BlueGreen



# Otaihanga Retirement Village

Ecological assessment

**Prepared for** Summerset villages (Paraparaumu) limited
**30 October 2026**

## Document Quality Assurance

| | | |
|---|---|---|
| **Bibliographic reference for citation:**<br>Document. *Summerset Ratanui Road Development, Otaihanga: Ecological Assessment*<br>Report prepared by BlueGreen Ecology for Summerset villages (Paraparaumu) limited. | | |
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| Status: Final | Revision / version: 4 | Issue date: 30 October 2026 |

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*Cover photograph:* Shelter belt stockpiled slash on property @BlueGreen Ecology 2024.

## Executive Summary

This assessment concludes that the site contains no significant indigenous terrestrial ecological values, that the identified natural inland wetland features are small, highly modified and of negligible ecological value, and that the proposed development can achieve a net ecological gain through creation of larger indigenous wetland areas and riparian enhancement.

The site at Ratanui Road is an area of approximately 12.7 ha that is currently rural in character and use.

Research and a site survey show that there are no indigenous terrestrial ecological values of note, or values that could meet the significance criteria in Policy 23 of the Regional Policy Statement (RPS). The site has been used for farming and contains no remnant ecological features. The only areas not currently grazed are a small area of blackberry and herbaceous weeds on the northern boundary sand hill and various exotic trees across the site.

The Ministry for the Environment (MfE) 2020 natural wetland delineation protocol has been applied and shows the presence of 16 small natural inland wetlands and one larger natural inland wetland, as defined by the Natural Resources Plan (NRP).

These 17 features total 1,552 $m^2$, noting that their extent varies seasonally. They are largely exotic vegetation assemblages in currently grazed pasture or contain shallow-water macrophytes. While technically dune hollows, the features are not examples of naturally rare and threatened dune slacks. The features do not meet the significance criteria in Policy 23 of the RPS, and all are of low ecological value and function.

A highly modified waterway bisects the site. It is of low aquatic value and is usually dry at the surface. A few young shortfin eels are periodically present when winter rains cause some surface water to be retained. The waterway is currently crossed by two culverts, and its riparian vegetation consists only of rank grass (periodically grazed), with scattered Carex plants along the lower edge.

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# 1.0 Introduction

Summerset Villages (Paraparaumu) Limited (Summerset or the applicant) had purchased land between Ratanui and Otaihanga Roads for the potential use as a retirement village (Figure 1). Summerset is now applying to develop and operate a comprehensive care retirement village at sites on Ratanui Road in Otaihanga (Figure 2). This report is an ecological values and effects assessment and follows on from the Ecological Assessment for Private Plan Change 4 to the Kāpiti Coast District Plan, in which existing and potential ecological values were determined. The assessment has involved several years of periodic site investigations, so the wetlands and stream have been observed under a range of hydrological conditions.




*Figure 1 Location of the Otaihanga Retirement Development Project in Paraparaumu.*

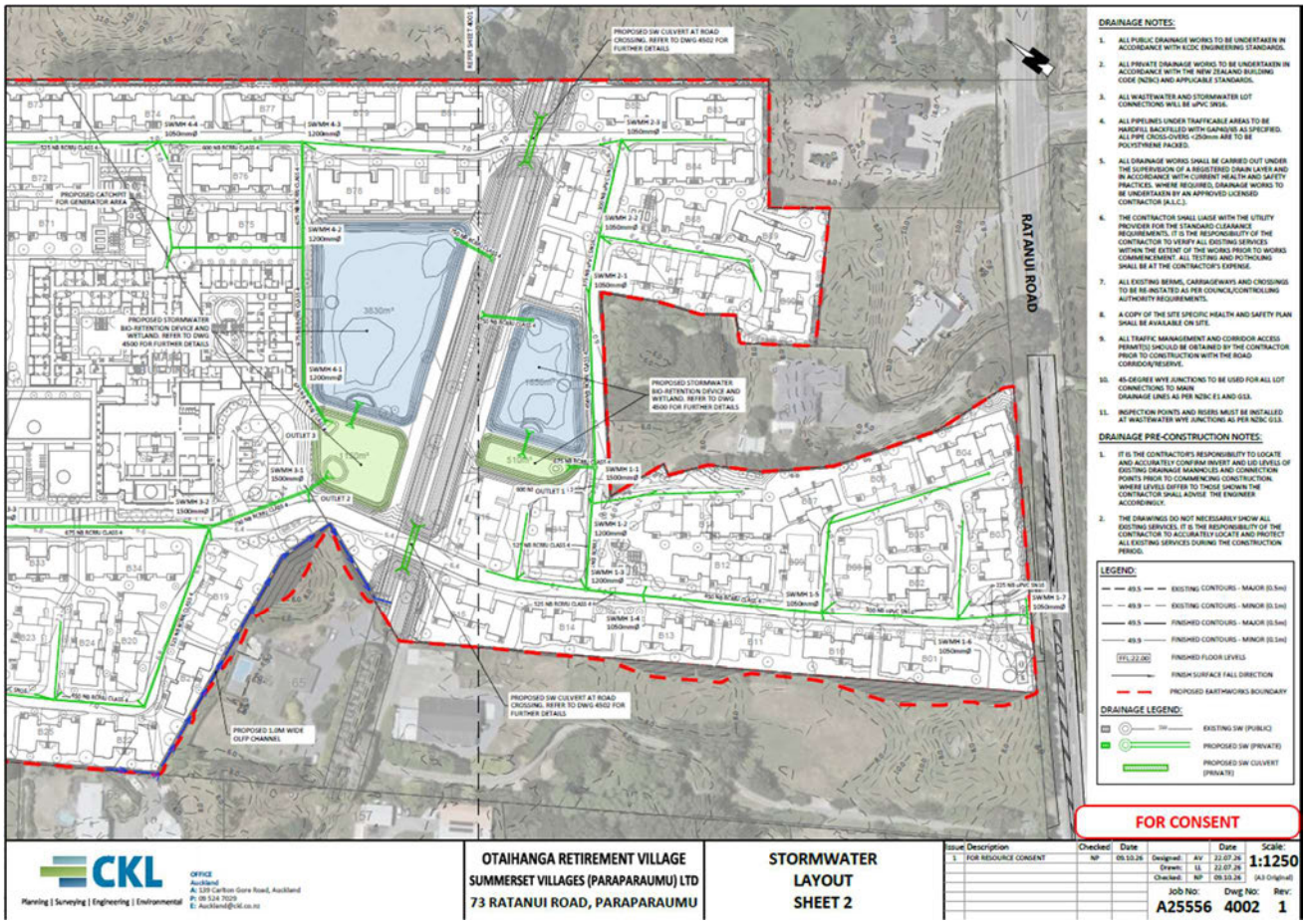



Figure 2 Proposed development highlighting the wetland and stormwater areas (blue and green).

## 1.1 Statement of Experience

This Ecological Assessment has been prepared by Dr Vaughan Keesing who is employed as a senior ecologist by BlueGreen Ecology Limited, an RMA Ecological Consultancy. Dr Keesing is based in Porirua (Pukerua Bay). He provides expert advice on a variety of ecological matters including wetlands, aquatic and terrestrial vegetation ecology.

He has been a consulting ecologist for the last 28 years. His qualifications include a B.Sc. (Hons, 1st) in Zoology and a Ph.D. in Ecology, both from Massey University, as well as a Diploma in Research Statistics.

He prepared the ecological information for the rezoning request for the rezoning of the Site on behalf of the Applicant and gave expert ecological evidence at the hearing.

## 1.2 Code of Conduct

While this is not a matter before the Environment Court I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023 ('Code'), and have complied with that Code in the preparation of this report.

While this is not a matter before the Environment Court I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023 ('Code'), and have complied with that Code in the preparation of this report.

# 2.0 Ecological Assessment Methods

The assessment that follows utilises the guidance of the EIANZ (2018) and its methods related to site ecological evaluation and recognition of ecological effects. The zone of influence is both the site but also in terms of hydrology the local sub catchment of the Waikanae River (from old SH 1 west, the Waikanae River north and Mazengarb Road south).

## 2.1 The desktop investigation included a review of:

- Relevant databases such as the Our Environment habitat layers, iNaturalist citizen science website for logging species sightings, the New Zealand Freshwater Fish Database (NFFDB), and Land Environment New Zealand (LENZ) database cover for threatened vegetation types
- Planning documents (RPS, NRP, KCDC plan (including maps)) as they relate to ecological features, schedules etc
- "Retrolens" historic aerial photography as well as present day aerial imagery.
- Greater Wellington Regional Council (GWRC) regionally highly modified stream layer (after Dr. Greer)[1]
- Discussion with the landowners, one of whom has been on the property for 40 years.

## 2.2 Wetland Statutory Framework / NPS-FM Wetland evaluation

The National Policy Statement for Freshwater Management 2020 (as amended in 2023 and 2025) (NPS-FM), the Resource Management (National Environmental Standards for Freshwater) Regulations 2020, the Regional Policy Statement (policy 23) and the Natural Resources Plan (GWRC), proposed Plan Change 1 version (NRP), set out national and regional policies and regulations defining what a natural (inland) wetland is and governing works and discharges in, and in the vicinity of, natural wetlands. In particular, they reference the wetland delineation protocol and methods relating to the pasture exclusion, and these have been followed.

In terms of the pasture exclusion, I have proceeded on the basis that the NPS-FM is the key relevant statutory instrument. The pasture exclusion in the NPS-FM is not expressed as being contingent on the land remaining in pastoral use. Although the Ministry's Pasture Exclusion Assessment Methodology guidance[2] states that the pasture exclusion applies only where the future land use will remain pastoral, that guidance does not have the statutory basis of the NPS-FM and cannot qualify or narrow the exclusion as it is expressed

[1] Regional Highly Modified Streams (arcgis.com)

[2] Ministry for the Environment. 2022. Pasture exclusion assessment methodology. Wellington: Ministry for the Environment.

in the NPS-FM itself. I have therefore applied the exclusion according to its terms, rather than importing the guidance.

In essence the following algorithm (MfE 2020[3]) is used to determine if a feature is a natural inland wetland:

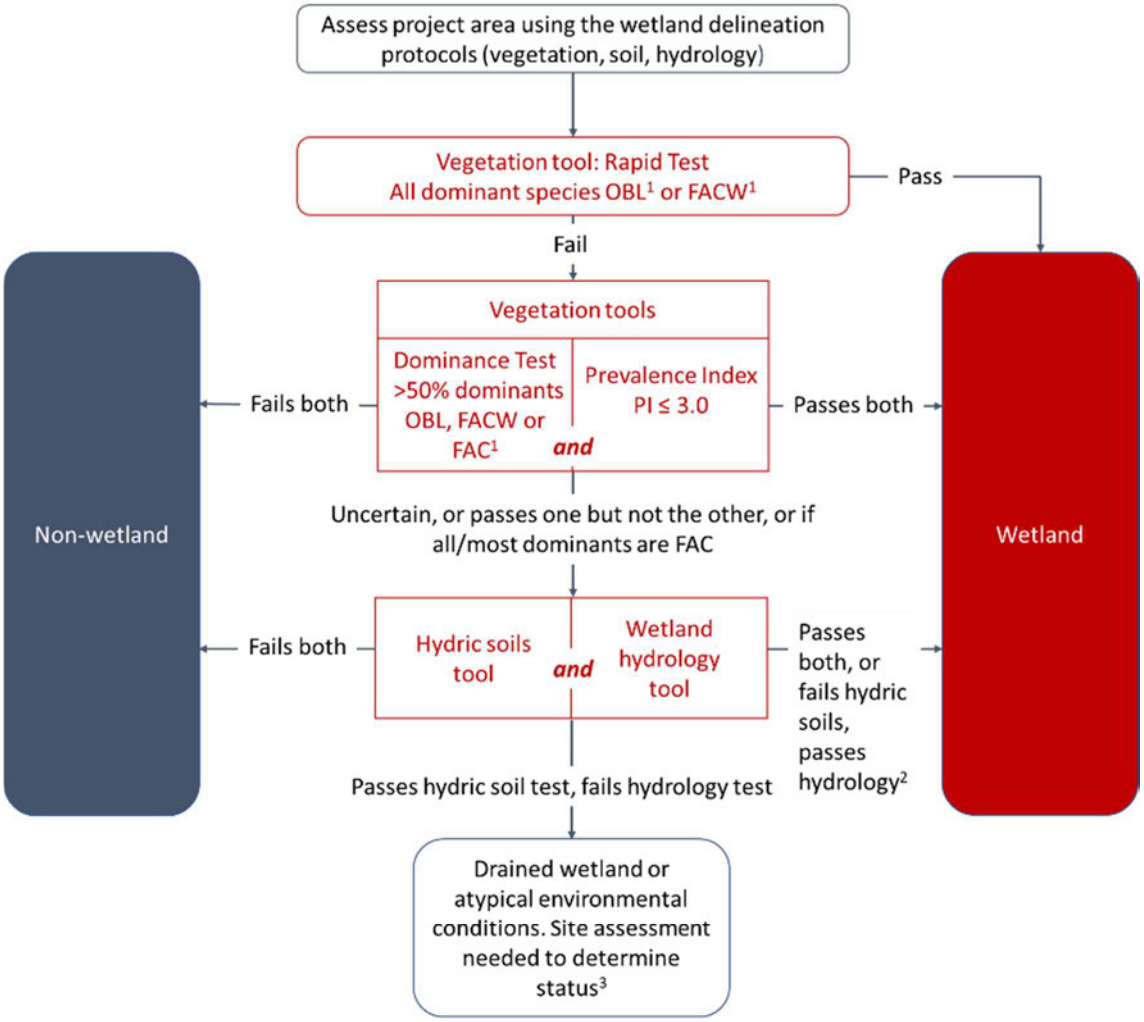



*Figure 3 MfE wetland delineation process*

This process includes consideration of the NPS FM (2020) exclusions to the definition of "natural inland wetland", i.e.:

a) in the coastal marine area; or

[3] Delineating wetlands under the Resource Management Act (RMA) 1991 and the National Policy Statement for Freshwater Management 2020 (NPS-FM). Essential Freshwater 2022. Ministry for the Environment 2020.

b) a deliberately constructed wetland, other than a wetland constructed to offset impacts on, or to restore, an existing or former natural inland wetland; or

c) a wetland that has developed in or around a deliberately constructed water body, since the construction of the water body; or

d) a geothermal wetland; or

e) a wetland that:

   (i) is within an area of pasture used for grazing; and

   (ii) has vegetation cover comprising more than 50% exotic pasture species (as identified in the National List of Exotic Pasture Species using the Pasture Exclusion Assessment Methodology (see clause 1.8));

   (iii) unless the wetland is a location of a habitat of a threatened species identified under clause 3.8 of this National Policy Statement, in which case the exclusion in (e) does not apply

## 2.3 Field investigations

A field survey was conducted on 29 May 2024. The survey followed a scoping exercise using a mosaic of aerial photographs of different ages to establish likely features and obvious temporal changes. The property was then walked in its entirety to identify terrestrial indigenous vegetation, habitat features, waterways and waterbodies, and possible natural wetlands. A discussion was held with the landowners about historic activities on the farms, particularly pond and garden works and shelter belt management.

With regard to fauna, no targeted surveys for lizards or bats were conducted following the initial walkover. This is because the property does not contain potential habitat for native species of these fauna (noting that northern grass skink are likely present), and fauna use is otherwise limited to occasional avian visitation and common invertebrates. That said, a herpetological survey has since been instigated and is reported on separately in the Lizard Management Plan prepared by Boffa Miskell. Native bats (long-tailed) have not been recorded in Kapiti for decades, with the last records of both species on Kapiti Island or to the east in the Tararua Ranges (Figure 4). The colony of short-tailed bats translocated to Kapiti Island (2004) was considered to have failed (2018).

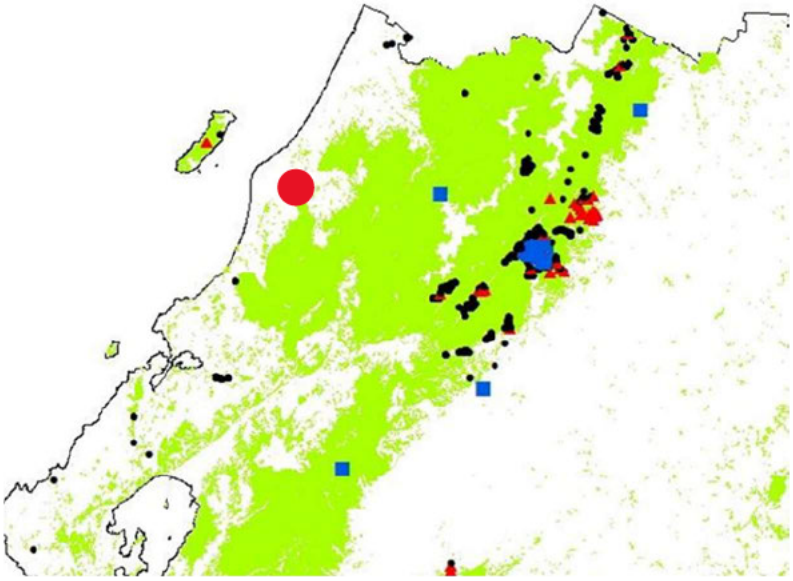


Figure *4*. Bat database records as at 23 December 2022 (Crisp et al 2023), long tailed bats (red triangle), short tail (blue square), none recorded (black dot). Red dot indicates the site.

There are four larger (exotic) trees on the property that may have roost potential, but there is no corridor or local source population, and no likely potential for bats to be present, let alone to use the trees as roosts. Indeed, a number of the larger pines were recently cleared. For these reasons, we did not, and do not, consider that this assessment requires a specific bat survey.

Where potential natural wetlands were located on the site and rapid tests were inconclusive, representative vegetation plots were undertaken (MfE 2020 protocol), and soil pits (to 0.5 m depth) were dug in a number of the lowest-lying areas to enable hydric soil tests (MfE 2020; Fraser et al. 2018) and hydrology assessment (MfE 2021; Lambie et al.). These data allow the required dominance and prevalence indices to be calculated. I note that both properties were fenced, stocked, and are clearly farms grazed by stock and therefore areas of pasture.

With respect to the highly modified stream, the bed was dry at the time of survey, so no instream faunal surveys were possible; instead, the bed was walked, and a description and photographs were produced.

The stream channel has been dry at the surface for five of six site inspections, but the recent winter provided sufficient water to undertake baited net trapping (fyke and Gee minnow traps). No eDNA or other instream fauna sampling has been undertaken because surface water is usually absent. The channel has been walked several times to characterise it and its vegetation cover.

## 2.4 Assessing ecological significance and effects management.

The relevant ecological significance policy is captured by the significance criteria in Policy 23 of the GWRC RPS (Plan Change 1) and is based on an assessment of representativeness, rarity, diversity & pattern and ecological context and undertaken usually at the Ecological District scale. The management of effects on natural wetlands and streams is addressed in Policies 24 (if indigenous and significant) and 24A, Policy 40A (natural inland wetlands specifically), and the NPS-FM effects management hierarchy (i.e. avoid, minimise, remedy, offset and compensation). Policy 40B addresses loss of river extent and values. In all cases, the direction to avoid loss of natural inland wetland extent and value follows a sequence: avoidance, then minimisation, then remediation; more than minor residual effects remaining after those steps are then offset and, finally, compensated for.

## 3.0 Results

I have adopted further detail on the landscape context from the peer review of this ecological assessment prepared by Nicholas Singers of Singers Ecological:

"*The Paraparaumu landscape was a series of coastal dunes and inter dune wetlands. The property is on the drier dune surfaces and once likely held kohekohe forest but no trace of forest remains. Very small depressions, possibly not even natural depressions remain in which small wetlands persist. In the Foxton Ecological District most wetlands develop in two distinct ways.*

- *In hollows created by moving dunes which blow inland parallel to the prevailing wind. These create parabolic or crescent-moon shaped features. The hollows behind the moving dune become wetlands that are typically similar shaped to the moving dunes. These can sequentially aggregate to form dune plains. New wetlands in moving dune landforms are known as dune slacks. These are ephemeral wetlands and older and larger areas are known as dune deflation hollows.*
- *At the junction of major dune building phase and where the sand dunes meet older landforms, small to large dune lakes form with their associated wetlands. These areas are typically permanently wet.*

*In the lee of Kapiti Island at Paraparaumu these characteristic parabolic landforms are less pronounced because the land is more sheltered from the prevailing westerly wind. This is also why an isthmus or incipient tombolo is developing towards Kapiti Island.*

*The online S-map (Figure 5) identifies the entire Project area as a sandy recent soil (Foxton), which is a dune soil. This is informative in that most of the site is dune, but that does not preclude micro sited wetland soils.*

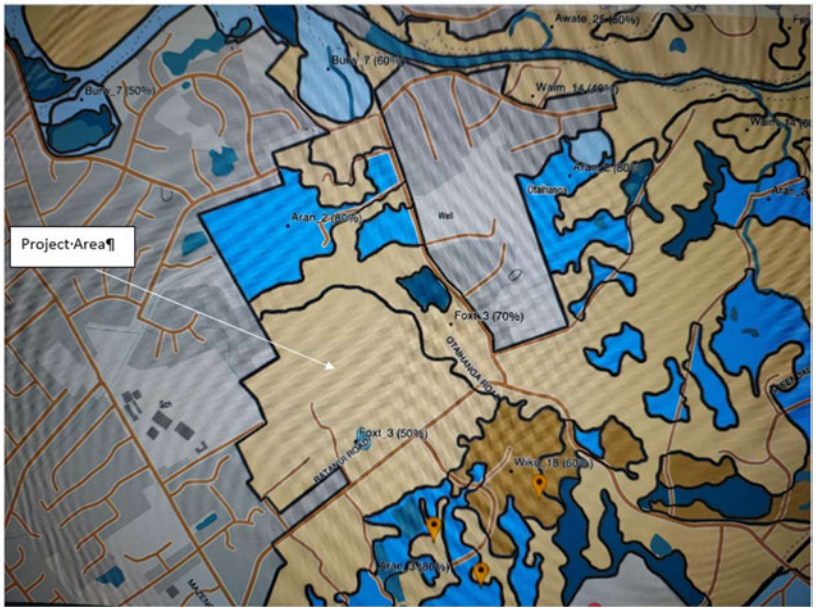



Figure *5* Otaihanga Project Area, showing a light brown polygon which is the well-drained sandy recent soil (RS) (Foxton Soil). Eastwards are dark brown polygons which are older dunes with a sandy brown soil (BST) (Waikuku)

which are moderately well drained. The blue polygons indicate historic areas which were seasonally or permanently wet. Light blue is a sandy gley soil (GST) (Aranui) which are poorly drained and formerly would have been dominated by kahikatea, pukatea forest. The dark blue areas are acid humic organic soils (OHA) which are very poorly drained and indicate historic or current (larger) permanently saturated wetlands."

## 3.1 Site data

Across both 65 and 73 Ratanui Road I observed one linear waterway, one large, ponded area, one small dug pond, one large driveway garden feature, two sand hill scrub features that were not pasture, an area of recent shelterbelt pine felled piles, dune hill and hollow pasture, shelterbelts, isolated trees and the driveway tree line as well as 20 small dune hollow potential wetland areas.

The properties total around 12.7 ha and contain no Significant Natural Area (SNA), QEII covenant area or other plan-listed or registered ecological value. There is no obvious sizeable ecological feature on or near the properties.

## 3.2 Terrestrial

The great majority of trees are exotic (pine, blackwood, cypress and willow in the paddocks). The few native species seen are Coprosma, karo, tī kōuka and pittosporum (*Pittosporum ralphii*) in the driveway gardens and pond surrounds. The raised sand hill area on the northern boundary is largely blackberry, rank pasture grasses, common weeds and two or three exotic trees.

There is very limited to no habitat for native bats, skinks or geckos. The following common rural birds were observed: pūkeko, spur-winged plover, sparrow, finches, welcome swallow and blackbirds. When the large pond holds open water (usually winter as it dries substantially in summer), it may attract a range of waterfowl. The pond edge contains planted blackwoods (dominant), two mamaku, willow, *P. ralphii*, one large Japanese cedar, agapanthus, pōhuehue, akeake (several), pampas, several pine trees and large harakeke. The owner of the property has stated that he planted all of these plants after digging out the pond from what he describes as a shallow depression in what was a dairy paddock.

Hares and rabbits were seen, and rats, mice, possums and mustelids are likely to be present, at least periodically.

## 3.3 Wetlands

Twenty potential wetland features were located, all in dune hollows on both properties. These features are illustrated in Figure 6. Most are small, in the order of 4 m by 5 m; all are in paddocks, and none is excluded from stock access.

The features are palustrine marsh wetlands (Johnson & Gerbeaux 2004). That is, they are mainly mineral wetlands with moderate to good drainage, fed by groundwater or surface water of slow to moderate flow, and characterised by moderate to great fluctuation of the water table or water level.

The features are labelled 1-20 and specific wetland test data are presented in Table 1. Typically, these hollows were vegetated with a mixture of creeping buttercup, *Juncus effusus, Juncus edgariae*, creeping bent, Yorkshire fog, *Paspalum dilatatum* and chickweed. A

range of other species occur sporadically in a number of the features across the site. At the time of the initial survey, the central area of most features was decaying water pepper, which had seasonally died back, leaving most features with a largely bare central area. The implication of this natural process for the cover dominance and prevalence indices is discussed below. A full list of species found is presented in Appendix 1.

I provide a more in-depth discussion of feature 2 (the large pond) and feature 17, as both are stated by the landowners to be human-created features, yet both have a dark-shaded appearance in 1940s aerials, indicating that some form of non-pasture cover was present.

It is possible that these features are not "natural inland wetlands" in accordance with the NPS-FM. If they were found to be created and planted wetlands, both would be excluded under exclusion (b) of the NPS-FM (2020) definition (deliberately constructed wetlands). However, I have conservatively assessed them as natural inland wetlands, as it is not possible to be certain that they are not.

I note that the operative NRP (in the definitions section) does not include the NPS FM exception of association with a deliberately created water body, and any exception would only be by way of created wetland exception and that would only apply to feature 2 on account of all the species and the surface water retention being caused by the excavation and planting of that feature. A process relayed to me as occurring in the late 1970s to early 80s by the landowner.

As stated, features 2 and 17 should both be conservatively treated as natural inland wetlands, and I have included in my assessment the more permanent (or mostly permanent) wetland species cover area for feature 2, as recorded during site visits and observed in aerial photographs. That wetland edge is predominantly *Isolepis prolifera*, occasional *Juncus edgariae* and red azolla (*Azolla rubra*) over the open water when surface water has been present for some months.

The other features across the properties were essentially the same (exotic common species primarily non-recognised pastures and Juncus and water pepper), and a number of the representative and also distinguished features are illustrated in the following figures.

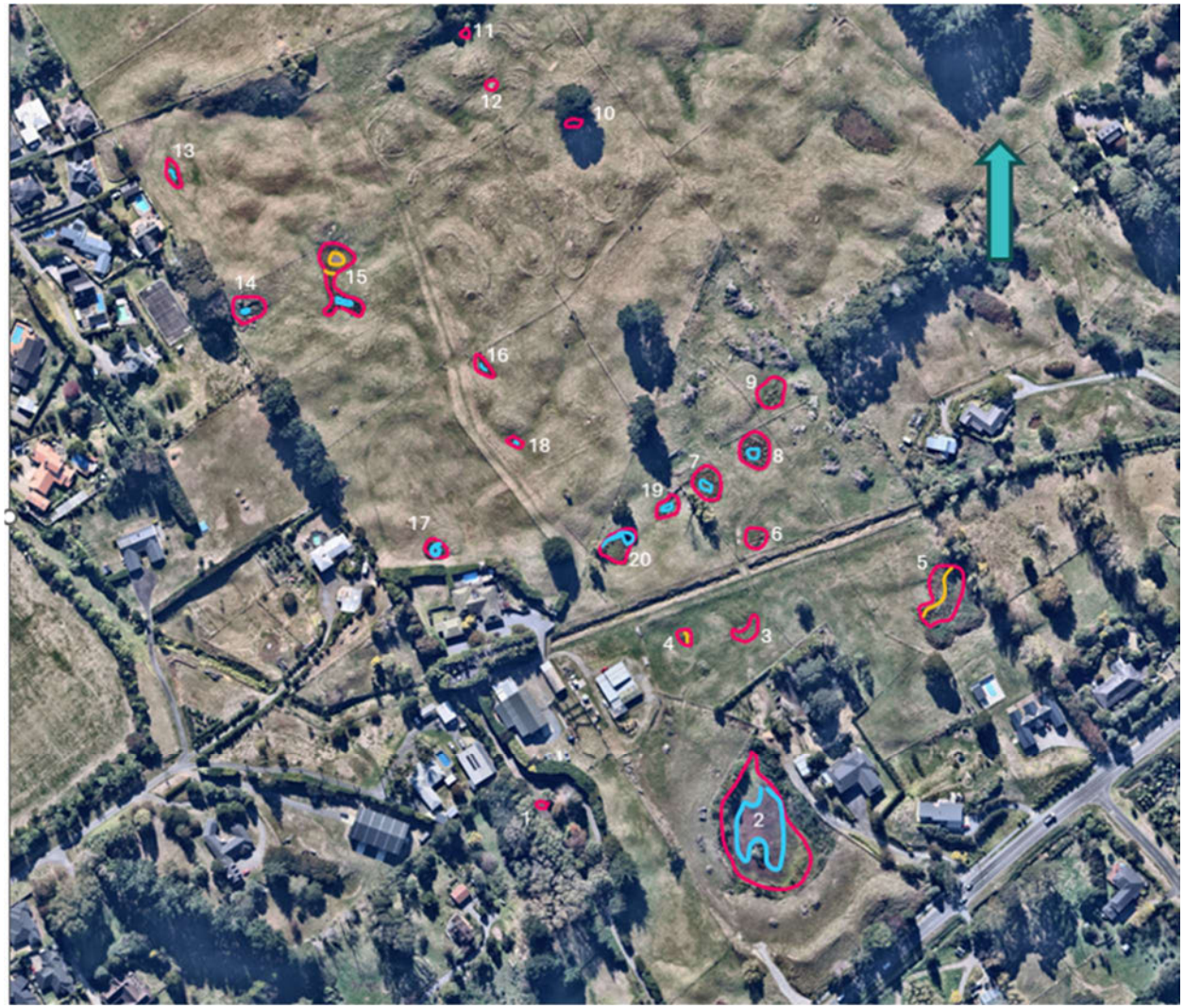
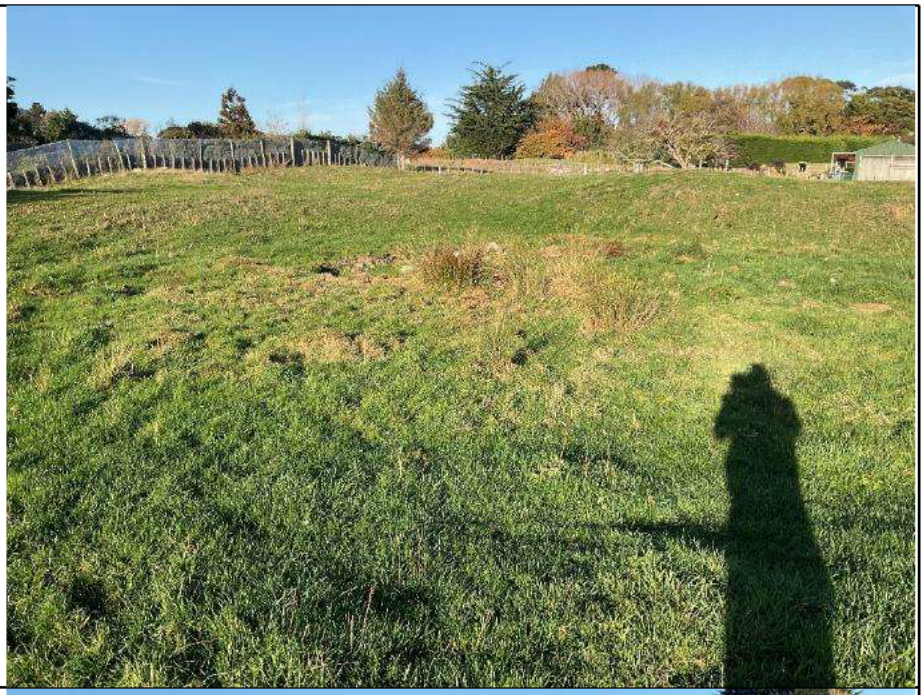



*Figure 6. Potential wetland features found on the properties. (Red only are not wetland, blue inside red indicate natural inland wetlands while orange shows those features that only show seasonal natural wetland (see Table 1)*

Dune hollow features are illustrated in the following photographic section.

| | |
|---|---|
| 1 - water pepper hollow |  |
| 2 -pond bed - lime green Isolepis prolifera and red azolla |  |

| | |
|---|---|
| 3<br>Scattered juncus and some creeping bent |  |
| 4<br>Cluster of juncus |  |

| | |
|---|---|
| 5<br>Depression crescent with juncus and Isolepis |  |
| 6<br>typical and similar to sites: 7, 8, 9, 14, 16, 19. Water pepper centre and Juncus edge. |  |

| | |
|---|---|
| 10<br>Seasonally dry hollow |  |
| 11 |  |

| | |
|---|---|
| 12<br>starwort hollow |  |
| 13<br>water pepper hollow (died off) |  |

| | |
|---|---|
| 15<br>dumbbell shaped wetland juncus effusus and edgariae south, J. articulatus north |  |
| 15<br>north arm |  |

| | |
|---|---|
| 20 |  |

All of the features present are highly modified, small low points in grazed paddocks, or dug out. They do not fit the profile of a naturally uncommon dune deflation hollow (Wiser et al 2013) which are naturally uncommon ecosystems. Those systems are indigenous vegetation associated with sands and wetlands, and the features identified on this site are not indigenous or representative of indigenous dune deflation hollow habitats.

All features except features 2 and 5 fail the rapid assessment, as there is no clearly dominant cover of FACW and/or OBL[4] species (owing to the seasonal dieback of water pepper). Therefore, each feature was inspected, the mosaic of assemblages (where present) was characterised, and a representative vegetation plot (2 x 2 m) was undertaken in each type. A few features had multiple plots due to varying character types within the one feature. Dominance and prevalence index scores were calculated, and the results are reported in Table 1.

There are 20 separate hollows or features, and some features have two or three areas of different quality and so received additional vegetation plot assessments. Ten of the 28 vegetation assessment plots qualified as natural inland wetland by way of dominance >0.67 and prevalence <3.0. These areas (see algorithm in methods) do not require hydrology and hydric soil tests to be ascribed a natural wetland classification (7 features in total (Table 1)). In the main, it was the dominance of creeping bent, Juncus or, in feature 1, live Persicaria that drove the result. Nine other plots failed these tests but had extensive dead Persicaria centrally; had this assessment been undertaken a month earlier, these areas would also have met the dominance and prevalence criteria because of water pepper

[4] Obligate (OBL): occurs almost always in wetlands (estimated probability >99 per cent in wetlands) · Facultative wetland (FACW): occurs usually in wetlands (67–99 per cent).

cover, but they did not do so on the day of data collection. These areas have been treated in this assessment as positive tests for natural inland wetland under dominance.

The MfE delineation method does not offer guidance on how to treat periodic presence. Eight other plots simply do not meet the criteria, having prevalence scores that are too high. A number of affirmed and rejected sites with prevalence scores around 3 (where dominance is met) required hydrology and hydric soil testing. As at the time of survey (and excluding feature 1, which is outside the development zone), 1,149 $m^2$ of wetland features (7 individual hollow features and the pond) meet the natural inland wetland definition, and a further 384 $m^2$ (from 8 features) would have done so in winter conditions. No feature is excluded because of the pasture exclusion; rather, features are excluded because of prevalence indices well over 3 (the cut-off).

| Note | Feature # | Rapid | Dominance | Prevalence | Dominant taxa | Hydric soil | Hydrology | NPS Exclusions | Natural wetland | Area (m2) | Seasonal wetlands |
|---|---|---|---|---|---|---|---|---|---|---|---|
| west access road garden bowl | 1 | yes | Yes (1) | 1.95 | water pepper | - | yes | no | Yes | 16 | |
| Large, constructed pond (dry) | 2 | parts | Yes (1) | 2 | Isolepis | - | yes | Arguably No | Yes | 900 | |
| old dig site with bricks | 3 | No | | | | No | No | pasture / artificial | No | | |
| | 4 (1) | Yes | Yes (1) | 2.57 | Juncus | No | No | no | Yes | 9 | |
| | 4 (2) | No | Yes (0.67) | 3.15 | | No | No | pasture | No | | |
| | 5(a) | Yes | Yes (1) | 1.95 | Juncus | No | No | no | Yes | 36 | |
| | 5(b) | Yes | Yes (1) | 2.38 | | No | No | no | Yes | | |
| | 5(c) | No | No (0.5) | 3.2 | | No | No | | No | | |
| | 6 | Yes | Yes (1) | 2.22 | Juncus | No | No | No | Yes | 35 | |
| 80% dead Persicaria leaving bare soil | 7 | No | No | 3 | | No | No | | No (but) | | 78 |
| 95% central dead Persicaria | 8 | No | No (but) | 2.22 | creeping bent | No | No | No | No (but) | | 78 |
| | 9(1) | Yes | Yes (1) | 2.08 | creeping bent | No | No | No | Yes | | |
| | 9(2) | Yes | Yes (1) | 2.1 | creeping bent | No | No | No | Yes | 56 | |
| pine hollow, tyres and sheet metal | 10 | No | | | | No | No | | No | | |
| | 11 | No | Yes (0.67) | 3.45 | due to Centella | No | No | pasture | No | | |
| | 12 | Yes | Yes (1) | 1.59 | Starwort | No | No | Yes | Yes (but) | 25 | |
| 97% dead Persicaria and bare soil | 13 | No | No | 3 | | No | No | no | No (but) | | 12 |
| 60% dead Persicaria and bare soil | 14 | No | No | 2 | | No | No | no | No (but) | | 36 |
| bare earth central circle | 15 (1) | No | | | | No | No | Yes | Yes | 27 | |
| outer 2m band | 15(2) | Yes | Yes (1) | 2.11 | Juncus | No | No | no | Yes | 40 | |
| connecting swale | 15(3) | No | No (0.5) | 3.48 | | No | No | no | No | | |
| second circle (centre dead Persicaria) | 15(4) | No | Yes (0.67) | 2.99 | | No | No | no | No (but) | | 40 |
| | 16 | No | No | 2 | | No | No | no | No (but) | | 40 |
| House pond | 17 | Yes | | | | No | No | Arguably No | Yes | 40 | |
| | 18 | No | No | 2 | | No | No | no | No (but) | | 40 |
| | 19 | No | No | 2 | | No | No | no | No (but) | | 40 |
| | 20(1) | No | No (0.33) | 3.31 | | No | No | | No | | |
| 70% dead Persicaria | 20(2) | No | No | 2.43 | | No | No | | No (but) | | 20 |
| Total Areas (m2) | | | | | | | | | | 1149 | 384 |

*Table 1. Feature vegetation plot data analysis.*

### 3.3.1 Hydric soil test

Ratanui Road is characterised by sandy brown soils (NZSC); peat soils are not present on site but are found to the south and east around Otaihanga. The sandy brown is a Gley Soil dominated by sand or loamy sand to depth. Waterlogging, either seasonal or more permanent, is usually a feature, and where it is more permanent there is reddish-brown mottling from chemical reduction. The indications on site are of a seasonally high but well-draining water table, with groundwater moving through 2-3 m each year (pers. comm. with the landowner and installed piezometer).

Four 0.5 m deep holes were dug in the beds of four of the potential wetland hollow depressions, and the results are shown below.

The profiles all showed the same brown sandy loam of fine, uniform grains of a uniform brown colour, with little to no fibre or organic material and no discernible smell. It is a well-drained soil, and there was no sign of water in the holes, nor any mottling on the sides. Note that, due to drying and the limitations of the camera, the rich brown observed by eye is not obvious in the following photographs.





Feature 9 – Soil observations



Feature 12





Feature 4





Feature 15

At excavation, the colours were most like **Chroma 6, value 5**[5], which is not one of the hydric soil combinations (Fraser et al. 2018). In terms of the algorithm for determining hydric soil, there was no peaty material within 30 cm and there were no low chroma or value combinations indicating hydric soil. I note that the photographs show a more washed-out colour than the vivid brown observed by eye before the soil surface dried.

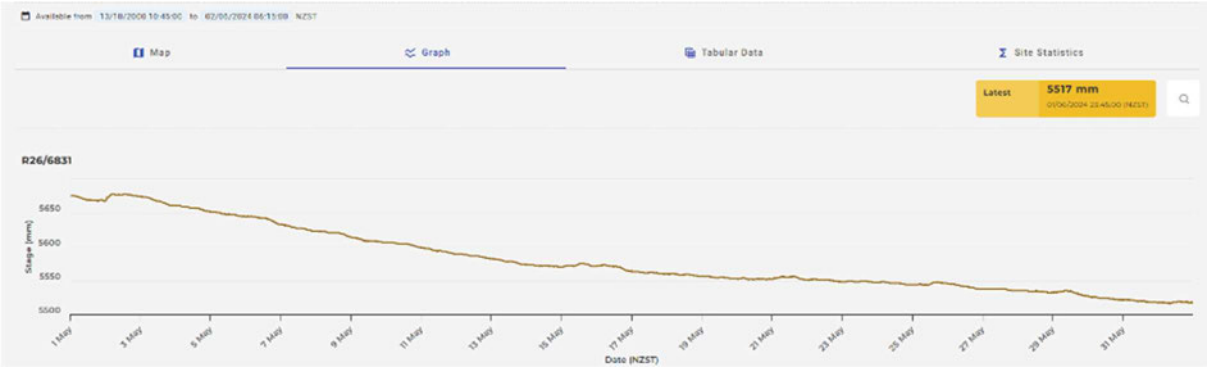
No mottles were evident and there were no dark chroma low value colours. Under the Fraser et al (2018) algorithm the result is “other soil” (i.e. non hydric (not wetland)).

### 3.3.2 Hydrology

I have no regular or historic on-site data on groundwater or surface water, noting that piezometers have since been installed in September 2026. My 0.5 m holes dug in the low points of four depressions did not encounter water (30 May 2024).

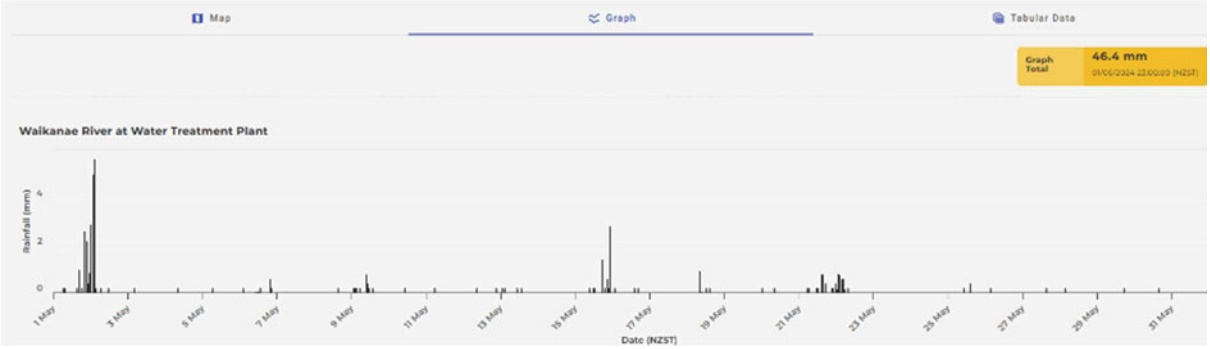
Those piezometers suggest that ground water generally flows north.

GWRC have a ground water measure site at the coast and one near Arawhata Road (R26/6831) and it shows that over May the ground water (stage height) had been falling all month. May 2024 was the lowest ground water stage for the 2024 year (5514mm).




Rainfall over May was low. GWRC has a rain gauge at the Waikanae River water treatment plant, which recorded six short rain periods and 46 mm in May 2024.

[5] Soil chroma is a measure of the intensity or purity of a soil's colour, indicating how bright or dull the colour appears. Certain chroma indicate wetland soils.




It is reasonable to say that at the time of survey the groundwater was likely to have been at or near its annual lowest, at least for the 2023-2024 season. That said, rainfall across the year is generally low and diffuse, i.e. there is no clear season of higher monthly rainfall, which means there is unlikely to be an identifiable month or months where there can be certainty about the presence of a high water table and surface inundation of the hollows.

With respect to the hydrology tool, I cannot say with any certainty if the features identified on properties at 65 and 73 are inundated for at least seven consecutive days during the growing season (11 August to 13 June (306 days)) but I suspect they are.

Assuming they do meet the initial criteria, no feature meets the Group 1 primary tests (surface water, groundwater or soil saturation) for natural inland wetlands. With respect to Group 2, one feature (12) has starwort on the ground, which might be considered an algal mat (similar principle) (2D), and several features have sparsely vegetated concave surfaces (2H) (e.g. feature 15).

In regard to the hydrology tool (which has not been finalised and is not accepted by hydrologists as a sufficient tool for laypersons, particularly given its interpretation and caveat requirements), one primary or two secondary indicators give a site wetland hydrology.

Under this regime features 12 and 15(1) show indications of wetland hydrology by way of Group 2 indications.

### 3.3.3 Wetlands within 100m of the property boundary.

I have not walked across the various properties adjacent to this. From aerials there are no natural inland wetlands west (developed areas), north on the flattened pastures or south (aside from a raupo road drain). To the east at about 90m there are two depressions of similar nature to those on the property and a north-eastern depression within 50m. However, I do not consider it at all likely these features are hydrologically connected to the site and note the general fall of the catchment is north and east toward and not away from these features.

### 3.3.4 Wetland Fauna

A note with regard to wet adapted animals and the current NPS and RMA definition of wetland. The requirement under the definition is for there to be both plants and animals adapted to wet conditions for there to be an RMA defined wetland. A recent workshop (and then publication (Buckley et al., 2025)) by a national suite of fauna and wetland experts has concluded that where the plant and hydrology factors meet the wetland test criteria then the probability that there are at the very least wet adapted soil invertebrates is near 100%, sufficiently so that specific survey is not required. While the hydrology of the site tends to dryness because it is in sand dune there is always sufficient seasonal high ground water in the wetland features that there will virtually always be wet adapted mesofauna in the soil at some point in each year and that is sufficient to meet the RMA / NPS wet adapted animal component of the definition. Therefore, all the wetland features identified by plant and hydrology factors also have wet adapted fauna.

## 3.4 Waterways

There is one east–west channel, crossed by two culverts and fenced, in the southern third of the site. The channel is visible on the 1942 Retrolens aerial but does not appear to have a source (it may have been a spring, but that area is now under residential development). LINZ places the source further south and east, but there is no clear on-the-ground connection under Ratanui Road. The GWRC watercourse map (online Regional Highly Modified Streams (arcgis.com)[6]) shows the channel as a highly modified stream beginning among residential dwellings and running westward (Figure 7), not an artificial watercourse.



*Figure 7. GWRC designated natural and highly modified streams and rivers.*

However, I am told by the landowner that it is regularly without surface water, and on the day of one of my earlier site visits it could be seen as damp soil, a pocketed (pugged) bed with predominantly terrestrial grasses and herbs (dandelion, hawksbeard, clover, chickweed) and few wetland species (creeping buttercup, starwort, bachelor's button), suggesting it is often dry for long periods. The bed itself is soil and mud, with no gravel or

[6] https://gwrc.maps.arcgis.com/apps/webappviewer/index.html?id=87a85d0ad2a3493fbeccb789eac79773

rock. The banks are covered in pasture grasses, including tall fescue, occasional Juncus and scattered *Carex virgata*. These are periodically grazed by cattle.



*Figure 8. Channel with no surface flow (May 2024).*



*Figure 9 August wet winter surface flow condition.*

There were no aquatic values at the time of the initial and second or third site visit, and it is highly unlikely the channel is permanent habitat for fish or macroinvertebrates other than for short winter periods of some years.

The 2026 winter survey deployed baited fyke and Gee minnow traps and caught one young 400 mm shortfin eel in 10 cm of surface water and 100-200 mm of soft mud with patches of *Isolepis prolifera*, bachelor's button, starwort, false celery and floating sweet grass. When surface water is retained, it seems likely that one or more shortfin eels move up this tributary of the Mazengarb Stream to exploit the flooded soft muds, feeding on chironomid larvae and water snails in the muds and macrophytes. Such seasonal winter macrophyte and wet mud habitat is poor aquatic macroinvertebrate habitat and likely supports only the few pollution-tolerant and harsh-environment-tolerant species common in highly sedimented macrophyte habitats (MCI typically <60 and species richness <10). It is not regular, stable, good-quality aquatic habitat.

# 4.0 Ecological Values

There are no at risk or threatened species recorded on site, either plant or animal.

There are no terrestrial indigenous ecological values associated with the properties. While a small range of animal species, including some indigenous birds, use the trees, various pasture areas and the created pond for resources, these are common species that use the wider landscape, including house gardens, fruit trees, lifestyle block wet areas and paddocks. Northern grass skink (not threatened) are present, but they are not in the wider open pasture areas (BML 2026).

## 4.1 Wetlands

Figure 10 below marks the areas that classify as natural inland wetland under the NPS-FM delineation process as described above (16 on site, noting that feature 15 has two parts). Those that meet the test are coloured green.




*Figure 10. Features (green inside red) that qualify as natural inland wetland via conservative vegetation cover Dominance and prevalence indices, irrespective of absence of hydric soil and hydrology indications.*

The EIANZ (2018) guidance assesses value using the following table. Although there are some 15 features on the sites, they are very similar in species composition, size and setting, so the features are not tested individually; instead, an average feature type is tested and the outcome applied to all.

Table 4 **Attributes to be considered when assigning ecological value or importance to a site or area of vegetation/habitat/community.**

| Matters | Attributes to be considered |
|---|---|
| Representativeness | Criteria for representative vegetation and aquatic habitats:<br>• Typical structure and composition<br>• Indigenous species dominate<br>• Expected species and tiers are present<br>• Thresholds may need to be lowered where all examples of a type are strongly modified<br>Criteria for representative species and species assemblages:<br>• Species assemblages that are typical of the habitat<br>• Indigenous species that occur in most of the guilds expected for the habitat type |
| Rarity/distinctiveness | Criteria for rare/distinctive vegetation and habitats:<br>• Naturally uncommon, or induced scarcity<br>• Amount of habitat or vegetation remaining<br>• Distinctive ecological features<br>• National priority for protection<br>Criteria for rare/distinctive species or species assemblages:<br>• Habitat supporting nationally Threatened or At Risk species, or locally[19] uncommon species<br>• Regional or national distribution limits of species or communities<br>• Unusual species or assemblages<br>• Endemism |
| Diversity and Pattern | • Level of natural diversity, abundance and distribution<br>• Biodiversity reflecting underlying diversity<br>• Biogeographical considerations – pattern, complexity<br>• Temporal considerations, considerations of lifecycles, daily or seasonal cycles of habitat availability and utilisation |
| Ecological context | • Site history, and local environmental conditions which have influenced the development of habitats and communities<br>• The essential characteristics that determine an ecosystem's integrity, form, functioning, and resilience (from "intrinsic value" as defined in RMA)<br>• Size, shape and buffering<br>• Condition and sensitivity to change<br>• Contribution of the site to ecological networks, linkages, pathways and the protection and exchange of genetic material<br>• Species role in ecosystem functioning – high level, key species identification, habitat as proxy |

### 4.1.1 Representativeness

Historically, the swamps of Kapiti on the lowland plains between dunes were podocarp-broadleaved forest of abundant kahikatea, with occasional to abundant pukatea, kiekie and supplejack, and locally rimu, tawa and swamp maire, particularly on organic and gley soils with a high water table (Singers et al. 2018). On the dunes, including the small dune hollows, the cover was most likely predominantly podocarp-broadleaved forest, with mosaics of kānuka, red māpou, korokia and akeake on very recent soils, grading into ngaio, tītoki, kōwhai, tōtara, mataī, rewarewa, maire species, māhoe, lancewood, kaikōmako and kohekohe on older dune soils.

There are few remaining examples of these ecosystems (such as Tini Bush (RAP 4, Ravene 1992)). Most of the swamp or marsh in these now largely farmed landscapes is harakeke–raupō swamp with occasional remnant kahikatea, pukatea and swamp maire, or mānuka fen.

The recommended area for protection (RAP) 3 (Ravene 1992) "Andrews Pond" (not far south of the site) shows a manuka/Isolepis/sphagnum shrubland on a dune hollow system. Manuka is dominant with a sphagnum ground cover as well as Isolepis prolifera and *Baumea* (now Machaerina) *teretifolia* with some *Carex secta*.

The current wetland cover bears no resemblance to the historic pre-modification state of the site, or even to the remnant indigenous swamp and marsh systems recognised in the PNAP. Indeed, the hollows on site are so small that they were unlikely to have been wet when the dune areas were under forest.

The features are in no way representative of natural formed indigenous wetlands be they historic swamps or current day regenerated features of sedgeland marsh. Therefore, we consider the appropriate ranking to be very low.

### 4.1.2 Rarity / Distinctiveness

While indigenous wetlands are rare in the Wellington Region (ca. 2.8% of the historic extent) (Ausseil et al., 2008), the features measured to derive that value were pre-human wetlands. It is these pre-human, and therefore indigenous representative, wetlands on true wetland hydrology that are now rare, not wetlands meeting the RMA definition on hydrology alone. The greatest loss has been of swamps, and in the Wellington Region the principal areas of their historic existence and loss were the Wairarapa and the Kapiti Coast.

Features dominated by water pepper, Juncus and exotic wet grasses are common throughout the Wellington Region, on the Kapiti dunelands and in the Foxton Ecological District. Thus, although indigenous wetlands are rare, the features on site are not indigenous and are not representative of the rare wetlands identified by Ausseil et al. (2008) and Dymond et al. (2021), and therefore do not meet the rarity component of the values assessment.

As noted above, the features present do not fit the profile of a naturally uncommon dune deflation hollow (Wiser et al., 2013). Those systems are indigenous vegetation associated with sands and wetlands, and these features are not indigenous or representative of indigenous dune deflation hollow habitats. That is, they rank as very low for representativeness.

Nor are the features distinctive in any positive way.

### 4.1.3 Diversity / Pattern

Diversity is a measure of the number of different types of species or habitat types that exist in a given area and is relevant to an Ecological District (here the Foxton ED). The small hollow features are of low species diversity, and all of similar character without gradients other than a variable groundwater depth which has not induced diversity in abiotic components. The scattered small features are largely uniform in type and character and species, and all relate to shallow inter dune deflations.

For comparison, the NZ Plant Conservation Network holds species lists from surveys. There are few lowland plains non-forest wetland systems, but one example is the swamp at 226-234 Te Hapua Road, a farmed but very wet property. The Wellington Botanical Society recorded three shrub species, two ferns, one orchid, 15 sedges, three rushes, 19 other herbaceous species and one moss at this site. In total, 44 taxa were recorded there, compared with 5-6 in any one feature on the site, or 18 across the entire subject site (two rushes, and no shrubs, orchids, ferns, sedges or mosses).

Therefore, I rank this criterion as very low for this site.

#### 4.1.4 Ecological Context

The site's role in ecosystem functioning through its relationship with its surroundings includes its role in maintaining indigenous biodiversity, the provision of resources and liveable space related to the size and shape of the feature(s), how buffered or buffering the feature is, how important the feature is for faunal resources and passage through the landscape, and its role in abiotic factors (e.g. water filtration and detention).

The features are small, isolated, simple and largely exotic, in a long-standing rural peri-urban setting. They do not connect to a waterway or other natural feature, are too small to regulate or temper groundwater and surface water, do not filter and discharge to any waterway, and do not provide resources for fauna or offer shelter or buffering to any more important feature. Accordingly, the contextual value of these features, individually or collectively, is very low.

Wetlands are said to have important catchment functions, although few sources state with evidence what these functions are. In the main, they relate to water storage during rain events, reducing peak surface flow discharges, and retaining water seasonally to support streams through dry seasons. They are also considered nutrient sinks, but that is not always the case, and they can be nutrient exporters, especially of phosphates (Tanner & Sukias, 2011). They can also, of course, be faunal habitat. However, not all natural wetlands have these functions, or have them to a degree that makes them important. Research now shows that they are often no better filters than pasture (Monaghan et al., 2007)

While it is obvious that the exotic dominated wetlands have very limited indigenous biodiversity and poor ecosystem health, their hydrological functions cannot be seen or derived easily.

A wetland's productivity mainly relates to the amount of carbon that plants fix during photosynthesis. Some wetlands, especially swamps in valleys and depressions at the bottoms of catchments, have very high biological productivity because they offer few constraints to photosynthesis (they contain plenty of water and nutrients compared with ecosystems on dry land).

I do not consider that the current wetland features differ markedly in productivity from the surrounding pasture; that is, their soil and water chemistry is not likely to be markedly different, and they do not retain much more water. They are simply lower lying and therefore closer to the high groundwater level.

I have no on-site measurements of differences in soil chemistry or biomass productivity between the wetlands and the surrounding pasture. However, from my observations, the species, density and height in the exotic-dominated wetlands mimic the surrounding pasture. All areas are grazed, fertilised and farmed in the same way. Accordingly, I see no reason to expect markedly different soil chemistry, nutrient status or productivity (carbon storage) in the exotic-dominated wetlands.

The main difference between the exotic dominant wetlands and surrounding pasture is that the lower lying exotic dominant wetland areas stay moister longer in summer and wetter in winter to a small degree.

The published New Zealand science on nutrient filtration and management in natural wetlands is largely inconclusive, but several studies show that denitrification (of nitrate) occurs in sweet grass pasture swales, although that process produces nitrous oxide and dinitrogen (Zaman et al., 2008). Research also shows (Luo et al., 2008) that dairy pasture soils cause denitrification and that the rate is linked to season, pasture use and moisture level. It is not clear from research that farm wetlands differ from pasture in terms of nutrient filtration and denitrification.

Rutherford et al. (2009) show evidence that riparian wetlands support stream base flow. They show that attenuation of water and nutrients can occur in small **riparian** wetlands (small meaning 5% of catchment area) where there is no or infrequent stock access and the wetlands are densely vegetated (tall exotic grasses, flax, mānuka, Carex, Juncus). However, the wetlands on site are too small and too distant from the channel and have no stock access restrictions, and the stream is not supported by retained flow from these wetlands; it remains dry most of the year.

### 4.1.5 Wetland Summary

| Criterion | Outcome |
|---|---|
| Representativeness | Very low |
| Rarity and distinctiveness | Very low |
| Diversity and pattern | Very low |
| Context | Very low |
| Outcome | **Negligible ecological value** |

## 4.2 Waterway

The highly modified stream (GWRC web data) has been used as a drain for over 60 years and is not considered to have permanent flow or retained water except during some winters. The substrate is soft mud and soil with terrestrial vegetation or common macrophytes, but it is still an active bed. The fish fauna is limited to occasional shortfin eel, and we predict a low-MCI, low species richness, pollution-tolerant macroinvertebrate assemblage. The aquatic ecological values of the system are therefore very low; it is only temporary aquatic habitat for a small set of rapidly colonising macroinvertebrates, and may be used as a food resource, when flowing, by shortfin eels able to tolerate the variable water quality. While, as with the terrestrial values, the EIANZ has a set of criteria for evaluating a stream or waterway, this channel is clearly very low in all categories and offers **negligible ecological value**.

## 4.3 Significance

Policy 23 of the GWRC RPS has a set of criteria not dissimilar to the EIANZ values set. The wetland features present that classify as natural wetland are predominantly or fully exotic and cannot in any way be said to be "representative", especially where the focus (as prescribed in the Policy 23 significance criteria) is on indigenous biodiversity.

Because the features on site are predominantly populated by exotic species, are neither representative nor rare, and do not meet the diversity or context criteria[7], they cannot be found to be significant in terms of section 6(c) of the RMA or the Policy 23 RPS criteria.

[7] I cannot speak to the final criterion: Tangata whenua values

# 5.0 Potential effects & their management

## 5.1 Wetland works

The development of the village requires vegetation removal and land morphology change. While none of the identified natural wetlands is of particular representative value or significant, and they are all small, they nevertheless meet NPS FM (2020) and NRP natural inland wetland classification. They are, however, of negligible ecological value (and function) and the loss of 1500m$^2$ of these in this catchment (Mazengarb) landscape would be a loss of around 10 to 15% of the local Mazengarb catchment wetland features (I estimate from aerials some 8-10 ha between the Waikanae River and Ca. the Mazengarb Road). This will represent a loss of circa 15% of such wetland features in the Waikanae local sub catchment (a scale I consider relevant to determining the magnitude of the effect and in part at which I made my values assessment). <1% is negligible, 1-10% low and 10-25% moderate. The effect will therefore have a moderate magnitude of effect (at the sub catchment scale). This is a moderate magnitude and negligible value, which under the EIANZ (2018) matrix derives a **very low (less than minor) level of effect**.

Arguably then there is no effect-based reason to undertake any effects management and certainly not any offset actions because the effect of removing the wetlands is not more than minor. However, the NPS FM and NRP do seek the avoidance of loss of extent and value of all qualifying natural inland wetlands.

In terms of the effect hierarchy (NPS FM) consideration was given to avoidance. However, with the design requirements, as well as the location, size and low value of the wetlands this was not practicable nor ecologically required. This also was the case for minimisation of effects. Several wetlands (4, 19, 6, 7 and 8) are in positions where the new wetland will be created and for these wetlands the effect on them is clearly remediated by the creation of the new feature, noting that the new wetlands will be vegetated with indigenous plants, larger and overall represent an ecological gain.

The loss of the remaining wetlands will result in a less than minor effect (as discussed above) and that is the residual effect after mitigation. However, Summerset avoids the wetlands loss with the creation of high quality wetlands on the site. This is despite the fact that the effect level of the loss of wetlands does not warrant an offset (see Appendix 6 of the NPS FM i.e. which directs that aquatic offsetting is to "redress more than minor residual adverse effects") given the effects are less than minor.

Summerset are interested in applying an ecological approach to their developments and are comfortable to offset the 1260m$^2$ of natural wetland not remedied with onsite created indigenous representative wetland development (two wetlands) totalling some 5,480 m$^2$. This should be seen in the hierarchy as further mitigation (i.e. remedial actions to return wetlands on site (in addition to those wetland features that will be directly replaced to a greater extent rather than lost requiring offset). For that reason, also no Biodiversity Offset Accounting Model (BOAM) calculation is needed, but if one was to be undertaken in my experience it would result in a 1:1 ECR in any case.

We have been careful to ensure that the two wetlands to be created are not part of the stormwater treatment train, and so receive clean water. However, for a number of reasons

(not least water supply), they are associated with the flow path of managed future stormwater on the property. This is hydrologically prudent to support the wetlands in addition to access to the ground water. The two areas allocated to be wetlands on the property have inflow water protected by a stormwater treatment train including rain gardens and a forebay and settlement area prior to water entering the wetlands (Figure 11). Thus no stormwater management actions are required within the wetlands.

Importantly the wetland creation will benefit from the stormwater as well as the development related to the ground water level.

There is also to be a riparian enhancement to return the current grazed pasture into an appropriate native riparian vegetation (post culvert replacements) which is identified in the figures below.

Marsh concept.




*Figure 11. Possible stormwater basin wetland establishment areas concept. Blue = retained features and then the different colours show possible different wetland assemblages.*

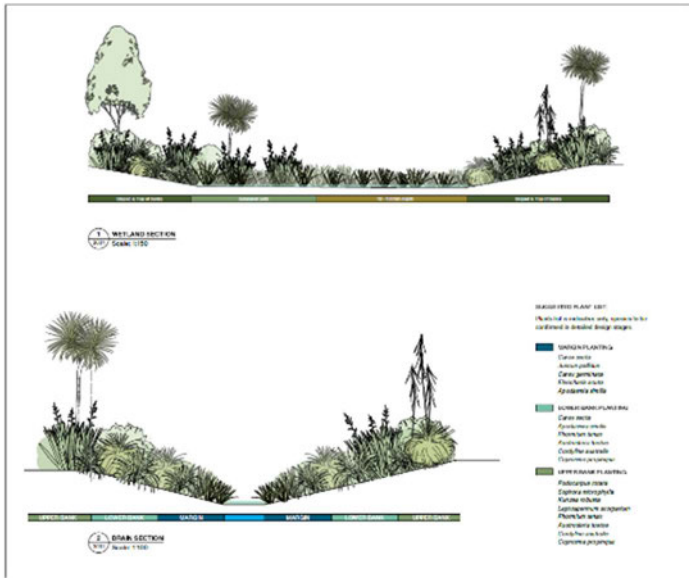


*Figure 12 Kamo Marsh indicative cross sections of the wetland area and stream riparian area.*

The species proposed are those I consider suit the hydrology and local conditions and reflect the examples of wider wetlands re-established.

I consider that the indigenous wetland creation of a larger area than the total of the small features currently present is a remedial action that returns a positive natural inland wetland outcome for this site and that there are no residual adverse effects to be offset.

## 5.2 Culvert replacements

There are currently three culverts across the stream on site: two driveway culverts at the western end that will remain within the retained vendor property, and an existing farm culvert (all approximately 5-6m long). The farm culvert will be replaced by two box culverts, allowing two new roads.
These box culverts will be correctly sized, embedded 25% and matched to the current flat gradient, so as to meet the NES regulation 70 culvert requirements for fish passage.

I assume that, given how often there is no water in the channel, the culverts can be installed in the dry (i.e. without a pump-around water diversion), and that in those dry circumstances there will be no need for fish rescue and transfer.

Furthermore, sediment discharge is unlikely.

With regard to fish passage, I do not consider passage is required as to my knowledge and assessment the stream has only infrequent limited numbers of shortfin eel in winter some years when water is present. That said the culverts will allow free fish passage for swimming fish when water is present.

Furthermore, while the road culvert will be longer (circa 25m) and more of the bed covered (circa 45m), the values of the bed and stream are such that there will be no meaningful

change in value (indeed post and pre culvert pools offer more eel habitat than is currently present) and so there is no loss of extent as this is a straight drain and no loss of value. Provided installation and sizing are correct there will be less than minor adverse effects of that activity and no additional remedial or offset actions required. The proposed streamside riparian planting will have a positive ecological effect through providing shading, bank stability and habitat.

# 6.0 Conclusion

Overall, the assessment identifies no indigenous terrestrial habitats or values within the site that require removal as part of the proposed development.

The presence of native bats is considered highly unlikely. Only three exotic trees were identified as having any potential roosting value should bats be present in the wider landscape, where they have not been recorded.

Northern grass skink occur along the rougher vegetated northern sand dune, ranker pasture stream edges, the road edge shelter belt and a weedy (blackberry) area in the east and around the large pond but generally not across the wider pasture areas (BML 2026).

No threatened or At Risk taxa were recorded during the assessment.

The wetland features identified on the properties are small, simple, exotic-dominated assemblages that have developed following forest clearance and subsequent farming. They are not representative indigenous examples of natural dune wetland plant and animal assemblages, and do not correspond to the naturally rare dune wetland systems described by Wiser et al. (2013), nor to the indigenous wetland types that underpin the estimate of 2.8% remaining wetland extent in the Wellington Region (Ausseil et al., 2008).

On that basis, the ecological values of the wetland features are assessed as negligible, and the features are not significant in terms of section 6(c) of the RMA.

Approximately 1,500 $m^2$ of natural wetland features, comprising 16 features that meet or seasonally meet the definition of natural inland wetland, would be reclaimed as part of the proposal.

Although there is no proposed minimisation or direct remedy for the affected features themselves, the loss of approximately 1,500 $m^2$ of negligible-value wetland would result in a very low level of effect, assessed as less than minor, and therefore no offset is required. However, consistent with the intent of the NPS-FM and NRP (Rule 40) to avoid loss of wetland extent and value, Summerset proposes to create two naturally functioning, native-vegetated wetlands totalling a little over 5000 $m^2$. These wetlands would be separate from the stormwater treatment trains, receiving only well-treated stormwater and otherwise functioning primarily on groundwater. This represents a considerable wetland gain on the property.

The highly modified stream that runs through the property is not expected to be adversely affected to any material degree, including through the installation of a road culvert, provided appropriate design and installation measures are implemented, including provision for fish passage.

Riparian revegetation would improve the function of the stream margins, although the existing instream condition and values are sufficiently negligible that material gains for instream fauna communities are unlikely.

Overall, the proposal is expected to deliver a significant net ecological gain for natural wetlands when compared with the ecological outcomes anticipated under the current land use.

Given the site's modified condition and historic land use, the proposal is expected to have a very low risk of adverse ecological effects and, in several respects, to improve local ecological outcomes. While aquatic matters require appropriate consideration through culvert design, fish passage provision and riparian revegetation, no additional ecology-specific consent conditions are recommended for the management of effects beyond those measures identified in this assessment.

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## Appendix 1: Plant species recorded in potential wetland features.

| taxa | Common name | |
|---|---|---|
| *Juncus edgariae* | *Wīwī* | *Indigenous* |
| *Juncus effusus* | *Leafless Rush* | *Exotic* |
| *Persicaria hydropiper* | *Water Pepper* | *Exotic* |
| *Ranunculus repens* | *Creeping Buttercup* | *Exotic* |
| *Lolium perenne* | *Perennial Rye Grass* | *Exotic* |
| *Crepis capillaris* | *Hawksbeard* | *Exotic* |
| *Plantago major* | *Broad-leaved Plantain* | *Exotic* |
| *Holcus lanatus* | *Yorkshire Fog* | *Exotic* |
| *Agrostis stolonifera* | *Creeping Bent* | *Exotic* |
| *Trifolium pratense* | *Red Clover* | *Exotic* |
| *Lotus pedunculatus* | *Lotus* | *Exotic* |
| *Rumex crispus* | *Curled Dock* | *Exotic* |
| *Paspalum distichum* | *Mercer Grass* | *Exotic* |
| *Paspalum dilatatum* | *Paspalum* | *Exotic* |
| *Centella uniflora* | *Centella* | *Indigenous* |
| *Callitriche stagnalis* | *Water Starwort* | *Exotic* |
| *Cerastium glomeratum* | *Annual Mouse-ear Chickweed* | *Exotic* |

BlueGreen

**About BlueGreen**

Over the last 20 years we have gathered a high level of knowledge and expertise working on a number of large scale projects of national significance, right from pre-consenting investigations through to Environment Court and Board of Inquiry Hearings. As such we are able to offer our clients proven expertise to assist with a range of ecological challenges, both simple and complex, across various ecosystems.

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