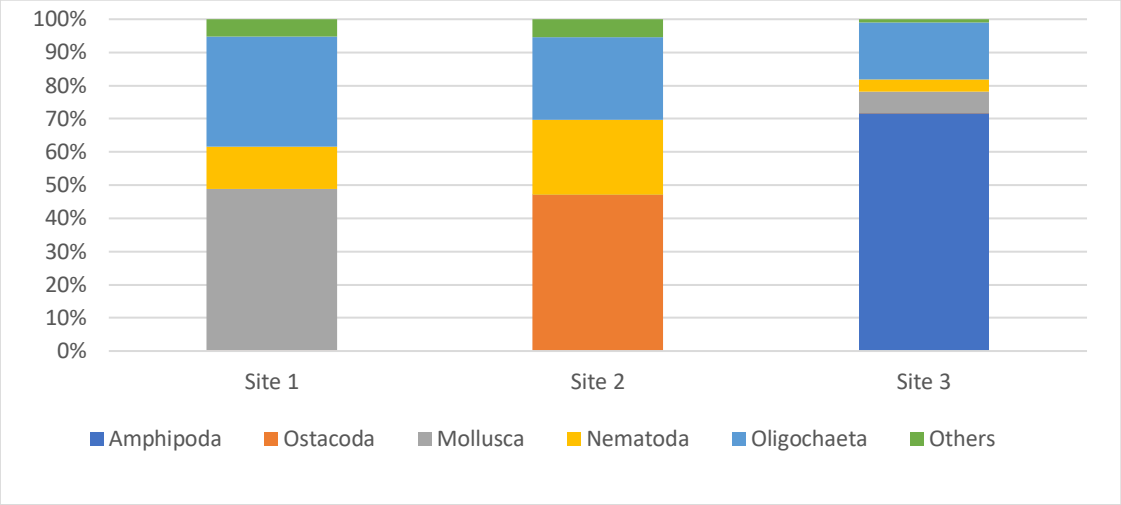


Figure 4. Macroinvertebrate Community Composition. Site 1 is upstream of Brookvale Road, Site 2 is downstream of Brookvale Road and the proposed stormwater discharge from the Arataki subdivision, and Site 3 is in the Mangateretere Stream.

4.0 Proposed Activities and Mitigation

4.1 Vegetation

It is proposed to remove all trees within the project area to facilitate bulk earthworks and to remove future hazards from limb and treefalls in a residential area. A small number of trees may be retained in areas where earthworks are not required such as the northern part of the site adjacent to the proposed Stormwater Reserve. Some small shrubs may potentially be transplanted within the site. The retention of such a small number of trees will not reduce the ecological effects. The majority of trees are exotic species located around the periphery of the site.

It is proposed to mitigate the effects by undertaking targeted fauna checks prior to felling (identification of potential bat roosting trees and acoustic monitoring and avoiding the main bird nesting season or identifying and avoiding active nests), and by undertaking replanting. The current street design identifies over 200 street trees, and there will be further planting within the stormwater reserve, landscaped buffer and recreational areas resulting in a similar number of trees before and after development. Vegetation cover will be considerably increased by future private garden planting.

4.2 Sediment Discharge

Land disturbing activities such as earthworks can result in increased sediment generation during rainfall events. The removal of vegetation cover allows easier mobilisation of sediment which is then carried into streams where elevated suspended sediment concentrations and sediment deposition on the streambed can have adverse effects on fauna and habitats.

The site is relatively flat and does not have any streams or wetlands, factors that significantly reduce potential for sediment runoff into waterways. Erosion and sediment control practices will further reduce sediment generation and yield. These controls have been designed in accordance with Hawkes Bay Regional Council Erosion and Sediment Control Guidelines (2009). Control devices comprise super silt fences (13% of site), decanting earth bunds with flocculation (19% of site) and sediment retention ponds with flocculation (68% of site; Woods, 2025b). It is also proposed that 56% of the site will discharge to the dry basin during construction, which will act and an impoundment area (no outlet) with the water used for dust control. Earthworks will have a limited duration and will be carried out in a staged manner. Following earthworks, land will be immediately stabilised by grassing. These measures will minimise sediment generation and yield during construction. In the long term, urbanisation is likely to result lower sediment yield than agricultural landuse (MfE, 2019).

4.3 Stormwater

Stormwater will be generated during rainfall events and can have quantity and quality effects in stream receiving environments. Impervious surface cover such as roofs, roads and driveways will reduce infiltration and increase surface runoff. Catchment urbanisation can result in reduced stream baseflows, increased peak flows, channel erosion and elevated contaminant concentrations (e.g. trace metals, hydrocarbon, sediment and bacteria (https://www.waikatoregion.govt.nz/environment/water/stormwater/).

Stormwater contaminants are higher where traffic volumes are high, and these are likely to be relatively low within this development. The expected impervious surface cover will be a maximum of 60%.

At the proposed Brookvale Road stormwater discharge point the Arataki project area is about 50% of the stream catchment. At the first stream confluence about 300m further downstream, the Arataki project area contributes about 7% of the stream catchment and at the Mangateretere Stream confluence with the Karamu Stream, about 3%. The Karamu Stream has a catchment area from source to sea of 490 km^2 (HBRC, 2016b) and the project area contributes less than 0.01%. This shows that stormwater from the project catchment is likely to have an influence on the flow regime and water quality in the immediate receiving environment near the discharge point. The influence of the discharge on the receiving stream would decrease with distance downstream (as the catchment area and stream size increases) and would be negligible in the Karamu Stream.

Peak runoff volumes will be attenuated in a water storage basin at the northern end of the site and a second basin in subcatchment B (East), which will store and slowly release water. This basin is a communal dry detention device designed to meet the objectives and requirements of the HDC and HBRC guidance documents (Woods, 2025b). Water from this basin will discharge via a 600 mm pipe to a bubble-up scruffy dome system located about 6 m from a stream on the northern side of Brookvale Road (Figure 2). This design will minimise discharge velocity and therefore potential erosion and erosion protection required at the outfall up to the 1% AEP event. The structure will be located within the road reserve and vegetation removal will be minimal (perhaps two bushes but no trees), and replaced with screening vegetation as required (Woods, 2025b).

Stormwater quality treatment will be provided by a proprietary Gross Pollutant Trap or GPT device in Subcatchment B (East), and raingardens within the kerb buildouts on Arataki Road for Subcatchment A (West). The treatment train provided by the GPT and Dry Basin will remove an estimated 84% of total suspended sediment (TSS) as associated contaminants (Woods,

2025a). These systems have been designed to meet or exceed the objectives and requirements of the HDC and HBRC guidance documents (Woods, 2025a).

5.0 Assessment of Effects

5.1 Summary of Ecological Values

Habitat on the site is generally unfavourable for native fauna and is limited to trees around existing buildings and the eucalypts and unmanaged grass on the eastern side of the site. There is a low probability of longtailed bats being present, and moderate probability of native birds in low numbers during the nesting season, and low probability of native skinks such as the northern grass skink in the unmanaged grass areas (the grazed or cropped pasture areas are unsuitable habitat for skinks). Overall, the indigenous biodiversity values for terrestrial and avifauna are very low. The receiving stream environment for stormwater at Brookvale Road is a modified channel with low fish biodiversity and macroinvertebrate metrics indicating poor environmental conditions. This stream is in very poor condition and the ecological communities have low sensitivity to potential effects of the project.

5.2 Assessment of Effects

5.2.1 Vegetation Removal

Clearing of exotic trees will not result in any adverse effects indigenous vegetation values.

The rough pasture, fallen branches and other debris below the trees may provide habitat for skinks, although none were detected in our tracking tunnel survey. We do not recommend further surveys or capture and relocation. Given the findings of our assessment, we recommend that staged habitat removal is an appropriate fauna management method to facilitate the proposed development. This can occur by intensifying grazing in these areas, and hand removal of light debris followed by machine removal of heavy debris. This will degrade habitats within the normal permitted farm management activities whilst allowing an opportunity for any potential lizards near the boundary to move to more favorable refuge cover outside the boundary. This approach is precautionary given that no lizards have been detected. It does not involve any relocating, handling or moving lizards. This approach is aligned with preliminary feedback received from the Hawke's Bay Regional Council ecologist. In our assessment this approach will manage potential effects on indigenous herpetofauna to a Very Low level.

There is a low probability of long tailed bats roosting on the site, with macrocarpa trees being identified as potential roost habitat. These bats travel significant distances and move roost trees frequently and have the highest national threat classification (Threatened – Nationally Critical), and a precautional approach is appropriate. We recommend pre-felling bat roost checks in accordance with the DOC Bat Roost Protocols (DOC, 2024). This will involve identification of potential roost trees (i.e. macrocarpa), and acoustic checks immediately prior to felling to ensure no roosting bats are present. In our assessment his will reduce the potential effects on long-tailed bats to Very Low.

There is a low probability of native birds nesting in the trees, and a very low probability of any threatened native species. To manage potential effects, we recommend a precautionary approach. We recommend that if earthworks and vegetation clearance is undertaken during the bird nesting season (August – March), nest checks of all trees should be undertaken to determine if native birds are nesting. If active native bird nests are detected, works must cease in a 20m buffer around the nest until chicks have fledged or the nest has failed. In our assessment the avoidance of nesting birds will reduce the potential effects on indigenous species to Very Low.

5.2.2 Sediment Discharge

We understand that bulk earthworks will be undertaken in two phases across six works stages (Woods, 2025b). All earthworks will be managed by an Erosion and Sediment Control Plan. The first stage will see the Phase 1 bulk earthworks undertaken over the entire footprint of each stage with secondary Phase 1 Civil Works requiring road gulleting and trenching. This will allow earthworks to be completed as quickly and efficiently as possible. The site is relatively flat and stable, and the depth of earthworks is relatively shallow (e.g. 1 m to 2.5 m). The soils include topsoil over underlying silty sand and sandy gravel. These characteristics provide permeability, reducing surface runoff volume that can transport sediment; low slope and runoff velocity, reducing erosion potential; and a lower proportion of fine suspendable clay particles that are difficult to remove. These factors suggest a lower generation of suspended sediment, and relatively efficient sediment control. The receiving environment is a soft-bottomed stream containing relatively tolerant ecological communities. The stream has low flow and therefore low capacity to dilute and disperse sediment, so discharges may result in localised sediment deposition and temporary reduction in abundance invertebrates in the immediate vicinity of deposition. Such effects would be temporary and would not constitute significant effects on ecological values. Any sediment that does accumulate in this low-gradient channel can be mechanically removed. Any suspended sediment reaching the Mangateretere Stream or the Karamu Stream during a high-flow event would be diluted and dispersed and would not have any adverse effects.

Earthworks will also be required for the construction of the stormwater discharge outfall on the north side of Brookvale Road. This will be a riser and scruffy dome discharging to a rock flowpath (Appendix 3). This will not involve works in the watercourse. This work will be completed during stage 1. Full sediment control measures will be in place in accordance with the Erosion and Sediment Control Plan during the installation of the pipework and scruffy dome.

5.2.3 Stormwater

Stormwater volumes from the Arataki development will be attenuated by a stormwater dry detention basin. The basin has been designed to undertake the following:

- 2-year and 10-year - attenuation of the post-development peak discharge to pre-development
- 100-year - attenuation of the post-development peak discharge to 80% of pre-development

This reduced peak flow for the 100-year rainfall event also reduces the risk of channel erosion in the downstream receiving environment (Woods, 2025a). In summary, increased impervious

surface will result in faster runoff, but flows will be attenuated to a level that is unlikely to cause erosion in the receiving environment.

Baseflows from groundwater probably will not change much. This may cause some increased flushing of fine sediment from the channel at Brookvale Road. This may increase conveyance but will not adversely affect habitat quality or ecological values. In our assessment the level of potential effects on ecological values from stormwater quantity changes is Very Low.

Stormwater contaminant loads will increase as a result of the development. The low slope of the site will tend to reduce entrainment and promote particle settlement processes, attenuating potential contaminant loads. Treatment to reduce contaminant loads will include raingardens on Arataki Road as a first flush treatment and a treatment train, for the bulk of the developed area, consisting of a baffle box proprietary devices and the dry basin which together provide a calculated 84% TSS removal rate. The ecological communities in the receiving environments are relatively tolerant of potential effects due to existing environmental conditions, including high water temperature and low dissolved oxygen, identified as the most important stressors in streams in the Karamu catchment by HBRC (2016). The receiving environment has low flows and low dilution capacity, so there may be some localised effects arising from water quality changes, but these are likely to be localised and not affect ecological values such as biodiversity or functions to any significant degree. Effects from changes to stormwater quality on ecological values are likely to be very low.

5.2.4 Planting

Planting of public open spaces, stormwater reserves, landscaped buffer or other areas within the site will provide an opportunity for improving ecological values. Amenity planting in streets and private gardens is likely to significantly increase overall vegetation cover, resulting in an increase in biodiversity and ecological function by increasing habitat complexity and structure and the diversity of resources, for example feeding, roosting and nesting habitats for birds. Planting will include native species, but only a small improvement in indigenous biodiversity values is likely. Planting species that provide food resources could potentially benefit native birds such as tui and kereru. The density of rat and cat populations will increase and result in increased predation. Overall, we expect an improvement in ecological functions (e.g. general species diversity) but only a slight benefit for indigenous species, limited to those species adaptable to urban environments such as tui.

5.3 Effects Management Hierarchy

The site and the freshwater receiving environment have low ecological values and potential effects can be avoided or minimised following the Effects Management Hierarchy approach. The following measures are proposed to avoid adverse effects on ecological values:

Actions to Avoid effects:

- Pre-clearance checks for bird nests;
- Pre-clearance checks of potential roost trees for long-tailed bats;
- Avoid in-stream works through off-line stormwater outfall design.

Actions to Minimise effects:

- Habitat management to reduce risk of potential effects on skinks, if any.
- Erosion and sediment control during earthworks to minimise effects on downstream environments.
- Detention Peak flow attenuation using a stormwater detention basin.
- Stormwater quality control measures.

5.4 Requirements of the NESF and NPS-FM

There are no streams or wetland within the site or wetlands within 100 m of earthworks, so provisions of the NESF and NPS-FM relating to drainage of wetlands; taking, use, damming or diversion, or discharge of water; earthworks or vegetation clearance; either within or outside but within a 10m setback, or within a 100 m setback, do not apply.

5.5 Plan Change 9

Hawkes Bay Regional Council issued Plan Change 9 related to water management in the Tūtaekurī, Ahuriri, Ngaruroro and Karamū (TANK) catchments on 9 September 2022 (it currently has legal effect pending appeals). The plan change contains provisions that target erosion control to reduce the adverse of sediment on aquatic ecosystems, and to improve management of stormwater to reduce adverse effects of urban runoff.

As there are no natural streams within the development site, objectives in Plan Change 9 relating to riparian management, shading, and rural land uses (such as agriculture or horticulture) are not directly applicable. However, the project recognises the sensitivity of the downstream receiving environment and the need to minimise additional pressures on water quality with a long-term goal of catchment wide improvement. In response, the proposal incorporates a high standard of sediment control during construction and robust operational stormwater treatment, meeting or exceeding current HBRC best practice guidelines. Measures include site-wide erosion and sediment controls, primary treatment via flocculated sediment retention ponds, and the capture and reuse of runoff from 56% of the construction area for re-use for dust control.

Post-construction, a treatment train approach is proposed, combining devices such as rain gardens and an attenuation basin with proprietary devices, which are expected to remove greater than 80% of total suspended solids and associated contaminants. These measures will reduce contaminant loads from the development and represent a meaningful contribution toward the high-level objectives of improving water quality over the long term across the Karamū catchment.

6.0 Conditions of Consent

The following bullet points list matters that should be addressed in appropriate resource consent conditions in order to minimise potential ecological effects:

General Works:

- Undertake vegetation clearance in accordance with the Fauna Management Plan.
- Ensure sediment and erosion control measures are implemented in accordance with an erosion and sediment control plan.
- Take all practical measures to prevent contaminants from entering any watercourses during site works.

Stream Works:

- Design the stormwater discharge device to minimise the risk of erosion within the watercourse.
- Provide a discharge device construction methodology and erosion and sediment control plan to minimise the volume of sediment entering the stream during construction.
- Prepare a spill management plan detailing spill prevention measures and response procedures in the event of accidental discharges of contaminants to the watercourse.

7.0 Conclusions

In summary, there are no streams or wetlands on the site, and downstream ecosystems comprise modified lowland streams that have low sensitivity to future sediment or stormwater discharges. Terrestrial habitats comprise grazed or cropping land with peripheral trees and unmanaged grasses, which have negligible indigenous vegetation values low potential to support indigenous fauna other than native birds such as pukeko and kereru (observed on site).

The project will involve vegetation removal, earthworks, discharge of sediment during construction, and discharge of stormwater from the residential development. Some characteristics of the site tend to attenuate potential construction and development effects, such as flat topography, and permeable soils reducing potential erosion and runoff. The site has limited vegetation and low fauna habitat cover. Several standard practices are proposed to avoid or minimise potential effects, including pre-clearance checks for birds nests and bat roosts; lizard habitat management; erosion and sediment control practices; and stormwater detention and treatment. Some of these measures are precautionary, but all will reduce actual and potential effects and will comply with regional standards and practices.

Sediment and urban stormwater are likely to have localised effects on the stream receiving environment, but effects on ecological values such as habitat quality, biodiversity, or ecosystem

functions are likely to be Very Low. Effects on indigenous vegetation values will be negligible, while effects on native fauna will also be Very Low with management practices employed to minimise potential effects.

The current degraded state of the receiving environment is acknowledged, particularly in relation to macroinvertebrate communities and the vulnerability of species such as *kōura* to sedimentation. While the ecology assessment noted the low sensitivity of the receiving environment, this reflects that the stream has already experienced significant modification and has a limited capacity to support diverse ecological values in its current state. Nonetheless, the Arataki Project incorporates a comprehensive suite of mitigation measures, both during construction and long-term operation, to manage the potential for adverse effects and to support the broader direction of catchment wide improvement.

In our assessment the potential ecological effects of this project have been identified, investigated and assessed and will be avoided or managed to a level of Very Low or Negligible.

8.0 References

DoC, 2024. Protocols for minimising the risk of felling occupied bat roosts (Bat Roost Protocols). Approved by the New Zealand Department of Conservation's Bat Recovery Group. Version 4: October 2024.

Hawkes Bay Regional Council, 2009. Hawke's Bay Waterway Guidelines Erosion and Sediment Control. Prepared by Aqua Terra International Ltd. HBRC Plan Number 4109. April 2009.

Hawkes Bay Regional Council,2016a. Life Supporting Capacity in Lowland Streams With a focus on the Karamu Catchment. Environmental Science - Water Quality and Ecology. HBRC Report No. RM16-05 – 4782 January 2016.

Hawkes Bay Regional Council, 2016b. Ngaruroro, Tutaekuri, Karamu River and Ahuriri Estuary Catchments State and Trends of River Water Quality and Ecology. HBRC Report No. RM 16-08. Plan Number 4787. Environmental Science - Water Quality and Ecology. July 2016.

Hawkes Bay Regional Council, 2013. Karamu Characterisation Report Supporting Information for Water Allocation HBRC Report No. EMT13/24 – 4557. November 2013.

MfE, 2019. Sediment Attributes and Urban Development. Prepared by Morphum for Ministry for the Environment. Project number P02173. September 2019.

Robertson, C.J.R. & Bull, P.C., 2007. The Atlas of Bird Distribution in New Zealand.

Stark, J. D.; Boothroyd, I. K. G; Harding, J. S.; Maxted, J. R.; Scarsbrook, M. R. 2001: Protocols for sampling macroinvertebrates in wadeable streams. New Zealand Macroinvertebrate Working Group Report No. 1. Prepared for the Ministry for the Environment. Sustainable Management Fund Project No. 5103. 57p

Woods, 2025a. Stormwater Management Plan Arataki Project. Prepared for CDL. May 2025

Woods, 2025b. Infrastructure Report, Arataki Project. Prepared for CDL. May 2025

Appendix 1: Bird Records

All 38 indigenous birds recorded within the Study Area, and which may be present within the proposed Mt Harriet Wind Farm Site (eBird and OSNZ grid square). Primary habitat used by each species is shaded dark green and secondary habitat is shaded light green. List sorted by National Conservation status (Robertson et.al., 2021).

SPECIES - Robertson et al. 2012	Scientific Name	CONSERVATION STATUS - Robertson et al. 2021	Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential	OSNZ Bird Atlas	eBird Grid Square	BML Site Visit 29.08.2023
Kōtuku | White heron	*Ardea alba*	Nationally Critical									✓		
New Zealand dabchick | Weiweia	*Poliocephalus rufopectus*	Nationally Increasing										✓	
Long-tailed cuckoo | Koekoeā	*Eudynamys taitensis*	Nationally Vulnerable									✓		
Grey duck | Pārera	*Anas superciliosa*	Nationally Vulnerable									✓		
Caspian tern | Taranui	*Hydroprogne caspia*	Nationally Vulnerable									✓		
White-fronted tern | Tara	*Sterna s. striata*	At Risk - Declining									✓		
Red-billed gull | Tarāpunga	*Larus novaehollandiae scopulinus*	At Risk - Declining									✓	✓	
New Zealand pipit | Pīhoihoi	*Anthus n. novaeseelandiae*	At Risk - Declining									✓	✓	
Black-billed gull | Tarāpuka	*Larus bulleri*	At Risk - Declining									✓	✓	
Banded dotterel | Pohowera	*Charadrius bicinctus bicinctus*	At Risk - Declining									✓	✓	
New Zealand falcon | Kārearea	*Nestor meridionalis septentrionalis*	At Risk - Recovering									✓	✓	
Little shag | Kawaupaka	*Phalacrocorax melanoleucos brevirostris*	At Risk - Relict									✓	✓	
Black shag | Māpunga	*Phalacrocorax carbo novaehollandiae*	At Risk - Relict									✓		
Black-fronted dotterel	*Elseyornis melanops*	At Risk - Naturally Uncommon										✓	
Royal spoonbill | Kōtuku ngutupapa	*Platalea regia*	At Risk - Naturally Uncommon										✓	
Little black shag | Kawau tūī	*Phalacrocorax sulcirostris*	At Risk - Naturally Uncommon									✓		

SPECIES - Robertson et al. 2012	Scientific Name	CONSERVATION STATUS - Robertson et al. 2021	Native forest	Exotic Forest	Scrub / shrubland	Farmland / open country	Freshwater / wetlands	Coastal / Estuary	Oceanic	Urban/Residential	OSNZ Bird Atlas	eBird Grid Square	BML Site Visit 29.08.2023
White-faced heron | Matuku moana	*Egretta novaehollandiae*	Not Threatened									✓	✓	
Welcome swallow | Warou	*Hirundo n. neoxena*	Not Threatened									✓	✓	
Swamp harrier | Kāhu	*Circus approximans*	Not Threatened									✓	✓	
Spur-winged plover	*Vanellus miles novaehollandiae*	Not Threatened									✓	✓	
Silvereye | Tauhou	*Zosterops lateralis lateralis*	Not Threatened									✓	✓	
Shining cuckoo | Pīpīwharauroa	*Chrysococcyx l. lucidus*	Not Threatened									✓	✓	
Sacred kingfisher | Kōtare	*Todiramphus sanctus vagans*	Not Threatened									✓	✓	
Purple swamphen | Pūkeko	*Porphyrio m. melanotus*	Not Threatened									✓	✓	
Pied stilt | Poaka	*Himantopus h. leucocephalus*	Not Threatened									✓	✓	
Paradise shelduck | Pūtangitangi	*Tadorna variegata*	Not Threatened									✓	✓	
North Island tomtit | Miromiro	*Petroica macrocephala toitoi*	Not Threatened									✓		
North Island fantail | Pīwakawaka	*Rhipidura fuliginosa placabilis*	Not Threatened									✓	✓	
New Zealand wood pidgeon | Kererū	*Hemiphaga novaeseelandiae*	Not Threatened									✓	✓	
Parsons bird | Tui	*Prostemadera novaeseelandiae*	Not Threatened									✓	✓	
Morepork | Ruru	*Ninox n. novaeseelandiae*	Not Threatened									✓	✓	
Grey warbler | Riroriro	*Gerygone igata*	Not Threatened									✓		
Grey teal | Tētē-moroiti	*Anas gracilis*	Not Threatened										✓	
Australasian shoveler	*Spatula rhychotis*	Not Threatened									✓	✓	
Black-backed gull | Karoro	*Larus d. dominicanus*	Not Threatened									✓	✓	
Australasian gannet	*Morus serrator*	Not Threatened									✓		
Black swan | Kakīānau	*Cygnus atratus*	Not Threatened									✓	✓	
Bellbird | Korimako	*Anthornis m. melanura*	Not Threatened									✓		

Appendix 2: Macroinvertebrate Data

Macroinvertebrate Identification and Counts							
Protocol P3: Full Count with Subsampling Option							
Taxon			MCI HB	MCI SB	Site 1 U/S Brook	Site 2 D/S Brook	Site 3 Thompson ES
Hemiptera	Veliidae	Microvelia	5	4.6	50	57	-
Odonata: Zygoptera		Xanthocnemis	5	1.2	-	-	3
Diptera	Ceratopogonidae	Ceratopogonidae	3	6.2	-	1	-
	Chironomidae	Chironomus	1	3.4	1	-	-
		Orthocladiinae	2	3.2	-	-	12
		Tanytarsini	3	4.5	-	-	2
	Simuliidae	Austrosimulium	3	3.9	-	-	7
Crustacea	Paracalliopiidae	Paracalliope	5	-	-	-	2,815
Ostracoda	Ostracoda	Ostracoda	3	1.9	4	8,183	1
Mollusca	Lymnaeidae	Lymnaeidae	3	1.2	12	6	-
	Physidae	Physa = Physella	3	0.1	120	7	60
	Tateidae	Potamopyrgus	4	2.1	1,224	3	189
Bivalvia	Sphaeriidae	Sphaeriidae	3	2.9	1	-	3
Acarina = Acari		Acari	5	5.2	14	3	-
Collembola		Collembola	6	5.3	-	2	-
Hirudinea		Glossiphonidae	3	1.2	44	365	3
Coelenterata		Hydra	3	1.6	-	2	-
Nematoda		Nematoda	3	3.1	358	3,899	148
Nemertea		Nemertea	3	1.8	-	-	6
Oligochaeta		Oligochaeta	1	3.8	925	4,324	674
Platyhelminthes		Platyhelminthes	3	0.9	50	533	10
				Total abundance	2,803	17,385	3,933
				Taxonomic richness	12	13	14
				MCI (HB)	62	69	63
				MCI (SB)	51	57	44
				QMCI (HB)	3	3	4
				QMCI (SB)	3	3	1
				EPT richness	-	-	-

Appendix 3: Stormwater Outlet Design

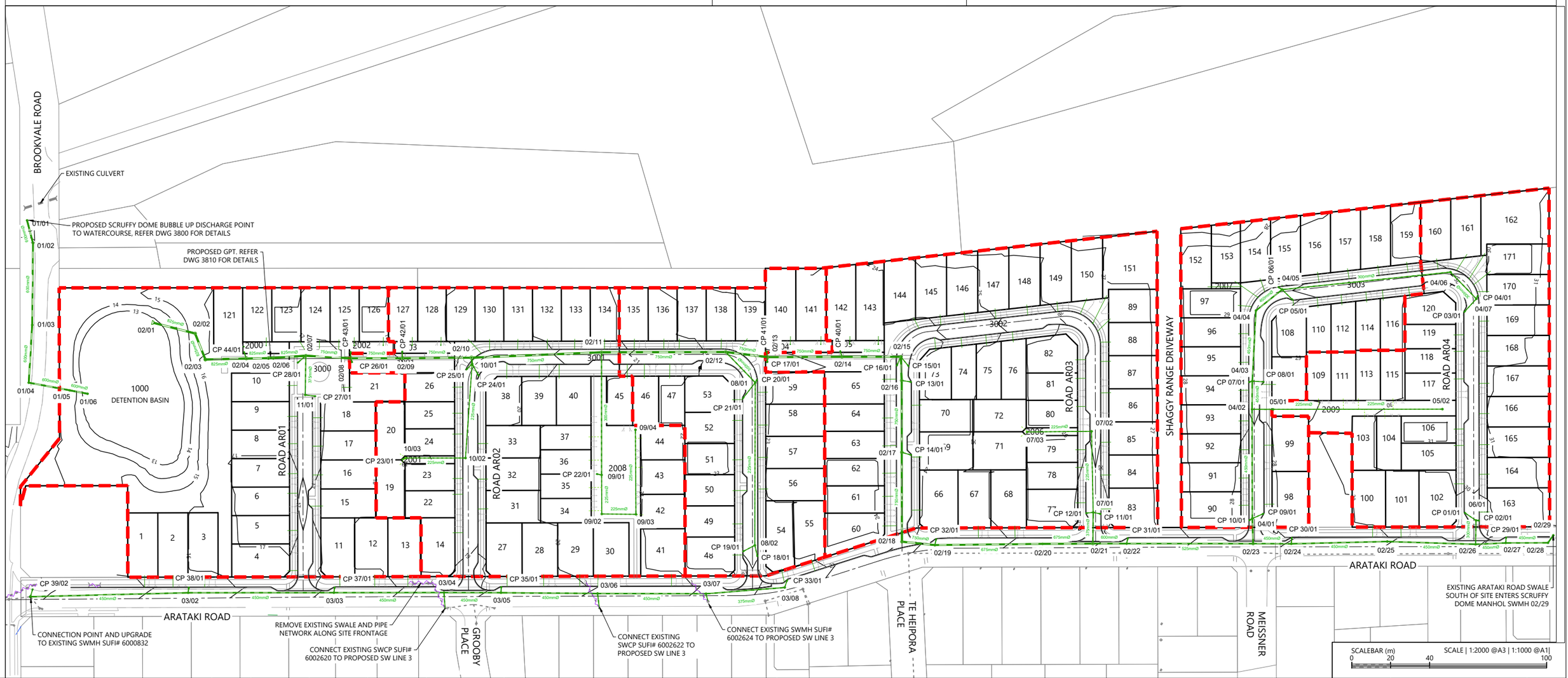
LEGEND

- STAGE BOUNDARIES
- PROPOSED MAJOR CONTOURS (1m) — 23
- PROPOSED STORMWATER LINE AND PIT — 3/1
- EXISTING STORMWATER
- PROPOSED SUMP
- EXISTING STORMWATER LINE AND PIT TO BE DECOMMISSIONED
- PROPOSED STORMWATER KERB OUTLET
- PROPOSED BUBBLE UP SUMP
- PROPOSED STORMWATER LATERAL CONNECTION

NOTES

1. ALL WORKS & MATERIALS TO COMPLY WITH HASTINGS DISTRICT COUNCIL STANDARDS.
2. FOR PIPE BEDDING DETAILS REFER TO STANDARD DETAIL SHEETS UNLESS OTHERWISE NOTED ON THE DRAINAGE LONG SECTIONS IN WHICH CASE SUCH NOTES TAKE PRECEDENCE.
3. CONCRETE PIPES CLASSES ARE NOTED ON THE DRAINAGE LONG SECTIONS. ALL SUMP LEADS TO BE RCRRJ CLASS 4.
4. ALL PIPE CROSSINGS UNDER ROADS TO BE HARDFILL BACKFILLED.
5. ALL SW LOT CONNECTIONS TO BE 150MMØ. RAMPED RISERS ARE TO BE EXTENDED & CAPPED OFF WITHIN 1.0M OF THE FINISHED GROUND SURFACE.
6. SW LOT CONNECTIONS ARE VIA KERB OUTLETS UNLESS OTHERWISE STATED. KERB OUTLETS TO FOLLOW HASTINGS DISTRICT COUNCIL ENGINEERING CODE OF PRACTICE STANDARD DRAWINGS WS 105 AND WS 106.
7. ALL MANHOLES TO BE 1050MMØ UNLESS OTHERWISE NOTED ON THE DRAINAGE LONG SECTION IN WHICH CASE SUCH NOTES SHALL TAKE PRECEDENCE.
8. THE CONTRACTOR IS TO PEG MANHOLES & CHECK FINISHED LEVELS (MH LID LEVELS) PRIOR TO ORDERING MANHOLES.
9. ALL MANHOLE LIDS IN CYCLEWAYS AND SHARED PATHS MUST HAVE A CYCLIST FRIENDLY COVER.
10. PIPE GRADES ON THE LONG SECTIONS ARE CALCULATED FROM MANHOLE SIDE TO MANHOLE SIDE. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT LASER LEVELS ARE SET TO COMPENSATE FOR THIS.

WOODS Est.1970



SCALEBAR (m) 0 20 40 100 — SCALE | 1:2000 @A3 | 1:1000 @A1

REVISION DETAILS		INT	DATE	SURVEYED	WOODS
1	ISSUED FOR DISCUSSION	AS	APR 2025	DESIGNED	AS
				DRAWN	AS
				CHECKED	BLO
				APPROVED	BF

BUILDING B, LEVEL 1
8 NUGENT ST, GRAFTON,
AUCKLAND 1023
+64 9 308 9229
WOODS.CO.NZ

CDL LAND NEW ZEALAND LTD

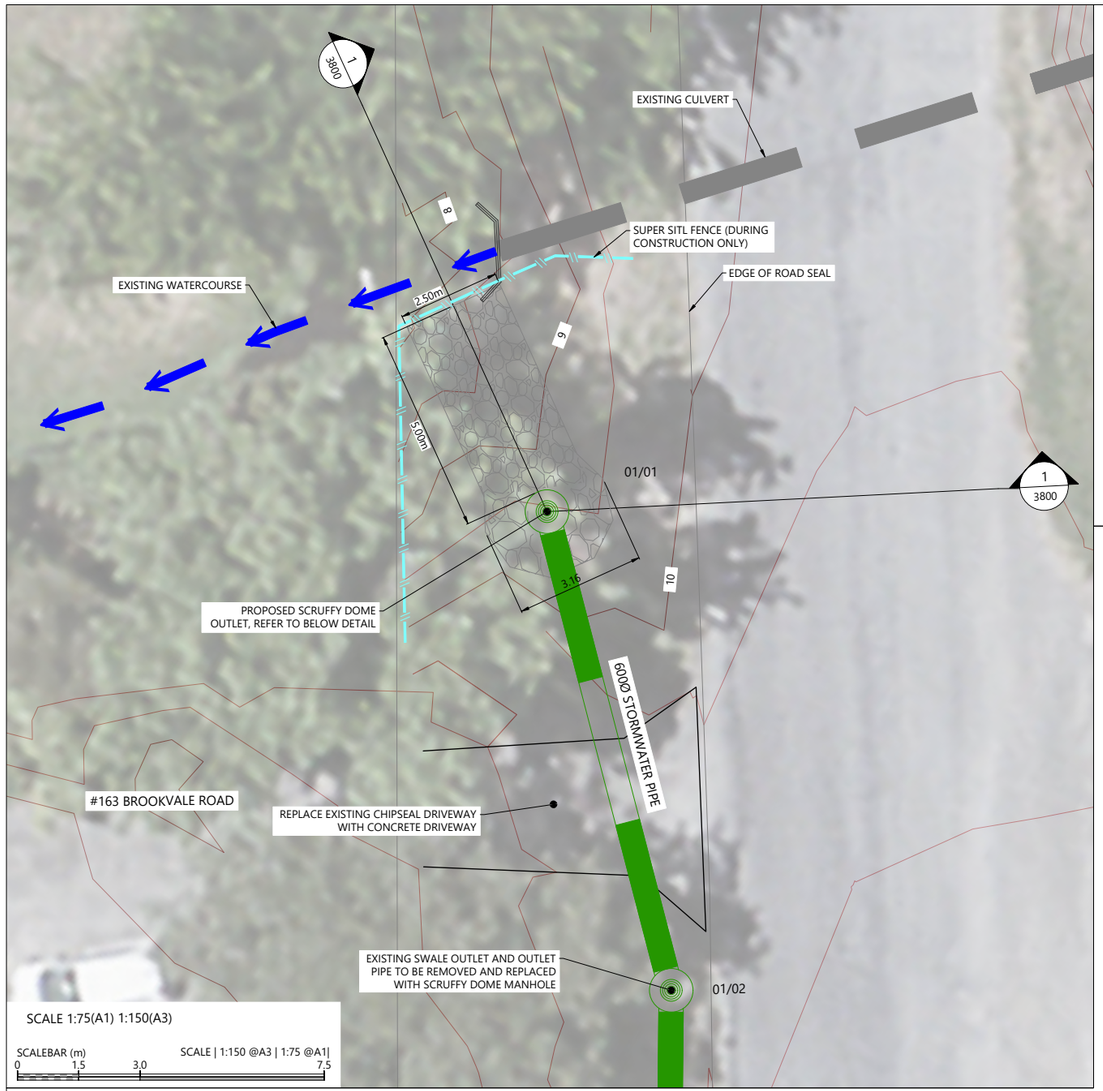
ARATAKI DEVELOPMENT - HAVELOCK NORTH

STORMWATER DRAINAGE LAYOUT PLAN

STATUS	ISSUED FOR DISCUSSION	REV
SCALE	1:2000 @ A3	1
COUNCIL	HASTINGS DISTRICT COUNCIL	
DWG NO	P24-244-00-3000-DR	

Plot Date: 8:24:23 pm,30 April 2025, BRANDONO

File: C:\12DS\DATA\WP-AKL-APP-02\P24-244 - ARATAKI - HAVELOCK NORTH_21690\02 DRAWINGS\01 ENG\P24-244-00-3000-DR_STORMWATER DRAINAGE LAYOUT PLAN OVERALL.DWG



LEGEND

PROPOSED STORMWATER LINE AND PIT — 3/1

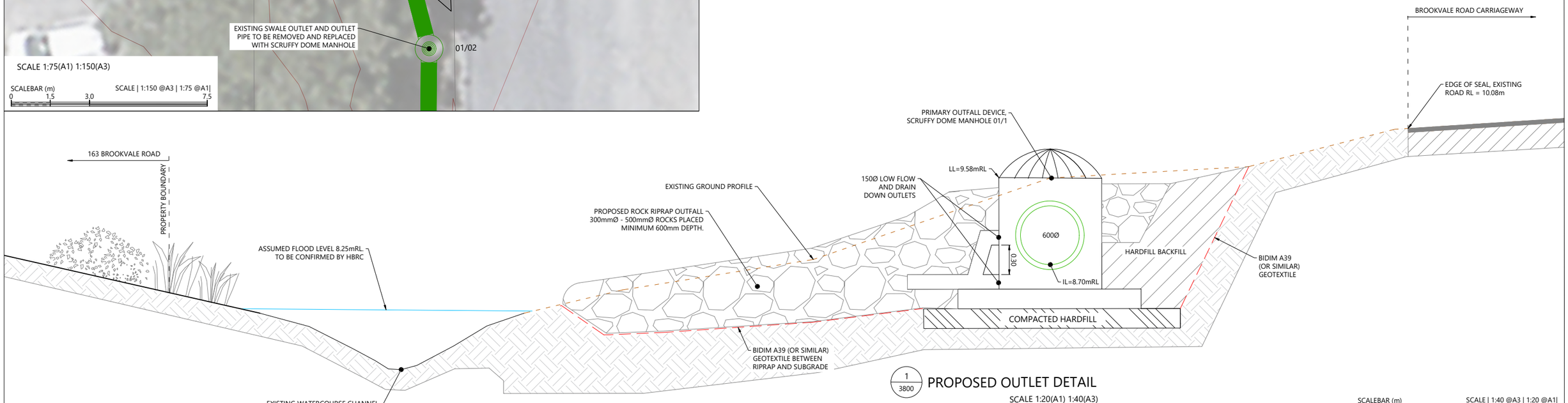
PROPOSED RIPRAP

EXISTING CONTOURS (1m) — 23

EXISTING MINOR CONTOURS (0.5m)

NOTES

1. ALL WORKS & MATERIALS TO COMPLY WITH HASTINGS DISTRICT COUNCIL STANDARDS.
2. FOR PIPE BEDDING DETAILS REFER TO STANDARD DETAIL SHEETS UNLESS OTHERWISE NOTED ON THE DRAINAGE LONG SECTIONS IN WHICH CASE SUCH NOTES TAKE PRECEDENCE.
3. CONCRETE PIPES CLASSES ARE NOTED ON THE DRAINAGE LONG SECTIONS. ALL SUMP LEADS TO BE RCRRJ CLASS 4.
4. ALL PIPE CROSSINGS UNDER ROADS TO BE HARDFILL BACKFILLED.
5. ALL SW LOT CONNECTIONS TO BE 150MMØ. RAMPED RISERS ARE TO BE EXTENDED & CAPPED OFF WITHIN 1.0M OF THE FINISHED GROUND SURFACE.
6. SW LOT CONNECTIONS ARE VIA KERB OUTLETS UNLESS OTHERWISE STATED. KERB OUTLETS TO FOLLOW HASTINGS DISTRICT COUNCIL ENGINEERING CODE OF PRACTICE STANDARD DRAWINGS WS 105 AND WS 106.
7. ALL MANHOLES TO BE 1050MMØ UNLESS OTHERWISE NOTED ON THE DRAINAGE LONG SECTION IN WHICH CASE SUCH NOTES SHALL TAKE PRECEDENCE.
8. THE CONTRACTOR IS TO PEG MANHOLES & CHECK FINISHED LEVELS (MH LID LEVELS) PRIOR TO ORDERING MANHOLES.
9. ALL MANHOLE LIDS IN CYCLEWAYS AND SHARED PATHS MUST HAVE A CYCLIST FRIENDLY COVER.
10. PIPE GRADES ON THE LONG SECTIONS ARE CALCULATED FROM MANHOLE SIDE TO MANHOLE SIDE. THE CONTRACTOR IS RESPONSIBLE FOR ENSURING THAT LASER LEVELS ARE SET TO COMPENSATE FOR THIS.



1 / 3800 PROPOSED OUTLET DETAIL

SCALE 1:20(A1) 1:40(A3)

REVISION DETAILS		INT	DATE	SURVEYED	WOODS
1	ISSUED FOR DISCUSSION	AS	APR 2025	DESIGNED	AS
				DRAWN	AS
				CHECKED	BLO
				APPROVED	BF

BUILDING B, LEVEL 1
8 NUGENT ST, GRAFTON,
AUCKLAND 1023
+64 9 308 9229
WOODS.CO.NZ

CDL LAND NEW ZEALAND LTD

ARATAKI DEVELOPMENT - HAVELOCK NORTH

STORMWATER STREAM OUTLET DETAIL

STATUS	ISSUED FOR DISCUSSION
SCALE	AS SHOWN
COUNCIL	HASTINGS DISTRICT COUNCIL
DWG NO	P24-244-00-3800-DR
REV	1

WOODS Est.1970

Plot Date: 9:04:19 am, 1 May 2025, BRANDONO

File: C:\12DS\DATA\WP-AKL-APP-02\P24-244 - ARATAKI - HAVELOCK NORTH_21690\02 DRAWINGS\01 ENG\P24-244-00-3800-DR_STORMWATER DETAILS.DWG

Appendix 4: Fauna Management Plan

Boffa Miskell

Arataki Subdivision

DRAFT Fauna Management Plan
Prepared for CDL

10 June 2025

Boffa Miskell is proudly a
Toitū net carbonzero certified consultancy

Document Quality Assurance

Bibliographic reference for citation: Boffa Miskell Limited 2025. *Arataki Subdivision: DRAFT Fauna Management Plan*. Report prepared by Boffa Miskell Limited for CDL.		
Prepared by:	Eddie Sides Senior Principal Ecologist Boffa Miskell Limited	
Status: Draft	Revision / version: 1	Issue date: 10 June 2025

Use and Reliance
This report has been prepared by Boffa Miskell Limited on the specific instructions of our Client. It is solely for our Client's use for the purpose for which it is intended in accordance with the agreed scope of work. Boffa Miskell does not accept any liability or responsibility in relation to the use of this report contrary to the above, or to any person other than the Client. Any use or reliance by a third party is at that party's own risk. Where information has been supplied by the Client or obtained from other external sources, it has been assumed that it is accurate, without independent verification, unless otherwise indicated. No liability or responsibility is accepted by Boffa Miskell Limited for any errors or omissions to the extent that they arise from inaccurate information provided by the Client or any external source.

Template revision: 20230505 0000

File ref: BM240623 Arataki Fauna Management Plan_v2.docx

Cover photograph: Eddie Sides, 2025

CONTENTS

Appendices

1.0 Introduction

CDL propose to develop an 11 ha greenfield residential subdivision at Arataki Road, adjoining Havelock North.

The site contains the following ecological features:

- Pasture grasslands, covering most of the site.
- Rank grasses along fencelines and other ungrazed areas.
- Exotic trees (mostly eucalypts and a few macrocarpas) along the eastern boundary and adjacent embankment. Most of these trees are outside of the property.
- The ornamental trees around the existing houses and driveways within the site.

There are no streams or wetlands within the site.

These terrestrial habitat features provide potential habitat for indigenous fauna such as lizards (herpetofauna), bats and birds (avifauna). Vegetation within the site will be largely removed during earthworks.

This Fauna Management Plan (FMP) describes the methods to reduce the effects of the proposed subdivision works on indigenous fauna, including potential effects on lizards, bats and birds.

The objective is to maintain or enhance species populations within works areas by avoiding and minimising impacts on them. These objectives will be achieved by implementing industry-accepted best practice methods and undertaken by suitably qualified and experienced specialists.

The removal of the eucalypts adjacent to the site is not part of this application.

Boffa Miskell

www.boffamiskell.co.nz

0 250 m

1:10,000 @ A3

Data Sources: Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors

Projection: NZGD 2000 New Zealand Transverse Mercator

LEGEND

- Proposed stormwater outfall location
- Site
- Tracking tunnels
- Stream sampling sites
- Permanent stream
- Intermittent stream

ARATAKI PLAN CHANGE

Site Overview (Ecology)

Date: 29 April 2025 | Revision: 0

Plan prepared by Boffa Miskell Limited

Project Manager: Emma.Todd@boffamiskell.co.nz | Drawn: HCo | Checked: ESi

Figure 1

2.0 Wildlife Act and Fauna Protections

Native animals including bats, birds, lizards, frogs and some invertebrate species are 'absolutely protected' under the Wildlife Act (1953, s63 (1) (c)), and their habitats are protected by the Resource Management Act (1991) and administered by the DOC and local authorities (WRC and Hauraki District Council, HDC), respectively.

A Wildlife Act Authority (WAA permit) is required to handle, catch, release or kill native wildlife including lizards, birds, bats and frogs. WAA permits typically include conditions that need to be met to ensure the safety of wildlife. These conditions may include limiting who may undertake the activity (e.g. experienced persons only), a maximum number of animals that can disturbed and the timing and quantity of surveys.

The Fast Track Approvals Act (2024) was enacted to facilitate the delivery of infrastructure and development projects with significant regional or national benefits, combining the requirements of serval other Acts in a single Approvals process. Information required for Wildlife Act Approvals are included in Schedule 7. This includes the purpose and nature of the proposed activities, the effects of the proposed activities on protected wildlife, and methods proposed to avoid and minimise adverse effects. This requires species protected under the Wildlife Act and known or predicted to be present to be listed 2(1)(d), and impacts on threatened, data deficient, and at-risk wildlife species (as defined in the New Zealand Threat Classification System) to be assessed.

This FMP describes how potential adverse effects on protected fauna will be mitigated.

No Wildlife Act Approvals are sought.

3.0 Proposed Activities

The proposed activities that may affect protected fauna comprise vegetation clearance prior to earthworks.

The extent of earthworks is shown in Figure 1.

The affected habitats are shown in Photos 1-10.

4.0 Protected Fauna

Most of the site comprises grazed pasture with negligible fauna habitat value.

Potential habitat is provided by tress, debris and rank grasses around the margins of the site. These may provide habitats for native lizards, bats and birds. The potential species present and potential impacts are described below.

4.1 Lizards

No lizard species have been recorded within or adjacent to the Site. Five species are known to be present within 15 km of the site, including northern grass skink (*Oligosoma polychroma*), northern spotted skink (*O. kokowai*), Hawke's Bay skink (*O. auroraense*), ngahere gecko (*Mokopirirakau* 'southern north island") and barking gecko (*Naultinus punctatus*). In the wider area, lizard records were typically in areas of indigenous vegetation or around areas of recent infrastructure and in coastal areas. Outside these areas, herpetofauna records were scarce, likely reflecting both land use (much of the area is modified pastural grassland) and a lack of survey effort or lizard- specific investigations.

The invasive plague skink (*Lampropholis delicata*) which are classed as an "unwanted organism" (Biosecurity Act 1993), are commonly found throughout the upper North Island at high densities and are likely present within the Site. Introduced frog species, including southern bell frog and the southern brown tree frog are present in the wider area and may be present within the Site. These species are non-native species and as such are not a constraint to the proposed development and are not further considered for this assessment.

Based on this desktop assessment, there is low probability of herpetofauna species being present in the grazed areas; moderate probability of the common skink species (northern grass skink) being present in the ungrazed areas; and a low probability of threatened species (Northern spotted skink, Hawke's Bay skink) being present because of their limited distributions.

4.2 Bats

There are no notable areas of native or exotic mature forest that border the site. The closest long-tailed bat (*Chalinolobus tuberculatus*) records are c. 19 km to the south of the Sites boundary at Mohi bush in 2016. There are no short-tailed bat (*Mystacina tuberculata*) records within 25 km of the site (the nearest known records for this species being over 70 km from the project site and they are extremely unlikely to be present).

We note that there is a noticeable lack of recorded surveys for bats around the coastal Napier, Hastings and Havelock North areas and areas of potential suitable bat habitats nearby may not have been surveyed.

Considering the available bat records and the habitat present within the site, it is considered that the potential for long-tailed bats to be utilizing the site to be generally low. Despite this, long-tailed bats have been known to travel in excess of 50 km from their roost sites, and therefore are in the foraging range of a known bat population.

4.3 Avifauna

A total of 38 species of indigenous birds have been identified within the local OSNZ and eBird grid-square. An additional 19 species of exotic birds have also been recorded. We do not consider that any of the introduced species of birds require further consideration.

Of the 38 indigenous bird species on record, 22 are classified as Not Threatened, 11 are classified as At-Risk and five are classified as threatened under the New Zealand Threat Classification System (Robertson et al., 2021). Apart from the grey duck, the Site is unlikely to

provide habitat for these threatened species, although, several of these species may traverse the Site when moving between coastlines.

Based on available data, the site appears to lack habitat for many native birds. Some native birds, including cormorant and heron (due to proximity to the coast/Tukituki River) species may utilise the eucalyptus tree shelterbelt, amenity planting and paddocks as potential nesting habitat. Additionally, during construction, banded dotterel which are known to be present in the area, may nest in the earthworks area.

Birds are highly mobile and will generally move away from noise and activity, although eggs and chicks are extremely vulnerable to disturbance during the breeding, and nesting season. For this reason, site clearance will be undertaken outside of the forest bird nesting season (August-February inclusive) as far as practicable.

5.0 Fauna Management Overview

Fauna management comprises the following:

- Birds – tree removal outside of nesting season (March to July inclusive) OR nest check and avoidance protocols (August to February).
- Bats – identification of potential roots trees. Acoustic surveys required prior to felling. Acoustic surveys limited to period when bats are active (September to April).
- Lizards – habitat management comprising grazing and removal of ground debris.
- Bat and Lizard fauna are subject to incidental discovery protocols.

Fauna management must be completed prior to vegetation clearance.

Fauna management must be undertaken with seasonal time constraints. Timing must take into account the seasonal constraints to fauna activity to avoid periods when lizards and bats are inactive (May-October, inclusive), and as far as possible, when native birds are nesting.

Vegetation and habitat clearance within the site must be managed to allow sufficient time to survey and capture (where applicable) fauna prior to site works.

If fauna salvage is required, the release site must be of a suitable quality and extent to support the population of the species to be relocated.

The project ecologist will confirm that these surveys have been undertaken and confirm what further action (if any) is required as a result of the findings.

The ecologist will notify the client in writing to confirm that fauna management is complete and habitat clearance may commence.

6.0 Bird Management

6.1 Nest Check Protocols

Vegetation clearance within the works footprints shall, as far as practicable, take place outside the native bird breeding season (August-February inclusive).

For work occurring in the months of March to July, no bird management is required.

If vegetation clearance is undertaken during the main breeding season, a bird and nest survey will be undertaken by an appropriately qualified and experienced ecologist. The bird and nest survey protocols are:

- Any vegetation scheduled for removal will be surveyed for native bird nests within 24 hours prior to clearance.
- If an active native bird nest is identified during the visual inspection, all vegetation removal within 20m of the nest will cease until the ecologist has confirmed that the nest has failed, or the chicks have fledged. This area will be clearly demarcated to ensure the vegetation is not accidentally felled.
- Once an area of vegetation has been confirmed clear of active native bird nests (i.e. the chicks have fledged or the nests have failed), vegetation clearance will commence as soon as possible to prevent birds laying a second clutch.

6.2 Monitoring and Documentation

The findings of each site clearance will be documented and reported. The following information will be included: if any active bird nests, or occupied crevices were observed; if vegetation clearance was delayed because of an active nest was observed; the date of clearance; and if any bird nests were missed. Survey details (climatic conditions, time and date, and search effort) will also be recorded.

7.0 Bat Management

7.1 Bat Roost Protocols

Bat management procedures shall be in general accordance with the most recent DOC guidelines “Protocols for minimising the risk of felling occupied bat roosts (Bat Roost Protocols)” (v4: 2024).

Tree felling must be carried out between 1 October and 30 April when bats most active so are easier to detect and less vulnerable to disturbance[1].A flow chart showing the process for tree removal is provided in Appendix 1 (from DoC, 2024).

- Acoustic bat monitors (ABMs) should be used to detect bat activity in the first instance. These must be installed by someone accredited with Competency 3.1[2] to determine bat presence around trees due to be felled.
- Surveys should be undertaken over a minimum of two consecutive valid survey nights[3] with no bat activity to have confidence that bats are not roosting in the clearance area.
- If there is uncertainty, and indications of a bat roost (e.g., crevice with staining), a trained arborist may climb the trees to check for bats under the direction of an approved bat specialist. The bat specialist must be accredited with Competency 3.3.
- If a bat is detected, surveys must continue until the bat(s) has moved to a new roost.
- If bats continue to use the roost, there is uncertainty about whether bats have left the roost, or there is high bat activity in the area, an ecologist accredited with all level 3 competencies will advise on how to proceed, consistent with the Bat Roost Protocols. The Operations Manager at DOC Hauraki will be advised.
- Trees can be felled if no bats are present. Trees must be on the day of inspection / on the day following survey completion.
- Felled trees must be checked for bats. Accidental discovery and mortality protocols are provided in Section 9.

7.2 Monitoring and Documentation

No further action / monitoring is required after trees are felled and checked for bats. Reporting will include a record of any trees that contain bat roosts and details the size, location and type of tree. Where no bats are detected within potential bat roost trees within the vegetation clearance areas then survey data will be provided separately.

8.0 Lizard Management

A tracking tunnel survey was undertaken. No lizards were detected. It is concluded that no significant populations of native lizards are present. No intensive pre-clearance management is required.

It is possible that lizards are present, and it is proposed to undertake low-intensity and relatively passive habitat management comprised of debris clear and by hand or machine and grazing (for example, providing temporary fencing to increase grazing access. This will reduce habitat

[1] Bat surveys can be undertaken in North Island when temperatures exceed 8 degrees for the first four hours after sunset (Borkin et al 2023), on still, dry nights. Acoustic recorder (ABM) should begin recording no less than half an hour before sunset.

[2] A set of competencies developed by the NZ Bat Recovery Group to ensure that anyone working with bats is competent to do so.

[3] See climatic conditions above.

favourability and encourage any lizards to move outside the grazed area, thereby reducing risk of potential effects.

Incidental discovery protocols are described in section 9.

9.0 Incidental discovery protocols

Fauna may be accidentally discovered (injured or deceased) during Project works, and an ecologist may not be on site to assist. In the event of fauna injury / mortality, the following procedures should be followed.

9.1 Bats

If a bat (intact, injured or dead) is discovered on the ground or in vegetation at any point during site clearance or geotechnical works, works will pause immediately and the DOC Hotline called (0800 DOC HOT, 0800 362 468). Works will not resume without approval from DOC. More detailed instructions for managing bat discovery during vegetation maintenance works can be found in the 2024 DOC Bat Roost Protocols (V4) and Bat care for first responders (Wildlands, 2019).

9.2 Lizards

If an injured native skink or gecko is discovered, the animal should be placed in a box or container with holes in the lid and moist earth/leaf litter from the site and kept in a cool, shaded place. The Project ecologist should be contacted immediately, and they will notify DOC. If a dead animal is discovered, it should be placed in a ziplock bag in a secure container and the project ecologist contacted. The project ecologist will contact DOC and organise an examination if required.

10.0 Reporting requirements

Methods and results of all ecological surveys related to site clearance will be recorded and reported to Hawkes Bay Regional Council.

Records will include:

- Details of bird nests and bat roosts and actions taken to avoid damage to active nests / roosts.
- Details of any accidentally discovered fauna and steps taken following discovery.

11.0 References

Borkin, K. M., Giejsztowt, J., McQueen-Watton, J., & Smith, D. H. (2023). Influence of weather on long-tailed bat detection in a North Island exotic forest. New Zealand Journal of Ecology, 47(1).

DoC, 2024. Protocols for minimising the risk of felling occupied bat roosts (Bat Roost Protocols) Version 4: October 2024 approved by the New Zealand Department of Conservation's Bat Recovery Group. https://www.doc.govt.nz/globalassets/documents/conservation/native-animals/bats/bat-recovery/protocols-minimising-risk-felling-occupied-bat-roosts.pdf

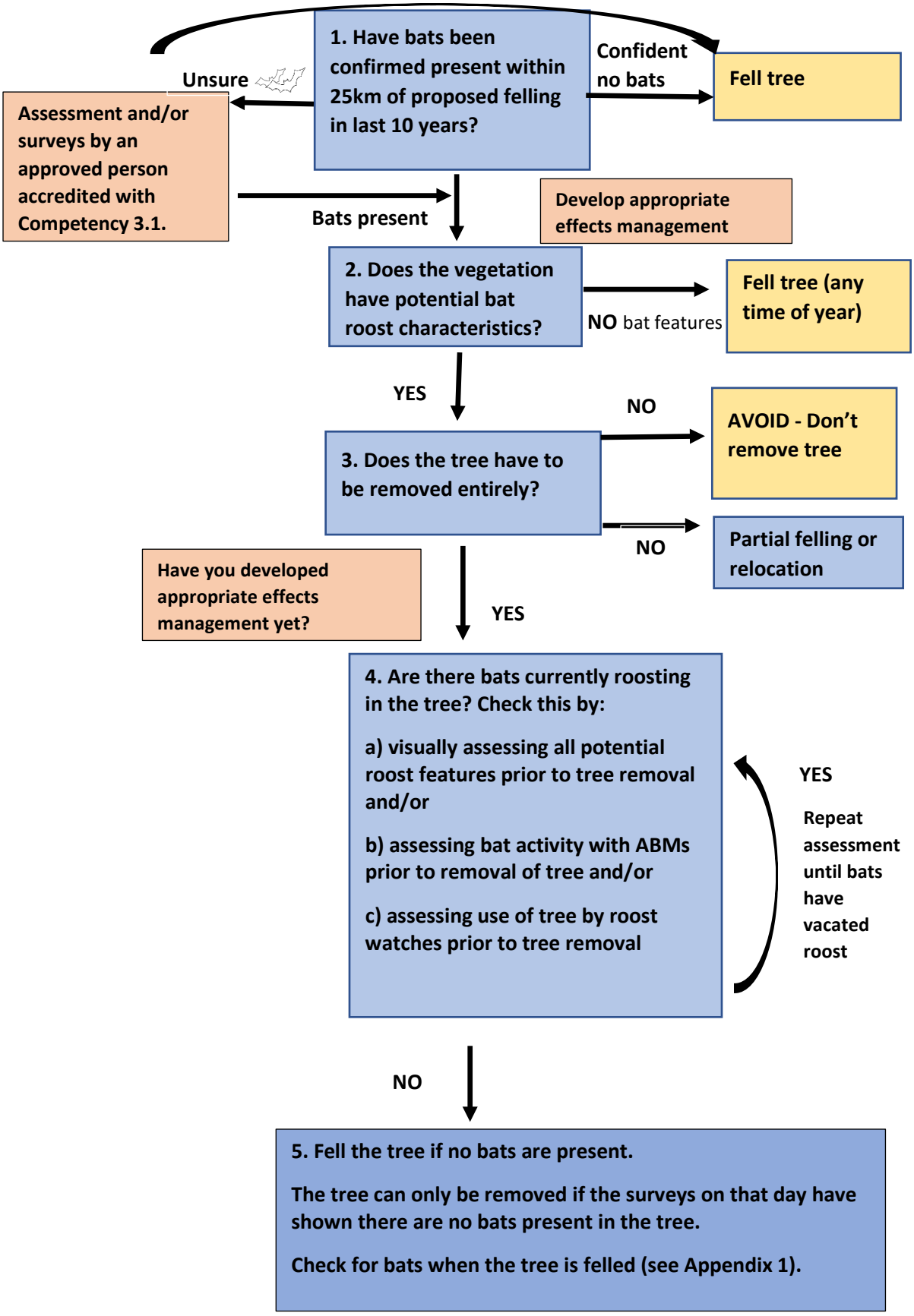
Robertson *et al*, 2021. Conservation status of birds in Aotearoa New Zealand, 2021. NEW ZEALAND THREAT CLASSIFICATION SERIES 36. NZ Department of Conservation. December 2021.

Wildlands (2019). Advice for first responders. Appendix 6 of Initial veterinary Care for New Zealand bats.

Appendix 1: Bat Management Resources

Figure 1. Tree removal in bat areas flow chart

Each numbered step relates to a step in the Decision Tool for Tree Removal. Follow each step fully in the text to work through the process.



Together. Shaping Better Places.

Boffa Miskell is a leading New Zealand environmental consultancy with nine offices throughout Aotearoa. We work with a wide range of local, international private and public sector clients in the areas of planning, urban design, landscape architecture, landscape planning, ecology, biosecurity, Te Hīhiri (cultural advisory), engagement, transport advisory, climate change, graphics, and mapping. Over the past five decades we have built a reputation for creativity, professionalism, innovation, and excellence by understanding each project's interconnections with the wider environmental, social, cultural, and economic context.

---

www.boffamiskell.co.nz

Whangarei	Auckland	Hamilton	Tauranga	Wellington	Nelson	Christchurch	Queenstown	Dunedin
09 358 2526	09 358 2526	07 960 0006	07 571 5511	04 385 9315	03 548 8551	03 366 8891	03 441 1670	03 470 0460