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Environmental Consultants





July 2025

# Ashbourne Development

## Ecological Impact Assessment

Submitted to:
Matamata Development Ltd
c/o Unity Developments Ltd

water fauna flora land

## Quality Assurance

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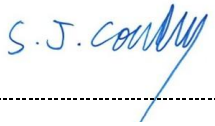
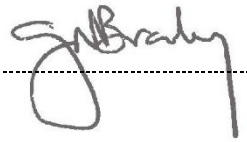
| | Dr Simon Connolly<br>Ecologist |  |
| **Reviewed by:** | Dr Gary Bramley<br>Director |  |

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# Executive Summary

Unity Developments is proposing a multi-use development, the Ashbourne Site, approximately 1.8 km south-west of the centre of Matamata at 247a Station Road. The proposed 4 precinct development includes two solar farms, a residential community, retirement village and a greenway corridor which would run along the centre of the site. The development proposal will be submitted via the Fast-track Approvals Act 2024 and considered by an appointed Panel. The Ashbourne Site is 125 ha in area and has primarily been used for dairy farming and equestrian grazing.

This Ecological Impact Assessment identifies the actual and potential ecological effects attributable to the proposal and provides recommendations for the management of adverse effects in accordance with the effects management hierarchy. This report summarises information from desktop database searches, such as Retrolens, the eBird database and the Department of Conservation Bioweb database. It also uses the results of site visits by EcoResto and Ecological Solutions, which involved methods such as habitat searches, fish trapping, deployment of Automatic Bat Monitors, and use of eDNA. This information is used to assess the ecological effects of the proposed development on vegetation, birds, bats, lizards, wetlands, fish, and watercourses.

Vegetation on site was dominated by exotic pasture grasses and trees in hedgerows with low ecological value. The vegetation did provide some potential habitat for native nesting birds as well as the At Risk-Declining copper skink (*Oligosoma aeneum*), though both of these were considered to likely be present in only low numbers on-site and therefore assigned a low and moderate ecological value, respectively. The Ashbourne Site was used by long tailed bats (*Chalinolobus tuberculatus*) Threatened Nationally Critical, and the possibility of roost trees on site could not be eliminated. The ecological value of bat habitat on the Ashbourne Site was considered moderate. Two types of wetlands were present on site: pasture wetlands dominated by exotic species, rated with a moderate ecological value; and oxbow wetlands along the Waitoa River, rated with a high ecological value. The Waitoa River has an ecological value of moderate, based on the water quality and species known to be present. However, the series of artificial farm drains (many of which were not bearing water during site visits) had negligible ecological value.

Vegetation clearance has similar effects and effects management across all four precincts. The proposed development has the potential to impact native fauna including birds, lizards, and bats through vegetation clearance. However, these effects are effectively managed through the implementation of specific fauna management plans as outlined in the Ecological Management Plan (Ecological Solutions 2025) resulting in either very low or low post effects management levels of effect.

Development of the Residential Community, Retirement Living village and associated Greenway have the potential to adversely impact the oxbow wetlands through earthworks within 100m and vegetation clearance within 10m for the construction of stormwater infrastructure. However, these effects are rated as low pre-effects management. The reclamation of artificial farm drains has the potential for high ecological impact on native fish. However, this effect can be effectively mitigated through implementation of fish management measures, described in the Ecological Management Plan (Ecological Solutions 2025). Stormwater discharge to the Waito River is considered to have a low ecological impact, pre-effects management due to the stormwater management design.

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# 1.0 Introduction

## 1.1 Background

Unity Developments is proposing a multi-use development, 'Ashbourne', within the Matamata-Piako District and Waikato Region, approximately 1.8 km south-west of the centre of Matamata at 247a Station Road (the 'Site'). The proposed development is to occur across two blocks of land, on both the northern side and southern side of Station Road. The Ashbourne development site comprises a total area of 125 ha (Figure 1). The majority of the Site, approximately 111.5 ha, lies south of Station Road, with a smaller 13.49 ha portion located to the north. The Site has been primarily used for agriculture, specifically seasonal dairy farming, cropping and equestrian grazing both presently and historically. The balance of the land, on both sides of Station Road, is made up of flat paddocks serviced by gently elevated, well-maintained farm races that provide access for livestock and vehicles.

The development proposal will be submitted via the Fast-track Approvals Act 2024 and considered by an appointed Panel. The project was referred by the Minster for Infrastructure on 13 May 2025 which means that a substantive application may now be lodged with the Environmental Protection Agency to be considered by the expert panel.

## 1.2 Project Description

The proposal will enable a four-precinct, multi-use development framed around a central spine road which runs from Station Road to the north of the Site to the eastern boundary (Figure 2). Intersecting this would be a secondary spine road connection to link the wider residential precinct to the commercial node, green space, and Greenway.

This transport network, supported by local roads, pedestrian, and cycle connections, enables a legible grid structure in the residential area. A range of housing types and densities are proposed to meet the growing and changing needs of the housing market to enable options for future residents.

Specifically, the four precincts include:

- Solar Farms – Two Solar Farms (c. 13 ha (Northern) and c. 24 ha (Southern)) designed to generate energy for over 7,000 homes per year, with integrated agrivoltaic farming to retain productive land use. The solar precinct promotes renewable energy and land productivity through dual-use farming under the panels, with landscape planting and security measures ensuring integration into the wider development. Earthworks proposed within the Solar Farm areas is minimal and limited to the construction of a vehicle accessway. This access may be the same, or similar to, the pre-development situation (i.e. a farm track). Stormwater and drainage systems have been designed to manage runoff, and no activities are anticipated to trigger consent requirements under the NES-F.

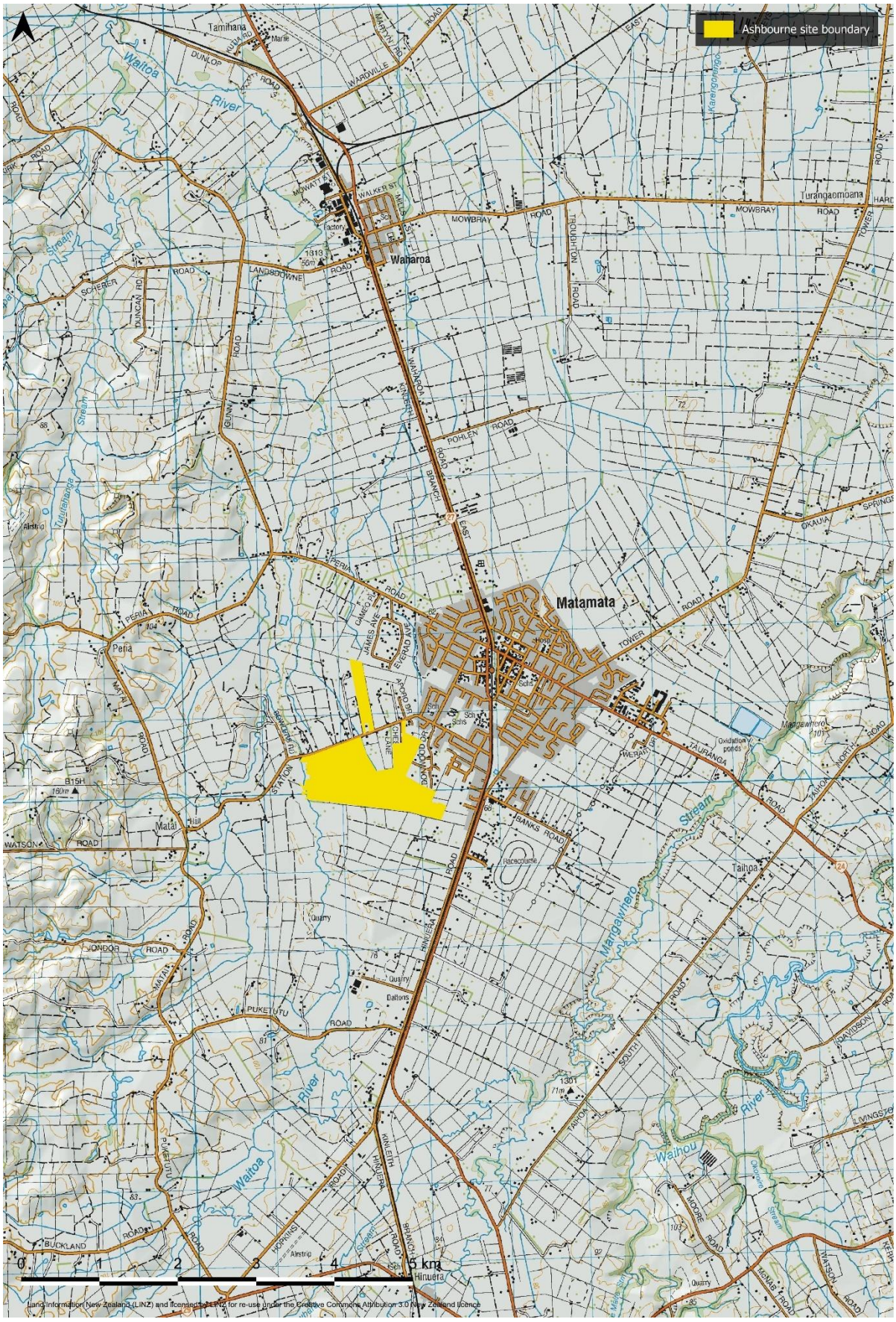


**Figure 1: Location of proposed Ashbourne development.**

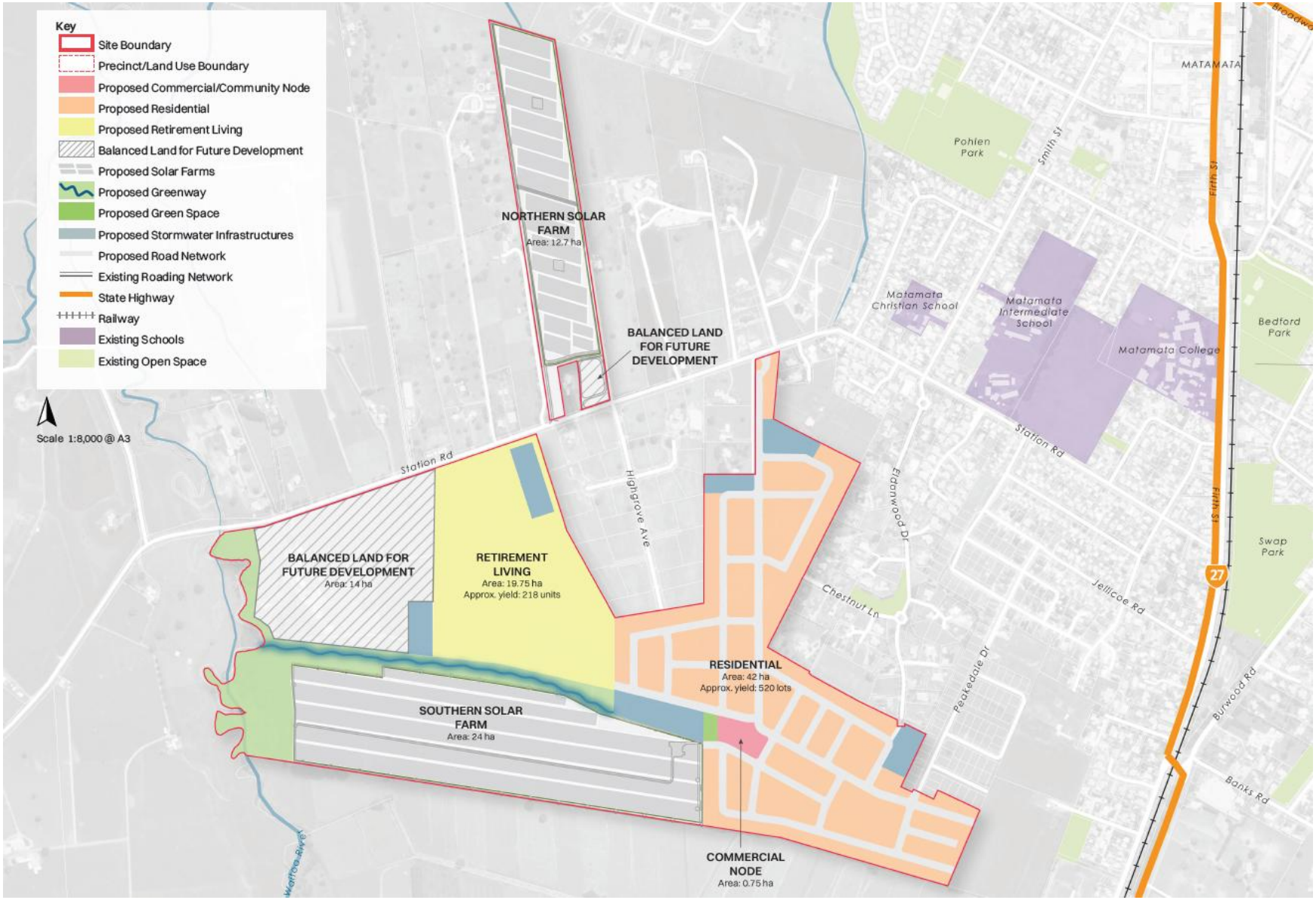


**Figure 2: Master Plan for the proposed Ashbourne development, provided by Unity Developments.**

- Greenway Corridor – A multi-functional Greenway that runs from the proposed Residential Community in the east, to the Waitoa river at the western extent of the Site, will convey stormwater and discharge to the Waitoa river. It is designed to accommodate and treat surface water runoff from various components of the proposed residential community. The Greenway has been designed to manage stormwater volumes up to a 1% Annual Exceedance Probability rainfall event. Flow within the Greenway will be attenuated through a cross-sectional design that caters to a range of flow rates. An outlet structure, including an earth bund and culvert, will limit discharge rates to 80% of predevelopment conditions. Energy dissipation features such as reno mattresses, and rock armouring will provide erosion protection at the outlet. Base level stormwater flow will be managed through infiltration to ground, which mirrors existing hydrological patterns.
- Residential Community – A c. 42 ha neighbourhood delivering approximately 520 new homes of varied types and densities, connected by a central spine road and supported by a commercial node. The residential precinct is shaped by strong urban design principles focused on legibility, diversity, and walkability, with a range of housing types and a 0.75 ha commercial hub that includes local shops, a café, and childcare.
- Retirement Living Village – A c. 19 ha staged precinct delivering around 218 units with aged care and community facilities, positioned to overlook the Greenway. The retirement precinct addresses the increasing demand for aged living in Matamata, providing staged, high-quality accommodation with health and community services in a well-connected and scenic setting.

To deliver these four precincts, earthworks, roading, wastewater infrastructure, stormwater infrastructure, and water supply infrastructure will be required. This will be carried out in a staged manner to ensure the development is integrated prior to future residents moving to Ashbourne.

## 1.3 Scope of Report

Ecological Solutions Limited was engaged to undertake baseline terrestrial and freshwater ecological surveys necessary to prepare an ecological impact assessment (EcIA) for the 'Ashbourne' development. The following EcIA identifies the actual and potential ecological effects attributable to the proposal and provides recommendations for the management of adverse effects in accordance with the effects management hierarchy. This EcIA is to inform the substantive application for resource consents and contribute to planning so that adverse ecological effects attributable to the development can be managed appropriately.

Ecological Solutions was asked to consider the proposed precincts as three different effects assessments (Solar Farm Developments, Residential and Greenway Development, and Retirement Living Development) and in light of both the New Zealand National Policy Statement for Freshwater Management (2020a) and The National Policy Statement for Indigenous Biodiversity (2024).

This report includes 15 sections as follows:

- Executive Summary
- This introduction (Section 1.0).
- A description of the ecological setting of the Site (Section 2.0).
- A description of the methods used to survey the ecological values of the Site (Section 3.0).

- A description of terrestrial ecology relevant to the Site (Section 4.0).
- The findings with respect to wetlands at the Site (Section 5.0).
- A description of freshwater ecology relevant to the Site (Section 6.0).
- An assessment of ecological value for each of the ecological attributes present (Section 7.0).
- An assessment of effects – Solar Farm Areas (Section 8.0).
- Effects Management – Solar Fram Areas (Section 9.0).
- An assessment of effects – Residential Community and Greenway (Section 10.0).
- Effects Management – Residential Community and Greenway (Section 11.0).
- An assessment of effects – Retirement Living (Section 12.0).
- Effects Management – Retirement Living (Section 13.0)
- A list of references used in preparing this report (Section 14.0).

# 2.0 Ecological Setting

## 2.1 Hinuera Ecological District

The site lies within the Hinuera Ecological District (ED). The Hinuera ED was historically mostly fernland and swamp with rare pockets of forest; and is now almost entirely farmed with a few small remnants of kahikatea (*Dacrycarpus dacrydioides*) forest (comprised of young kahikatea and tōtara (*Podocarpus totara*) (McEwen 1987).

The Hinuera ED lies within an inland basin with soils of alluvium, carried down from the central volcanic plateau by the Waikato River, and peat infilling southern parts of the Thames Valley.

## 2.2 Threatened Environment Classification

The Threatened Environment Classification (TEC) combines data from three national databases: Land Environments of New Zealand (LENZ 2012), the Land Cover Database (LCDB), and the national protected areas network (Cieraad et al. 2015, Walker et al. 2015). The TEC is designed as a regional-national scale tool for assessing the threat status of land environments based on the loss of original natural vegetation cover and the extent to which the remaining indigenous vegetation is protected. The entire site and much of the Hinuera ED is within Threatened Environment Classification 1 (<10% indigenous cover left), which means that any remaining indigenous vegetation would be ecologically important because of its rarity.

# 3.0 Methodology

## 3.1 Terrestrial Ecology

### 3.1.1 Vegetation

A desktop assessment of aerial imagery (Google Earth, Retrolens), topographic maps, GIS

datasets (e.g., Land Cover Database version 5.0 (LCDB V5.0), Waikato Regional Council) was used to inform an assessment of historic landcover and vegetation types as well as current landcover and vegetation types within the Site and the Hinuera ED more generally. Current vegetation at the Site was surveyed during a walk-through survey undertaken on 3 and 4 June 2025. Vegetation was photographed and described in terms of composition, value, structure, and integrity. Any 'Threatened' or 'At Risk' plant species encountered were recorded. Vegetation within wetlands was surveyed as set out in Section 3.2 below.

### 3.1.2 Birds

A search of the eBird database (data retrieved April 2025) was undertaken for records within 10 km of the Site. Species with a conservation status of 'Threatened' or 'At Risk' (Robertson et al. 2021) were identified and their potential to use habitats within or near the Site was assessed.

All birds seen or heard during site walkovers were recorded on three occasions, 2 May 2024 (Ecological Solutions), 4 August 2025 (EcoResto) (Whyte 2025), and 3 and 4 June 2025 (Ecological Solutions).

### 3.1.3 Lizards

A search of the Department of Conservation BioWeb database within 12 km[1] of the Site was undertaken to identify species which might be present within any suitable habitat present within or near the Site, such as rank grass and/or woody debris considered adequate habitat for skinks. Data were issued by the Department of Conservation in March 2025.

Any potential lizard habitat on site was identified, photographed and location mapped during the June 2025 site survey.

### 3.1.4 Bats

A search of the national bat database was undertaken for records within 25 km of the Site. Data were issued by the Department of Conservation on 4 February 2025.

An inspection of all trees on site for suitable roost features (>15cm dbh with cavities, crevices, loose bark etc) was undertaken on 4 June 2025.

In addition, an acoustic bat monitor (ABM) survey was undertaken with twelve AR4 acoustic bat recorders deployed on site between 4 and 18 June 2025. This date is outside the best practice bat monitoring season (October – April inclusive) and the absence of bat detections at that time would not confirm the absence of bats; however, bat presence would still be confirmed if bats were recorded.

## 3.2 Wetlands

An initial desktop assessment was carried out using aerial imagery (Google Earth, Retrolens), topographic maps and GIS datasets (e.g., LCDB V5.0, Waikato Regional Council). These were used to assist in assessing historic hydrological conditions and identifying possible wetland locations and extents within the Site for subsequent field survey.

A walk-through survey was undertaken on 3 and 4 June 2025 where potential wetlands within the Site were identified as defined within the National Policy Statement for Freshwater Management 2020 (NPS-FM 2020) (as amended in January 2024) (MfE 2024).

[1] Distance to existing lizard records not precise. 12km equals smallest reporting distance in accordance with ESL's GIS data sharing agreement with the Department of Conservation

Delineation of natural inland wetland was carried out in accordance with the MfE Wetland Delineation Protocols (2020b).

The NPS-FM defines natural inland wetlands as a wetland (as defined in the Act) that is not:

(a) in the coastal marine area; or

(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)); unless

  (iii) the wetland is a location of a habitat of a threatened species identified under clause 3.8 of the NPS-FM, in which case the exclusion in (e) does not apply.

Wetlands were mapped during field surveys by annotating printed aerial photographs from recent aerial imagery. Coordinates of wetland plots were also recorded using a hand-held GPS.

Wetlands within 100 m of the Site were not assessed directly because permission to access them was not obtained.

## 3.3 Freshwater Ecology

### 3.3.1 Watercourse classification

Watercourses within the Site were classified in accordance with the following definitions from the Waikato Regional Plan (WRP):

**Artificial watercourse**

A watercourse that contains no natural portions from its confluence with a river or stream to its headwaters and includes irrigation canals, water supply races, canals for the supply of water for electricity power generation and farm drainage canals.

**Ephemeral streams**

Streams that flow continuously for at least three months between March and September but do not flow all year.

**Modified watercourse**

An artificial or modified channel that may or may not be on the original watercourse alignment and which has a natural channel at its headwaters.

**Perennial stream**

A stream that flows all year round assuming average annual rainfall.

### 3.3.2 Stream characteristics

Measurements of physical stream habitat characteristics including channel depth, width, water depth and riparian cover were recorded, and watercourses were mapped. Macrophytes and periphyton within watercourses were informally recorded. Water quality parameters and MCI scores from a Waikato Regional Council sampling site on the Waitoa River at Landsdowne Road (approximately c. 6.5 km downstream of the Site) were retrieved from the Land Air Water Aotearoa (LAWA) website in June 2025.

### 3.3.3 Fish fauna

A search of the New Zealand Freshwater Fish Database (NZFFD) (updated February 2025) was carried out to identify fish records within the Site and wider catchment.

Fish fauna within two watercourses was quantified through one night of trapping with ten gee-minnow traps in each watercourse on 3 June 2025. Environmental DNA (eDNA) samples were also collected from three separate watercourses (including the two trapped watercourses) within the Site on 3 and 4 June 2025.

## 3.4 Ecological Values

### 3.4.1 Assigning Ecological Value

Ecological values were assigned following the approach outlined in the Environment Institute of Australia and New Zealand's (EIANZ) Ecological Impact Assessment guidelines (EcIAG) (Roper-Lindsay et al. 2018). The EcIAG outline a standardised approach for defining ecological values. The approach involves assessing four matters including representativeness, rarity/distinctiveness, diversity/pattern and ecological context with consideration of the attributes outlined in Table 4 of the EcIAG (Appendix B). The overall ecological values within the Site and vicinity were assigned based on the four matters outlined above and using the scoring system outlined in Table 6 of the EcIAG (Appendix B).

### 3.4.2 Assessment of Ecological Effects

The level of effects was assessed using the method recommended by the EcIAG (Roper-Lindsay et al. 2018). This method involves assigning ecological values as above and determining the magnitude of effects based on criteria outlined in Table 8 of the EcIAG and summarised below in Table 1. The overall level of effect was assigned based on the value and the magnitude using the matrix in Table 10 of the EcIAG and summarised below in Table 2. The magnitude of the effects was considered at the ecological district level (unless otherwise indicated).

**Table 1: Criteria for describing magnitude of effect (EcIAG 2018).**

| Magnitude | Description |
|---|---|
| Very high | Total loss or very major alteration to key elements/ features of the baseline conditions such that the post development character/ composition/ attributes will be fundamentally changed and may be lost from the site altogether; AND/OR Loss of a very high proportion of the known population or range of the element/feature. |
| High | Major loss or major alteration to key elements/ features of the baseline (pre-development) conditions such that post development character/ composition/ attributes will be fundamentally changed; AND/OR Loss of a high proportion of the known population or range of the element/feature. |
| Moderate | Loss or alteration to one or more key elements/features of the baseline conditions such that post development character/composition/attributes of baseline will be partially changed; AND/OR Loss of a moderate proportion of the known population or range of the element/feature. |
| Low | Minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible but underlying character/composition/attributes of baseline condition will be similar to pre-development circumstances/patterns; AND/OR having a minor effect on the known population or range of the element/feature. |
| Negligible | Very slight change from baseline condition. Change barely distinguishable, approximating to the "no change" situation; AND/OR having negligible effect on the known population or range of the element/feature. |

**Table 2: Criteria for describing level of effects (EcIAG 208).**

| Magnitude▼ | Ecological value ► | | | | |
|---|---|---|---|---|---|
| | ***Very high*** | ***High*** | ***Moderate*** | ***Low*** | ***Negligible*** |
| ***Very high*** | Very high | Very high | High | Moderate | Low |
| ***High*** | Very high | Very high | Moderate | Low | Very low |
| ***Moderate*** | High | High | Moderate | Low | Very low |
| ***Low*** | Moderate | Low | Low | Very low | Very low |
| ***Negligible*** | Low | Very low | Very low | Very low | Very low |
| ***Positive*** | Net gain | Net gain | Net gain | Net gain | Net gain |

# 4.0 Terrestrial Ecology

## 4.1 Vegetation

Planning maps in the Matamata-Piako District Plan do not show any significant natural areas (SNAs) or protected trees within or near the Site. With the nearest being the marginal strip of the Waihou River, approximately 4.5 km southeast of the Site.

The predominant vegetation with the Site consisted of managed/improved grazed pasture which included rye grass (*Lolium perenne*) red clover, white clover (*Trifolium pratense* and *Trifolium repens*) narrow-leaved plantain (*Plantago lanceolata*) with occasional curled dock (*Rumex crispus*) and other common herbaceous pasture species.

Hedgerows were present along property and paddock boundaries and were composed

primarily of barberry (*Berberis glaucocarpa*) with occasional hawthorn (*Crataegus monogyna*) and scrambling climbers such as blackberry (*Rubus fructicosus* agg.) and native pōhuehue (*Muehlenbeckia australis*).

Ornamental exotic tree and shrub species were present within the grounds of the dwelling at 247a Station Road. Species present included *Citrus* spp., *Camellia* spp., *Agapanthus praecox,* specimen cherry (*Prunus* spp.), olive (*Olea* spp.), feijoa and various ornamental garden plants and hedging.

Exotic specimen trees within the grazed pasture included poplar (*Populus* spp.), Japanese cedar (*Cryptomeria japonica*) London plane (*Platanus* × *acerifolia*) and birch (*Betula* spp.).

Native vegetation was limited to a pair of mānuka (*Leptospermum scoparium* agg.) and kānuka (*Kunzea* spp.) shrubs at the frontage of 127 Station Road, cabbage trees (*Cordyline australis*) along a drain at 247 Station Road, the pōhuehue within hedgerows mentioned above, harakeke (*Phormium tenax*) and cabbage tree plantings along Waitoa River (variable riparian width 5-10m over 550m) and rimu (*Dacrydium cupressinum*) and tōtara (*Podocarpus totara*) adjoining the modified oxbows in the floodplain of the Waitoa River. In general, the terrestrial ecological features of the Site were few in number, sparsely located and isolated from each other as summarised in Figure 3.

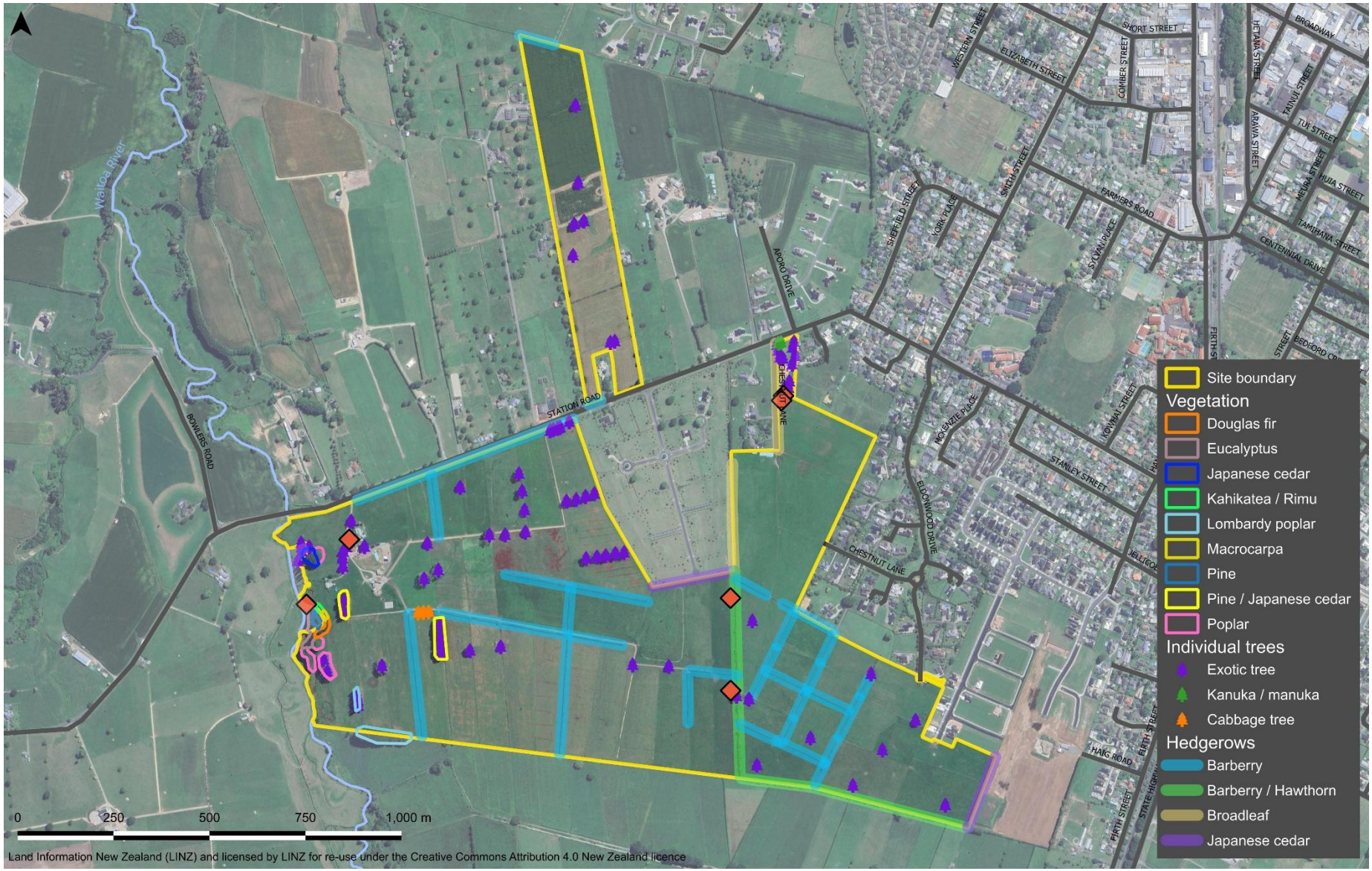


**Figure 3: Terrestrial features on the Site.**

## 4.2 Birds

### 4.2.1 eBird database

The eBird database includes records of 68 bird species within a 10 km radius of the Site, summarised in Table 3 and presented in Figure 4. Bird species recorded were those typically expected of modified farmland and semi-urban areas.

Of the native species recorded, 16 are considered to be 'At Risk' or 'Threatened' (Robertson et al. 2021). Of these, 10 are water birds which are unlikely to use the Site because there is no habitat present for them and 6 are confined to conservation areas. There were multiple records of karearea - New Zealand falcon (*Falco novaeseelandiae*) which are regarded as 'Threatened – Nationally Vulnerable' (Robertson et al. 2021) and New Zealand pipit (*Anthus novaeseelandiae*) 'At Risk – Declining' which are most likely to not use the Site.

**Table 3: eBird database bird species list and conservation status within 10km of the Site**

| Common name | Scientific name | Conservation status (Robertson et al. 2021) |
|---|---|---|
| African Collared-Dove | Streptopelia roseogrisea | Introduced and Naturalised |
| Australasian Shoveler | Spatula rhynchotis | Not Threatened |
| Australian Magpie | Gymnorhina tibicen | Introduced and Naturalised |
| Black Shag | Phalacrocorax carbo | **At Risk - Relict** |
| Black Swan | Cygnus atratus | Not Threatened |
| California Quail | Callipepla californica | Introduced and Naturalised |
| Canada Goose | Branta canadensis | Introduced and Naturalised |
| Common Chaffinch | Fringilla coelebs | Introduced and Naturalised |
| Common Myna | Acridotheres tristis | Introduced and Naturalised |
| Dunnock | Prunella modularis | Introduced and Naturalised |
| Eastern Rosella | Platycercus eximius | Introduced and Naturalised |
| Eurasian Blackbird | Turdus merula | Introduced and Naturalised |
| Eurasian Coot | Fulica atra | **At Risk – Naturally Uncommon** |
| Eurasian Skylark | Alauda arvensis | Introduced and Naturalised |
| European Goldfinch | Carduelis carduelis | Introduced and Naturalised |
| European Greenfinch | Chloris chloris | Introduced and Naturalised |
| European Starling | Sturnus vulgaris | Introduced and Naturalised |
| Golden Pheasant | Chrysolophus pictus | Introduced and Naturalised |
| Gray Teal | Anas gracilis | Not Threatened |
| Gray warbler | Gerygone igata | Not Threatened |
| Graylag Goose | Anser anser | Introduced and Naturalised |
| Grey Duck | Anas superciliosa | **Threatened - Nationally Vulnerable** |
| Helmeted Guineafowl | Numida meleagris | Introduced and Naturalised |
| House Sparrow | Passer domesticus | Introduced and Naturalised |
| Indian Peafowl | Pavo cristatus | Introduced and Naturalised |
| Kelp Gull | Larus dominicanus | Not Threatened |
| Little black shag | Phalacrocorax sulcirostris | **At Risk – Naturally Uncommon** |
| Little shag | Microcarbo melanoleucos brevirostris | **At Risk – Relict** |
| Long-tailed cuckoo / Koekoeā | Eudynamys taitensis | **Threatened – Nationally Vulnerable** |
| Mallard | Anas platyrhynchos | Introduced and Naturalised |
| Mallard x Pacific Black Duck (hybrid) | Anas platyrhynchos x superciliosa | NA |
| Masked Lapwing | Vanellus miles | Not Threatened |
| Morepork | Ninox novaeseelandiae | Not Threatened |
| New Zealand Bellbird | Anthornis melanura | Not Threatened |

| Common name | Scientific name | Conservation status (Robertson et al. 2021) |
|---|---|---|
| New Zealand Falcon | Falco novaeseelandiae | **Threatened – Nationally Vulnerable** |
| New Zealand Fantail | Rhipidura fuliginosa | Not Threatened |
| New Zealand Grebe | Poliocephalus rufopectus | **Threatened - Nationally Increasing** |
| New Zealand Kaka | Nestor meridionalis | **At Risk – Recovering** |
| New Zealand Pigeon | Hemiphaga novaeseelandiae | Not Threatened |
| New Zealand Pipit | Anthus novaeseelandiae | **At Risk – Declining** |
| New Zealand Scaup | Aythya novaeseelandiae | Not Threatened |
| North Island Robin | Petroica longipes | **At Risk – Declining** |
| Paradise Shelduck | Tadorna variegata | Not Threatened |
| Pied Cormorant | Phalacrocorax varius | **At Risk – Recovering** |
| Pied Stilt | Himantopus leucocephalus | Not Threatened |
| Pukeko | Porphyrio melanotus | Not Threatened |
| Red Junglefowl | Gallus gallus | NA |
| Redpoll | Acanthis flammea | Introduced and Naturalised |
| Rifleman | Acanthisitta chloris | Not Threatened |
| Ring-necked Pheasant | Phasianus colchicus | Introduced and Naturalised |
| Rock Pigeon | Columba livia | Introduced and Naturalised |
| Rook | Corvus frugilegus | Introduced and Naturalised |
| Royal Spoonbill | Platalea regia | **At Risk – Naturally Uncommon** |
| Sacred Kingfisher | Todiramphus sanctus | Not Threatened |
| Shining Bronze-Cuckoo | Chalcites lucidus | Not Threatened |
| Silver Gull | Chroicocephalus novaehollandiae | **At Risk – Declining** |
| Silver/Black-billed Gull | Chroicocephalus novaehollandiae/bulleri | **At Risk – Declining** |
| Silvereye | Zosterops lateralis | Not Threatened |
| Song Thrush | Turdus philomelos | Introduced and Naturalised |
| Spotted Dove | Spilopelia chinensis | Introduced and Naturalised |
| Swamp Harrier | Circus approximans | Not Threatened |
| Tomtit | Petroica macrocephala | Not Threatened |
| Tui | Prosthemadera novaeseelandiae | Not Threatened |
| Welcome Swallow | Hirundo neoxena | Not Threatened |
| White-faced Heron | Egretta novaehollandiae | Not Threatened |
| Wild Turkey | Meleagris gallopavo | Introduced and Naturalised |
| Yellow-crowned Parakeet | Cyanoramphus auriceps | **At Risk – Declining** |
| Yellowhammer | Emberiza citrinella | Introduced and Naturalised |

### 4.2.2 Site Records

Birds observed by Ecological Solutions were mostly exotic species such as skylark (*Alauda arvensis)*, goldfinch (*Carduelis carduelis*), house sparrow (*Passer domesticus*), common starling (*Sturnus vulgaris*) and Eurasian blackbird (*Turdus merula*). Native species recorded included welcome swallow (*Hirundo neoxena*), silvereye (*Zosterops lateralis*), pūkeko (*Porphyrio melanotus*), swamp harrier (*Circus approximans*) and spur-winged plover (*Vanellus miles*). The native species identified are all considered 'Not Threatened' (Robertson et al. 2021) and are common in rural and semi-urban habitats. There was limited habitat for native bird species within the Site.

Birds recorded by EcoResto were also mostly exotic (Whyte 2025). Native species present included kōtare (*Todiramphus sanctus*), pūkeko, spur-winged plover and white-faced heron (*Egretta novaehollandiae*). These species are all considered 'Not Threatened' (Robertson et al. 2021). Other species present included the exotic magpie (*Gymnorhina tibicen*), pheasant (*Phasianus colchicus*), house sparrow, mallard ducks (*Anas platyrhynchos*) and starling.

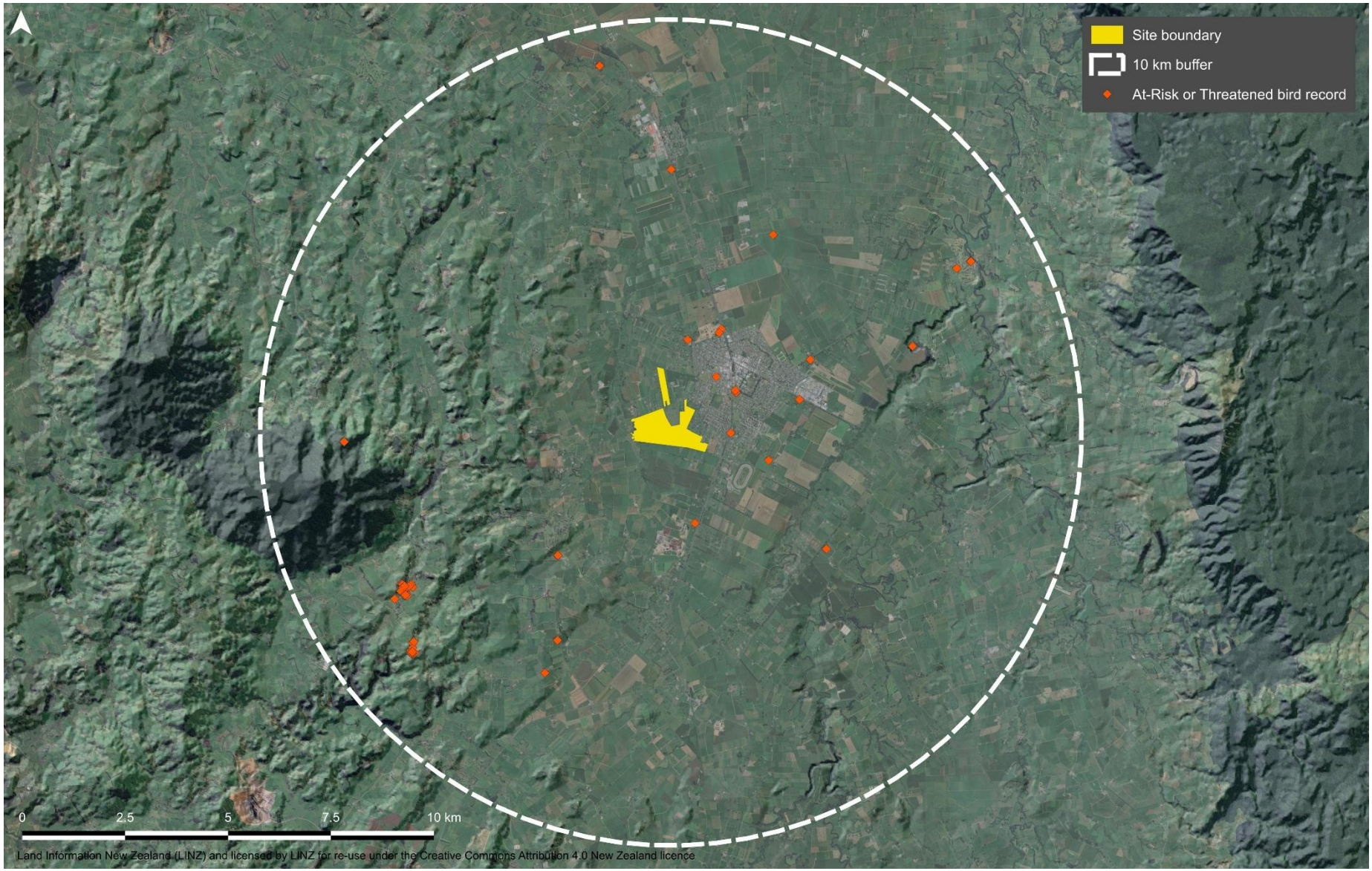


**Figure 4: eBird records within 10 km of the Site.**

## 4.3 Lizards

### 4.3.1 Desktop assessment

Four indigenous lizard records were retrieved from the Department of Conservation herpetofauna database.

Two copper skink (*Oligosoma aeneum*) were recently recorded (2024) at the northern outskirts of Matamata. No other indigenous skinks had been recorded within 12km[2] of the Site.

### 4.3.2 Habitat survey

There were isolated areas of rank grass associated with hedgerows and fenced drains which could provide potential habitat for native skinks within the Site. The habitat is not ideal for native skinks as the majority of the Site is regularly disturbed by livestock grazing and/or pasture maintenance. The high level of grazed pasture surrounding the Site limits the available migration corridors and habitats for skinks. If lizards are present, they will be at low levels such that detection could be difficult during surveys. No indigenous lizards were noted on Site.

## 4.4 Bats

### 4.4.1 Desktop assessment

There were multiple bat surveys within 25km, showing long tailed bat (*Chalinolobus tuberculatus*) activity, particularly to the southwest of the Site. This includes three relatively recent (2016–2018) bat surveys within 10 km of the Site: long tailed bat activity (1 pass) was recorded on Pond Road in 2018, 58 passes were recorded at a Hautapu site (2018), with a further 20 passes recorded at Buxton Farm (2018). Both the latter two surveys are less than 5 km southeast of the Site. In addition, low levels of bat activity were previously recorded at 102 Peria Road[3] (2km) and 194 Tauranga Road[4] (5km), Matamata as part of previously completed ecological impact assessments in proximity to the Site.

Surveys undertaken between 2011-2021 of the wider landscape (within 25 km) indicates areas of higher bat activity include: Te Miro Road and Newcombe Road (Cambridge Sites) and surrounding areas of Lake Karapiro, Taotaoroa, Thistlehurst sites and Whitehall (Figure 5).

### 4.4.2 Acoustic Bat Survey

Long-tailed bat activity was recorded by nine of the twelve ABMs deployed with the majority of activity recorded along the western boundary of the Site adjacent to the Waitoa River. A summary of the bat activity recorded between 4 – 18 June, 2025 (14 nights) is provided in Table 4 below with the distribution of ABMs and bat activity levels recorded shown in Figure 6. Long-tailed bats have a threat status of 'Threatened – Nationally Critical' (O'Donnell et al., 2022)

[2] Distance to existing lizard records not precise. 12km equals smallest reporting distance in accordance with ESL's GIS data sharing agreement with the Department of Conservation
[3] Ecology New Zealand Limited 2021. Matamata Country Club – Long-tailed Bat Survey Nov/Dec 2021. Prepared for Matamata Country Club. Report number 21197.1.001Rev0
[4] Ecology New Zealand Limited 2023. Calcutta Farms – Long-tailed Bat Impact Assessment. Prepared for Calcutta Farms No.2 Limited. Report number 222224.1-001Rev0.

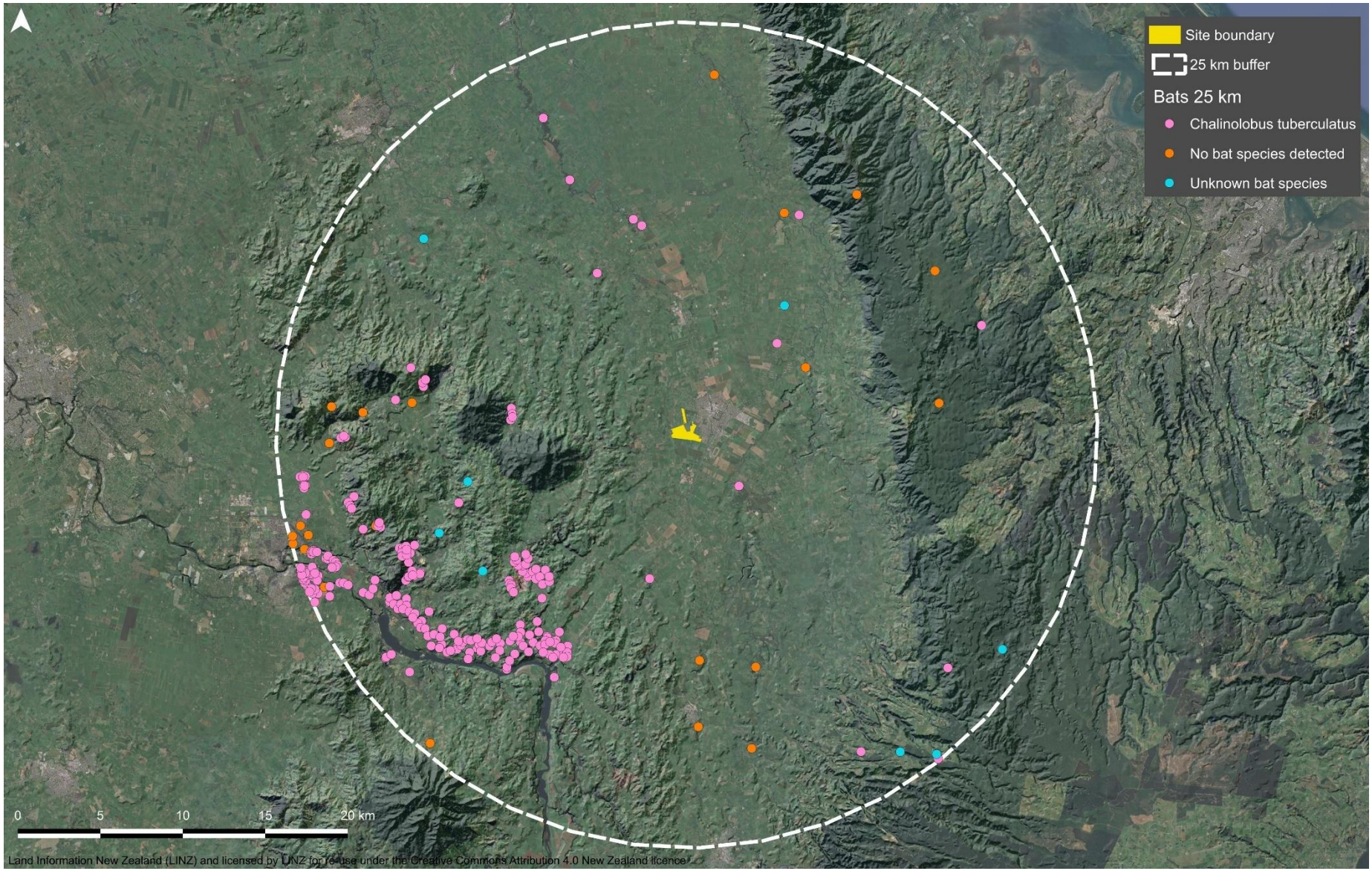


**Figure 5: Bat database records within 25 km of the Site.**

**Table 4: Summary of bat activity recorded during ABM survey**

| ABM number | Total bat passes |
|---|---|
| 2 | 5 |
| 3 | 6 |
| 15 | 0 |
| 19 | 31 |
| 23 | 110 |
| 24 | 8 |
| 51 | 91 |
| 53 | 10 |
| 61 | 0 |
| 62 | 1 |
| 64 | 2 |
| 66 | 0 |

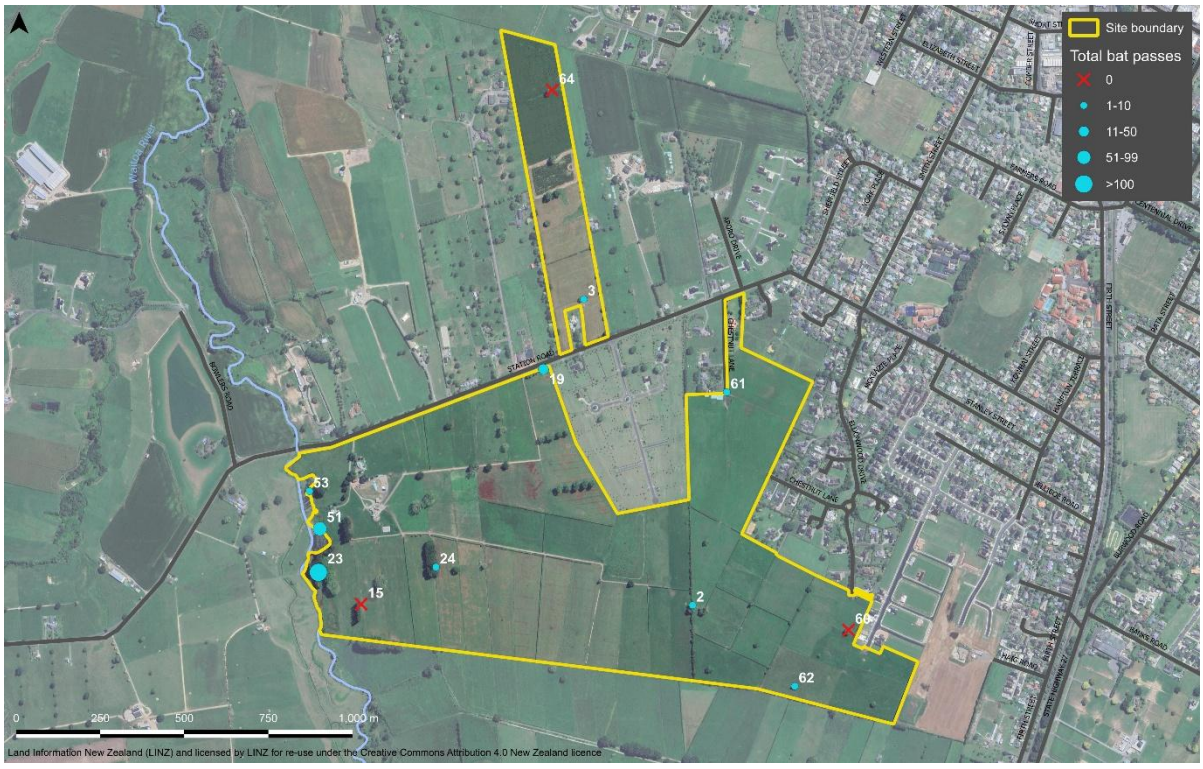


**Figure 6: ABM locations and long-tailed bat activity 4-18 June 2025**

### 4.4.3 Habitat assessment

The majority of trees present on site were > 15 cm diameter at breast height (DBH) and were conservatively considered potential bat roost habitat. The linear hedgerows may provide suitable commuting corridors and the Waitoa River and its surrounding vegetation was assessed as potentially being used as commuting or feeding habitats for bats, which was confirmed by the ABM survey mentioned above.

# 5.0 Wetlands

Five natural inland wetlands were located at the western end of the Site adjacent to the Waitoa River (Figure 12). These included two pasture wetlands and three remnant oxbow wetlands. The pasture wetlands were located in the upper floodplain and were subject to grazing (Figure 7) and the remnant oxbow wetlands were characterised by sections of open water (Figure 8). Vegetation within the pasture wetlands typically comprised exotic grasses such as creeping bent (*Agrostis stolonifera*), glaucous sweet grass (*Glyceria declinata*) and soft rush (*Juncus effusus*). Macrophytes such as water celery (*Apium nodiflorum*), water pepper (*Persicaria hydropiper*) and occasional Mercer grass (*Paspalum distichum*) characterised the oxbow wetlands.

**Figure 7: Natural inland wetland (pasture) on the upper floodplain of the Waitoa River.**

**Figure 8: Natural inland wetland (Oxbow) along the Waitoa River.**

# 6.0 Freshwater Ecology

## 6.1 Watercourses

The site is drained by a network of well-maintained farm drainage canals (drains). The drains were mostly dry at the time of the field survey 3-4 June 2025. There were two reaches which contained surface water, one for approximately 100 m before reaching the northern boundary of 247 Station Road (Figure 9) and the other ran along the northern boundary of 200B Station Road (Figure 10). Both drains were 1.0–1.5 m wide, contained water up to approximately 0.15 m deep.

**Figure 9: Drain with surface water discharging from northern boundary of 247 Station Road (247 Drain).**

**Figure 10: Drain with surface water on northern boundary of 200B Station Road (Northern Drain).**

The Waitoa River, a tributary of the Piako River, runs along the western boundary of the Site. The channel was deeply incised (approximately 2 m) and 2–3 m wide. The riparian margin has been planted in native species including cabbage tree, and harakeke at a variable width of 5-10 m. The channel was poorly shaded as the plantings are not yet well established enough to provide canopy cover. The river was soft bottomed and contained some aquatic macrophytes along the banks and long green filamentous algae within the channel.

**Figure 11: Waitoa River with planted riparian margin.**

## 6.2 Water Quality

Water quality data was not collected during the site visit. Waikato Regional Council monitor water quality in Waitoa River at Landsdowne Road in Waharoa (Land Air Water Aotearoa). This monitoring site is ~6.5 km downstream of the Site. The 5-year median values below are for the period 2020–2024.

The 5-year median *E. coli* concentration recorded at the Landsdowne Road monitoring site was 900 cfu /100mL and is within the NPS-FM (2020) 'Attribute Band E' which is below the national bottom line. The 5-year median ammoniacal nitrogen concentration was 0.011 mg/L, which is within the NPS-FM (2020) 'Attribute Band A' (i.e., ≤0.03 mg/L) (annual median). Attribute Band A indicates 99% species protection level or no observed effect on any species. The nitrate 5-year median concentration was 1.44 mg/L and is within the NPS-FM (2020) 'Attribute Band B' (i.e., >1.0 and ≤2.4 mg/L) (annual median) which indicates some growth effect on up to 5% of species. The 5-year median concentration for dissolved reactive phosphorus (DRP) at this monitoring site was 0.017 mg/L and is within the NPS-FM (2020) 'Attribute Band C' (i.e., >0.010 and ≤0.018 mg/L). Band C indicates ecological communities are impacted by moderate DRP elevation above natural reference conditions.

## 6.3 Benthic Macroinvertebrates

Benthic Macroinvertebrate data has also been collected in Waitoa River at the Landsdowne Road monitoring site in Waharoa (LAWA) (Table 5).

The Macroinvertebrate Community Index (MCI) score for Waitoa River for this monitoring site was 59.6 on 7 March 2023, and this has decreased from an MCI of 65.1 recorded on 15 January 2019. The 5-year median (2019–2023) MCI score for Waitoa River for this monitoring site was 61.8, which is within the NPS-FM (2020) 'Attribute Band D' (i.e., MCI; <90) and below the National Bottom Line (i.e., MCI; 90), meaning that the

macroinvertebrate community was 'indicative of severe organic pollution or nutrient enrichment' (MfE 2024).

The Quantitative Macroinvertebrate Community Index (QMCI) score for Waitoa River for the Landsdowne Road site was 3.0 on 7 March 2023, and this has ranged between 1.8–3.0 from 2019 to 2023. The 5-year median (2019–2023) QMCI score for Waitoa River at the monitoring site was 2.01, which is within the NPS-FM (2020) 'Attribute Band D' (i.e., QMCI; <4.5) and below the National Bottom Line (i.e., QMCI; 4.5), meaning that the macroinvertebrate community was 'indicative of severe organic pollution or nutrient enrichment' (MfE 2024).

**Table 5: Benthic Macroinvertebrate data from the Landsdowne Road monitoring station (LAWA).**

| Date | MCI | QMCI |
|---|---|---|
| 15/01/2019 | 65.1 | 2.8 |
| 25/02/2020 | 66.3 | 1.8 |
| 06/01/2021 | 61.8 | 2.0 |
| 09/03/2022 | 59.1 | 2.0 |
| 07/03/2023 | 59.6 | 3.0 |
| **5-year median** | **61.8** | **2.01** |

While the water quality data and biological monitoring data are not consistent enough in their outcomes to point to a specific level of impact, they collectively indicate the Waitoa River is currently adversely impacted by organic pollutant or nutrient enrichment.

## 6.4 Fish

### 6.4.1 New Zealand Freshwater Fish Database

The NZFFD holds records of nine species of freshwater fish within 5 km of the Site as set out in Table 6 and Figure 13. These records include seven indigenous fish species and two exotic fish as well as the freshwater invertebrates, freshwater shrimp (*Paratya curvirostris*) and kōura (*Paranephrops* sp.). Except rainbow trout (*Oncorhynchus mykiss*), all remaining freshwater fish and invertebrates were recorded within the Waitoa River catchment within 5 km of the Site. 'Threatened' and 'At Risk' fish species recorded include longfin eel (*Anguilla dieffenbachii*), torrentfish (*Cheimarrichthys fosteri*) and īnanga (*Galaxias maculatus*), all of which are considered 'At Risk – Declining' (Dunn et al. 2018).

**Table 6: Freshwater species records within 5 km of the Site listed in the New Zealand Freshwater Fish Database (NZFFD).**

| Common name | Scientific name | Conservation status (Dunn et al. 2018; Grainger et al. 2018) |
|---|---|---|
| ***Indigenous fish species*** | | |
| Longfin eel | *Anguilla dieffenbachii* | At Risk – Declining |
| Torrentfish | *Cheimarrichthys fosteri* | At Risk – Declining |
| Īnanga | *Galaxias maculatus* | At Risk – Declining |
| Shortfin eel | *Anguilla australis* | Not Threatened |
| Cran's bully | *Gobiomorphus basalis* | Not Threatened |

| Common name | Scientific name | Conservation status (Dunn et al. 2018; Grainger et al. 2018) |
|---|---|---|
| Common bully | *Gobiomorphus cotidianus* | Not Threatened |
| Common smelt | *Retropinna retropinna* | Not Threatened |
| ***Invertebrate species*** | | |
| Freshwater shrimp | *Paratya curvirostris* | Not Threatened |
| Kōura | *Paranephrops planifrons* | Not Threatened |
| ***Exotic fish species*** | | |
| Rainbow trout | *Oncorhynchus mykiss* | Introduced and Naturalised |
| Goldfish | *Carassius auratus* | Introduced and Naturalised |

### 6.4.2 Survey

The ten minnow traps placed within the 247 Station Rd Drain captured no fish. The ten minnow traps placed in the oxbow wetland captured seven shortfin eels (*Anguilla australis*) and two common bullies (*Gobiomorphus cotidianus*). No traps were placed within the Northern drain as this drain was considered to be outside the zone of direct impact.

### 6.4.3 Environmental DNA

eDNA sampling found no evidence of freshwater fish in the 247 Drain, bordering Station Road, and detected only shortfin eel in the northern drain. In the oxbow wetlands, shortfin eel, mosquitofish (*Gambusia affinis*), Crans bully (*Gobiomorphus basalis*), and common bully were detected (Table 7). Mosquitofish are an introduced pest species, and the eel and bully species detected are all 'Not Threatened'.

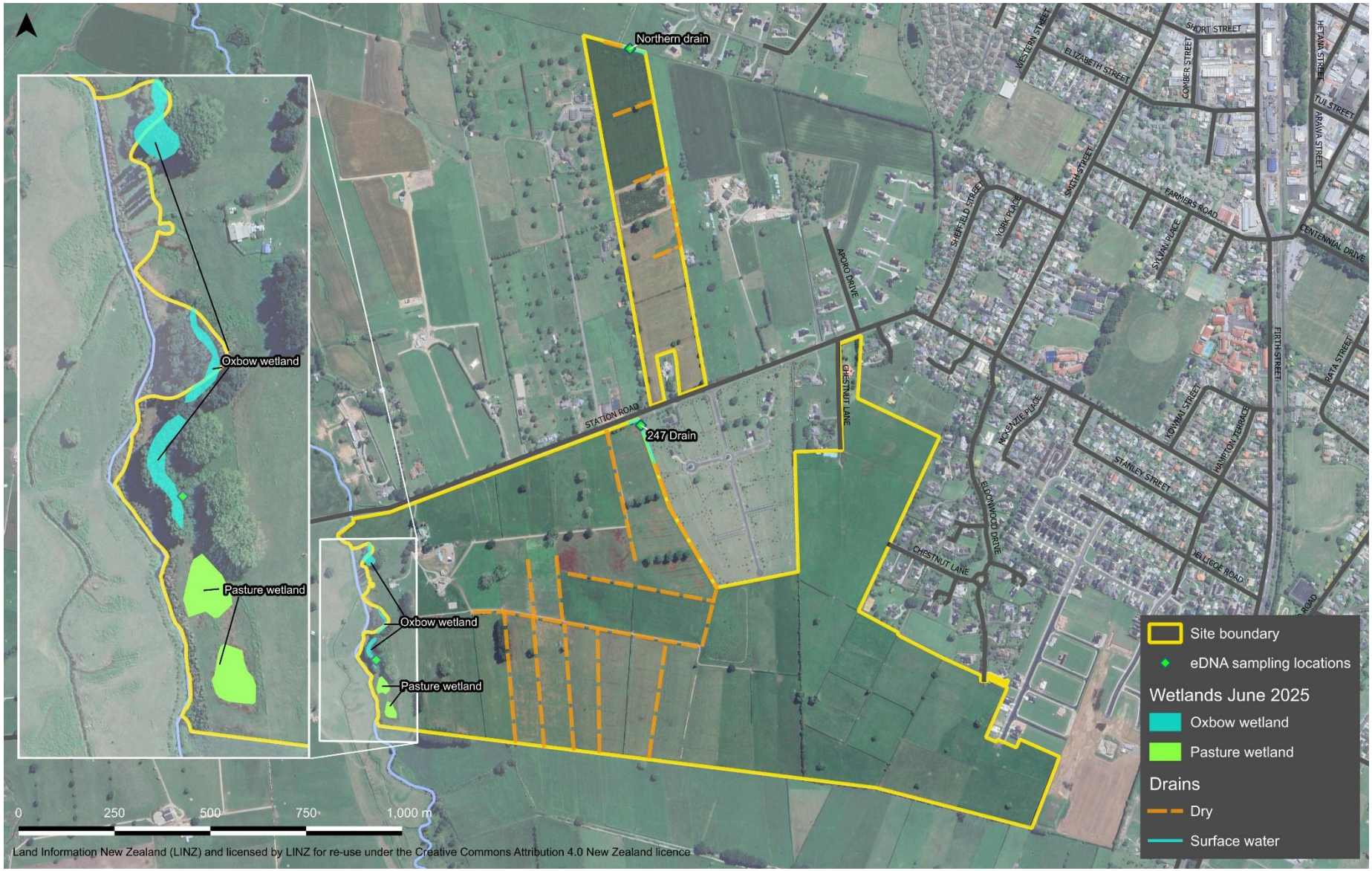


**Figure 12: Freshwater ecology features on the Site.**

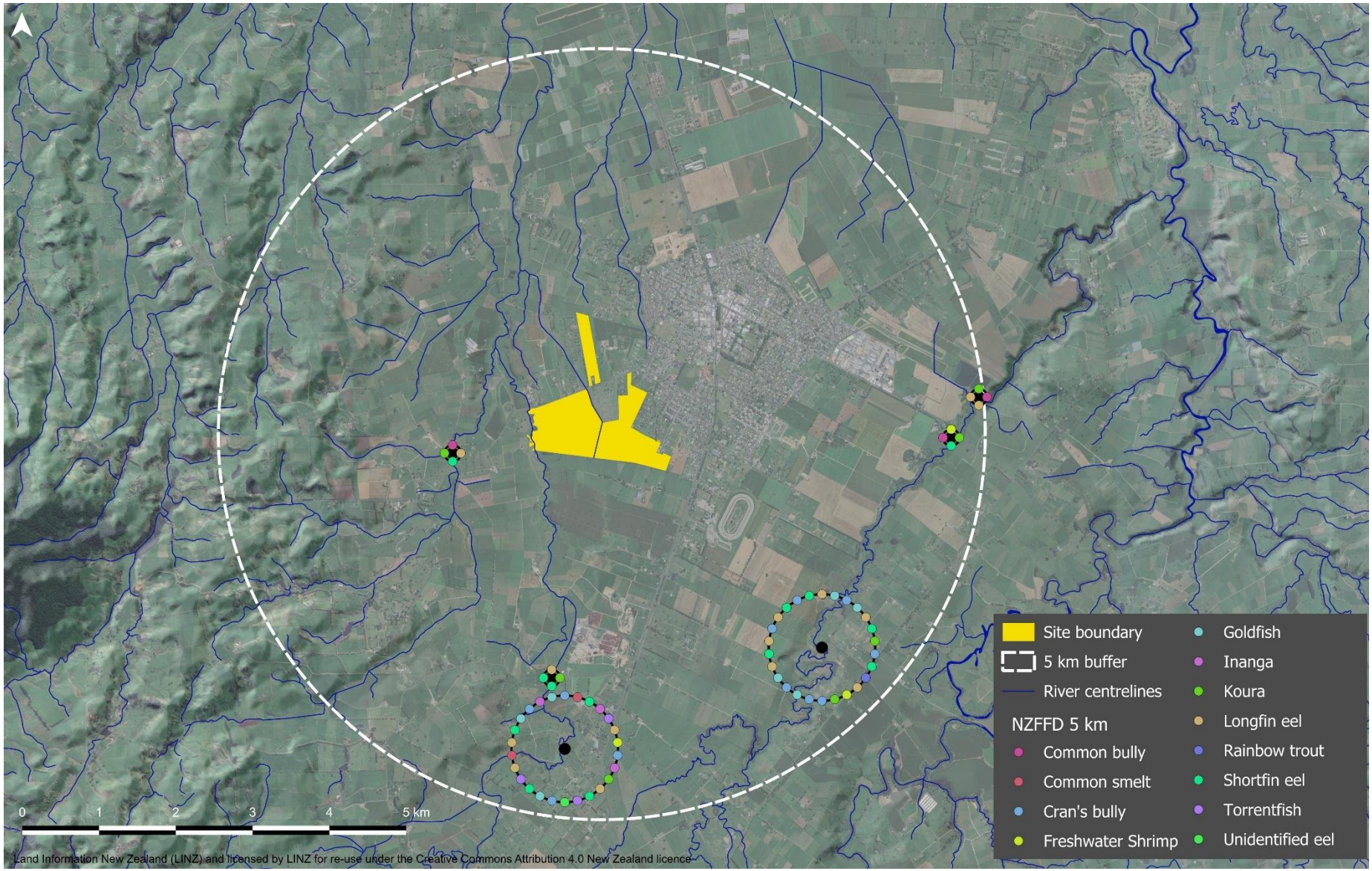


**Figure 13: NZFFD records within 5 km of the Site.**

**Table 7: Freshwater species detected by eDNA sampling on Ashbourne Site.**

| Scientific Name | Rank | Common Name(s) | Oxbow | 247 Drain | Northern Drain |
|---|---|---|---|---|---|
| **Native Fish** | | | | | |
| *Anguilla* | Genus | Eels | ✓ | - | - |
| *Anguilla australis* | Species | Shortfin eel; tuna | ✓ | - | ✓ |
| *Gobiomorphus* | Genus | Bullies | ✓ | - | - |
| *Gobiomorphus basalis* | Species | Crans bully; titikura | ✓ | - | - |
| *Gobiomorphus cotidianus* | Species | Common bully; tīpokopoko | ✓ | - | - |
| *Gobiomorphus cotidianus/basalis/dinae* | Genus | Common/Cran/Dinahs bully; titikura | ✓ | - | - |
| **Pest Species** | | | | | |
| *Gambusia affinis* | Species | Mosquitofish | ✓ | - | - |

Note: ✓ denotes detected. – denotes not detected.

# 7.0 Ecological Values

## 7.1 Terrestrial

### 7.1.1 Vegetation

Vegetation within the Site was typical of an agricultural landscape with very low ecological value. Indigenous vegetation within the Site was occasional and disconnected and the species recorded were all common and widespread. Overall, the vegetation on site was of 'negligible' ecological value.

### 7.1.2 Birds

No 'At Risk' or 'Threatened' birds (Robertson et al. 2021) were recorded during the site visits. Although, some species recorded in the eBird database (e.g., NZ falcon, NZ pipit) may utilise the pasture habitat for foraging. Pipit will use pasture for nesting but tend to avoid high producing pasture. Therefore, the habitats on site are unlikely to provide breeding or nesting opportunities. The overall value for birds and bird habitat within the Site was 'low'.

### 7.1.3 Lizards

No indigenous lizards were detected during manual habitat searches undertaken during the site visits. If lizards are present, a low diversity of species is expected at the Site based on existing records and available habitat. Potential skink habitat within the Site was of low quality, fragmented and surrounded by intensively managed pasture. There was no potential gecko habitat identified within the Site. If present, the lizard species most likely to be found on Site is copper skink (At Risk – Declining). It is expected that any lizards present will be at low numbers with low detectability. The overall value for lizards within the Site was considered 'moderate'.

### 7.1.4 Bats

Long-tailed bats were confirmed utilising the Site, likely for feeding and commuting, although there are potential roost trees on Site. Consequently, the overall value of bats at the Site is 'very high' because of their 'Threatened – Nationally Critical' threat status.

Potential bat roosting, commuting and foraging habitat on site was considered low quality. No indication of roosting activity in limited survey effort outside of the best practice survey period (October – April inclusive). Bat activity recorded across the Site suggests the Waitoa River could be utilised for navigation and foraging and may provide a corridor for bats to visit the Site infrequently. Consequently, the value of bat habitat on Site was considered 'moderate'.

## 7.2 Wetlands

### 7.2.1 Pasture wetlands

The wetland areas within the Site along the Waitoa river (Figure 12) were dominated by exotic vegetation typical of wetlands open to grazing livestock, in a pastoral setting. Despite their poor condition, wetlands as a habitat type are rare and therefore these wetlands have 'moderate' ecological values.

### 7.2.2 Oxbow wetlands

The oxbow wetlands identified along the Waitoa river (Figure 12) represent a rare habitat

type, and the confirmed presence of native freshwater fish, such as bullies, and shortfin eels mean these wetlands are considered to be of 'high' ecological value.

## 7.3 Freshwater

### 7.3.1 Watercourses

The Waitoa River is a permanent watercourse, which has been heavily modified by agriculture which is reflected in the poor water quality, lack of riparian vegetation, and extensive bank erosion in sections.

Fish diversity in the Waitoa River is low in the regional context, but the watercourse provides habitat for longfin eel, torrentfish and īnanga all of which have a conservation status of 'At-Risk – Declining'. The watercourse also provides some low-quality habitat for waterbirds. The watercourse has an overall value of 'moderate', based on the presence of 'At-Risk – Declining' species and connectivity within the wider catchment.

The artificial farm drains across the Site are not part of a natural watercourse. The channels have been constructed as part of farm management, have unnaturally straight alignments, lack permanently flowing water, are poorly shaded and provide uniform aquatic habitat of poor quality. The values of the artificial farm drains at the Site were assessed as 'negligible'.

### 7.3.2 Indigenous fish

NZFFD records include longfin eel, torrent fish and īnanga within the Waitoa River catchment within 5 km of the Site, all of which have a conservation status of 'At Risk – Declining' (Dunn et al. 2018). Based on this threat status, the fish values would be 'high'.

The artificial farm drains within the Site provided low quality habitat and no fish were captured during the limited survey of them. However, eDNA sampling detected the presence of shortfin eel within the northern drain. Consequently, the overall value for freshwater fauna within the Site was considered 'moderate'.

**Table 8: Summary of terrestrial ecological values following the EcIAG (Roper-Lindsay et al. 2018).**

| Feature | Representativeness | Rarity and Distinctiveness | Diversity and pattern | Ecological Context | Overall score | Comments |
|---|---|---|---|---|---|---|
| Vegetation | Very low | Very low | Very low | Very low | Negligible | Vegetation across the Site was dominated by common native and exotic species. The native trees were isolated and most were likely planted. |
| Birds | Low | Low | Low | Low | Low | No 'Threatened' or 'At Risk' bird species recorded or expected to be using the Site. |
| Bird Habitat | Low | Low | Low | Low | Low | The habitat for birds within the Site is typical of rural/peri-urban habitats utilised by common native and introduced birds within the Waikato Region. The habitats are not representative of indigenous habitats or the previously occurring habitats, which would have had extensive wetlands and substantially more forest present. |
| Lizards | Low | High | Low | Low | Moderate | Based on existing records and available habitat, Only one species is expected to be present (copper skink (At Risk – Declining)), and likely only in low numbers due to the lack of suitable habitat. |
| Lizard habitat | Low | Low | Low | Moderate | Low | These habitats are small and sparsely distributed. Given the Site's isolation from suitable habitats nearby, it is unlikely that lizards are recruited to the Site. Access to separate fragments of available habitat was considered low because of the active farm management. |
| Bats | High | Very High | High | High | Very High | Long-tailed bats (Threatened – Nationally Critical) confirmed to be utilising the Site. |
| Bat habitat | Low | Low | Moderate | Moderate | Moderate | Low quality commuting and foraging habitat. No indication of roosting activity in limited survey effort outside of best practice survey period. |

**Table 9: Summary of wetland and freshwater ecological values following the EcIAG (Roper-Lindsay et al. 2018).**

| Feature | Representativeness | Rarity and Distinctiveness | Diversity and pattern | Ecological Context | Overall score | Comments |
|---|---|---|---|---|---|---|
| Pasture wetlands | **Very low** | **high** | **Very low** | **Very low** | **Moderate** | Wetlands have been severely degraded by drainage and current and historic grazing. Potential wetland value limited by permitted baseline. Habitats do not reflect former wetland vegetation types. |
| Oxbow wetlands | **Moderate** | **Very high** | **Moderate** | **High** | **High** | Likely connects to Waitoa River during high flows. |
| Waitoa River | **High** | **Moderate** | **Low** | **Moderate** | **Moderate** | Within the broader catchment context, the Waitoa River provides moderate ecological functions and services. It provides important eel habitat and provides habitat for water birds. |
| Artificial farm drains | **Negligible** | **Negligible** | **Negligible** | **Negligible** | **Negligible** | The artificial farm drains on the Site are typical of farmland throughout the Waikato region and are not representative of historic waterways. The farm drains are not likely to support nationally or regionally threatened freshwater fauna species. |
| Indigenous Fish | **Low** | **High** | **Low** | **Low** | **Moderate** | No indigenous fish captured in limited sampling of artificial drains (although shortfin eels were detected in the northern drain through eDNA). Shortfin eels and common bully were captured in the oxbow wetlands |

# 8.0 Assessment of Effects – Solar Farm Areas

## 8.1 Introduction

This section assesses the actual and potential ecological effects associated with constructing and operating the two Solar Farm areas (Northern and Southern) as described in Section 1.2 and shown on the Ashbourne Master Plan provided in Figure 2.

The proposed activities that may result in actual or potential adverse ecological effects on both terrestrial and freshwater values, attributable to the development of the Solar Farms include:

***Terrestrial Effects***

- Terrestrial vegetation: vegetation clearance.
- Birds: loss of habitat; potential mortality of eggs, chicks, and/or adults attributable to vegetation clearance and the potential for solar panel bird strikes.
- Lizards: loss of habitat, and potential injury or mortality, attributable to vegetation clearance.
- Bats: loss of potential roosting, foraging and commuting habitat, and potential injury and mortality; and the introduction of increased artificial light at night potentially affecting bat behaviour patterns.

***Freshwater Effects***

- No adverse effects on freshwater values are expected as a result of the proposed Solar Farm developments. The majority of existing permeable ground coverage and artificial farm drains will be retained beneath the solar panels.

## 8.2 Effects on Terrestrial Ecological Values

### 8.2.1 Vegetation

It is anticipated that the 'low' ecological value exotic vegetation (e.g. isolated exotic trees and hedgerows) will be cleared while the exotic pasture/grassland will be retained on the Site.

Given that the pasture vegetation is expected to be retained underneath the solar panel installations and the installation of solar panels requiring limited to no earthworks, the pre - effects management magnitude of effect on vegetation is expected to be 'low', resulting in a pre-effects management level of effect of 'very low' as set out in Table 10.

Vegetation as habitat for fauna is considered in Sections 8.2.2 - 8.2.4 below.

### 8.2.2 Birds and Bird Habitat

The proposed activities attributable to the development of the Solar Farms will result in the removal of potential bird nesting habitat in the form of exotic trees and hedgerows. If vegetation clearance occurs between September and February, direct mortality or injury to birds could result due to the potential presence of nests and nesting birds.

The proposed activities will result in a partial change in vegetation cover and available habitat for birds on the Site. Potential adverse effects will include the loss of low-quality potential bird nesting habitat attributable to the clearance of hedgerows. The pre-effects

management magnitude of effect on birds is expected to be 'moderate' leading to a pre-effects management level of effect of 'low' as set out in Table 10.

In addition, there is growing international recognition that bird collisions with Solar Farms are a potential cause of mortality (McCrary et al. 1986; Kagan et al. 2014, Kosciuch et al. 2020); however, there is uncertainty about the severity of the issue, particularly at the population level. However, it is difficult to assess the likelihood or magnitude of this potential effect on New Zealand bird species. Much of the research is focused on arid environments in the United States, and designs of solar arrays not relevant to this construction (Anderson et al., 2025). These studies have limited transferability to New Zealand species and environments. However, estimates across the broad spectrum of anthropogenic induced mortality of birds suggests that Solar Farms are low risk compared with other built structures such as building windows, roads, fossil fuel power plants, power lines and others (Walston et al. 2016).

As habitat on site or in the immediate surrounding areas is deemed unsuitable for many birds of conservation value and the Site is not considered to be beneath a significant flyway for water obligate or associate migratory birds, the potential pre-effects management magnitude of effect on birds attributable to the collisions is considered 'moderate', leading to a pre-effects management level of effect of 'low' as set out in Table 10.

### 8.2.3 Lizards and Lizard Habitat

It is anticipated that only isolated exotic trees and hedgerows will be cleared as the majority of exotic pasture/grassland will be retained underneath the solar panel installations. In addition, the installation of solar panels is expected to require limited to no earthworks.

There are small areas of potential lizard habitat (i.e. rank grass, thick litter) along the drains and hedgerows within the Site. The presence of lizards on Site has not been confirmed; however, it is likely that copper skinks (At Risk – Declining) are present in low numbers. Consequently, vegetation clearance has the potential to cause injury or death to native lizards, leading to a pre-effects management magnitude of effect of 'high' and a pre-effects management level of effect of 'moderate' as set out in Table 10.

Vegetation clearance will also result in a loss of lizard habitat. Given the low value of this habitat on Site, the pre-effects management magnitude of effect on habitat is considered 'moderate' and the pre-effects management level of effect on habitat is 'low', as set out in Table 10.

### 8.2.4 Bats and Bat Habitat

Long-tailed bat activity on the Site has been confirmed; therefore, the felling of trees where bats may be roosting has the potential to kill or injure bats. Consequently, the pre-effects magnitude of effect on long-tailed bats is considered 'very high' and the pre-effects management, level of effect on bats is also 'very-high'.

Long-tailed bats use forest or vegetated edges and linear features for foraging and commuting, typically feeding along the edges and above trees, wetlands, and watercourses. They also use vegetation for commuting between roosting and foraging sites, so the loss of vegetation along these routes can potentially fragment and isolate bat communities (Thurley 2020). Additionally, development of the Site with artificial light at night (such as security lighting) will have adverse effects on bats' ability to use the Site (Schamhart et al. 2024). Therefore, the clearance of vegetation on Site and the installation of solar panels and artificial light has the potential to disrupt bat behaviour resulting in a pre-effects management magnitude of effect of 'moderate' and a pre-effects management level of effect of 'moderate' as shown in Table 10.

# 9.0 Effects Management – Solar Farm Areas

## 9.1 Introduction

The overall level of post-management effect determined using the EIANZ guidelines is to be used as a "guide to the extent and nature of the ecological management response required (including the need for biodiversity offsetting)" (Roper-Lindsay, et.al 2018, p84). Where Regional or District Plans do not provide specific guidance for the management of effects a suggested guide is:

- For Very High levels of effect:
  - "…unlikely to be acceptable on ecological grounds alone (even with compensation proposals). Activities having very high adverse effects should be avoided."
- For High or Moderate levels of effect:
  - Such an effect could be managed through avoidance, design, or extensive offset or compensation actions. Wherever adverse effects cannot be avoided, no net loss of biodiversity values would be appropriate.
- For Low or Very Low levels of effect:
  - "…should not normally be of concern, although normal design, construction and operational care should be exercised to minimise adverse effects."

Practical measures are proposed to address Very High ecological effects at the Site. The amount of enhancement effort and activity needed for this site is guided by Matamata-Piako Operative District Plan and the Waikato Regional Policy Statement as it relates to significance of ecological values adversely affected, the level of ecological effects, feasibility of implementation, and costs/ benefits and likelihood of success of effects management. Even though the overall level of effects is expected to be below that which is of concern under the EIANZ guidelines, practical management measures are recommended for birds, bats, and lizards given their protection under the Wildlife Act (1953). Recommendations to avoid and manage adverse ecological effects which could arise from the proposed Solar Farms are outlined below.

## 9.2 Vegetation

As the level of effect, pre-effects management, is considered 'very low' it is below what is normally of concern under the EcIAG and therefore no effects management is required. However, landscape/screen planting is proposed to take place along the Site boundaries, likely leading to an overall increase in tree cover within the northern and southern Solar Farm sites.

Considering the above, the post-effects management magnitude of effects on vegetation remains 'very low' – 'positive'.

## 9.3 Birds and Bird Habitat

While the pre-effects management level of effect on birds is considered 'low' and therefore should not normally be of concern, almost all native birds are absolutely protected under the Wildlife Act 1953. Consequently, it is recommended that vegetation clearance be avoided between September and February inclusive. Where this is not practicable, pre-clearance nest checks should be undertaken by a suitably qualified ecologist. If native bird nests are identified, a 20m setback from the nest tree should be implemented and maintained until the

nest has been determined to have failed or the chicks have fledged.

Provided that the above effects management measures are implemented, a Wildlife Act Authorisation from the Department of Conservation will not be required, and the post-effects management level of overall effect is to be considered 'very low' as set out in Table 10.

The nature and magnitude of effects of Solar Farms on birds is an area of developing research in Aotearoa New Zealand. Whilst methods for preventing lethal collisions of birds with solar panels are limited, planting of native trees around the perimeter of the Sites will help reduce the period of sun glare, and it's extent into the surrounding environment. In addition, there are best practice measures for reducing mortality of birds that are grounded or injured following a non-lethal impact (Penniman and Duffy 2021). These include pest control within the Solar Farm to prevent predators from killing these vulnerable birds and monitoring and recovery of injured birds that may require veterinary care (Penniman and Duffy 2021). Pest control would involve the use of traps and baits, with specific methods and design features outlined in the pest management plan (ESL 2025).

If the above effects management measures are implemented, it is expected that the post – effects management level of overall effect on birds will be 'very low' as set out in Table 10.

While the pre-effects management level of effect on bird habitat was considered 'low' and therefore should not normally be of concern, proposed tree plantings around the Site boundary should lead to a net increase in available bird nesting and perhaps foraging habitat (depending on the species concerned) in the long-term. Consequently, the post-effects management level of overall effect is expected to be 'very low' to 'positive' as set out in Table 10.

## 9.4 Lizards and Lizard Habitat

All indigenous lizards are absolutely protected under the Wildlife Act 1953. Consequently, a Lizard Management Plan (LMP) has been prepared as part the Ecological Management Plan (ESL 2025) to manage the potential effects on lizards. The LMP includes a detailed plan for vegetation removal protocols and lizard salvage, relocation and enhancement of the release site. A Wildlife Act Authorisation for the salvage and relocation of lizards will be obtained from the Department of Conservation prior to any activities that may have impacts on potential lizard habitat. The scope of the lizard management onsite will include, but is not limited to, the areas of lizard habitat identified in Figure 14. Prior to vegetation clearance commencing, the project ecologist will assess the areas requiring lizard management since conditions on site will likely have changed following the initial Site investigation. Given the proposed salvage and relocation of lizards to suitable habitats, the post-effects management magnitude of effects on lizards is expected to be 'low' as set out in Table 8.

While the pre-effects management level of effect for lizard habitat was considered 'low', and therefore should not normally be of concern, proposed plantings around the Site boundary and the Waitoa River Esplanade Reserve should lead to a net increase in available lizard habitat in the long-term. Consequently, the post-effects management overall level of effect is considered 'very low' to 'positive' as set out in Table 8.

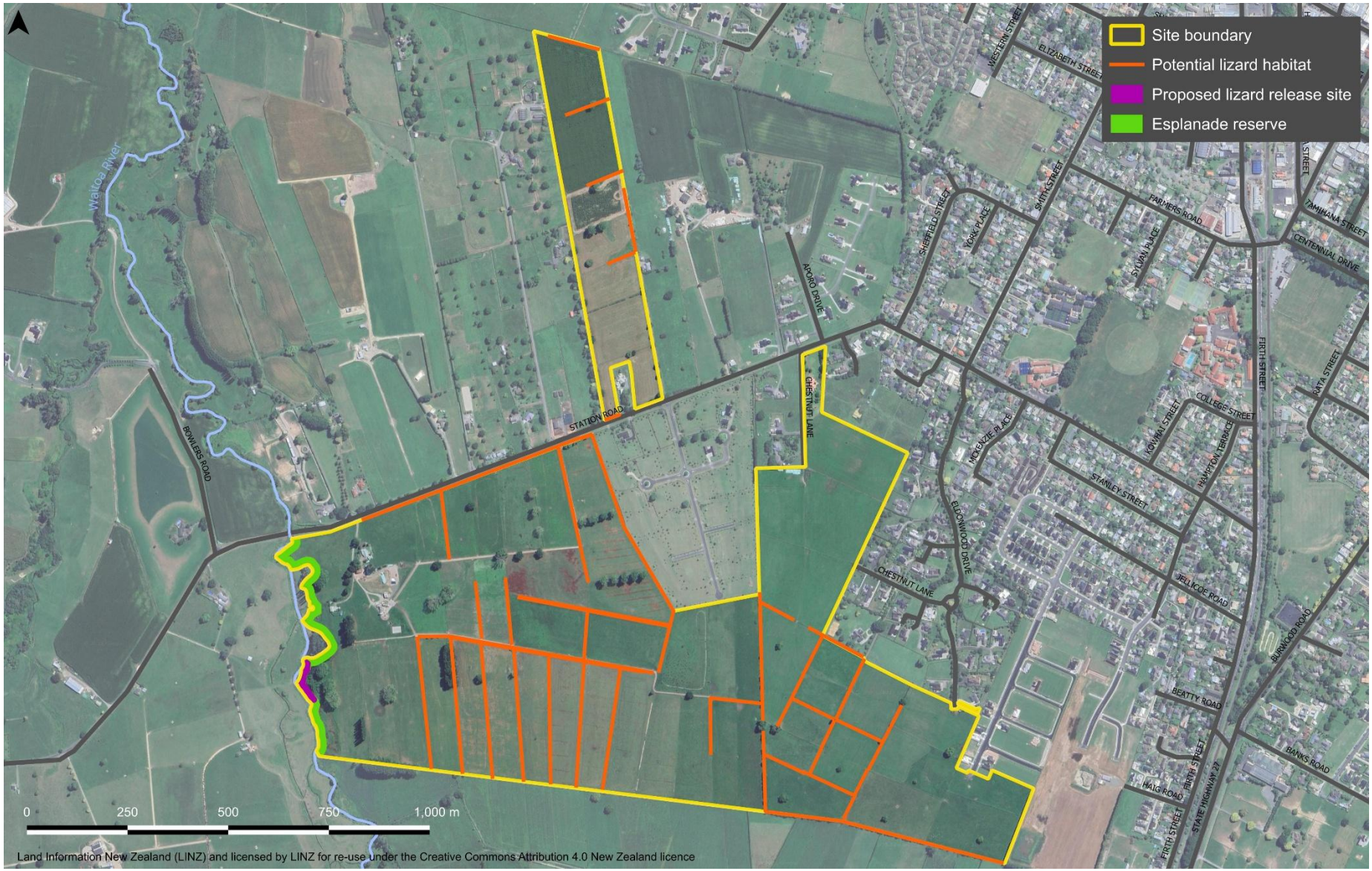


**Figure 14: Proposed lizard management areas.**

## 9.5 Bats and Bat Habitat

All indigenous bats are absolutely protected under the Wildlife Act 1953. Consequently, a Bat Management Plan (BMP) has been prepared as part of the Ecological Management Plan (ESL 2025). The BMP includes specific measures to avoid injury or death of bats during vegetation clearance as well as specific measures for minimising the effects of artificial lighting (if necessary) on bats and bat habitat.

To ensure that no bats are harmed during the removal of potential bat roost trees on site the BMP incorporates the Department of Conservation Bat Roost Protocols (BRP)[5]. The BRPs include monitoring bat activity prior to tree removal, ecologist supervision of tree removal and the use of bat aware climbing arborists equipped with borescopes for the inspection of potential roost features.

If necessary, mitigation of any potential adverse effects on bats caused by artificial light includes the incorporation of bat sensitive lighting standards in the design of the development. These lighting standards (DCCEEW 2023) as outlined in the Ecological Management Plan (ESL 2025) aim to avoid illumination of potential bat habitat both on and adjacent to the Site. These lighting standards will seek to ensure that bat activity on the Site and in the surrounding landscape is uninterrupted by excess light and that lighting within the development is compatible with bat activity.

In addition, if any active bat roost features are found (i.e., bats are observed) prior to tree clearance or during felling operations, artificial roosts will be provided within the Esplanade Reserve at a ratio of 3 artificial roosts for every one actual roost discovered (e.g. 3:1) as soon as practical following tree felling. These may be natural (e.g., relocation of felled trees with confirmed roost features) or artificial (e.g., Kent bat boxes or artificially created crevices/cavities in existing trees).

If the above effects management measures are implemented a Wildlife Act Authorisation from the Department of Conservation will not be required and the post-effects management level of overall effect on both bats and bat habitat is to be considered ‘low’ as set out in Table 8.

[5] Department of Conservation Protocols for minimising the risk of felling bat roosts, Bat Roost Protocols (BRP), Version 4: October 2024 approved by the New Zealand Department of Conservation’s Bat Recovery Group

**Table 10: Magnitude and level of effects for the proposed Solar Farm development pre- and post- effects management.**

| Activity | Ecological Feature | Effect | Ecological value | Magnitude of effect | Level of effect (pre-effects management) | Proposed mitigation measures | Level of effect (post effects management) |
|---|---|---|---|---|---|---|---|
| **Vegetation Removal** | Exotic trees, hedgerows and grassed pasture | Loss of botanical value | **Low** | **Low** | **Very low** | Low and Very low effects should not normally be of concern, although normal design, construction and operational care should be exercised to minimise adverse effects. Landscape/screen planting of indigenous trees along the Site boundary will account for any loss of trees and increase the number and diversity of trees on the Site. | **Very low - Positive** |
| | Birds | Injury or mortality of birds. | **Low** | **Moderate** | **Low** | As above. Follow Bird Management protocols outlined in the EMP: Avoid vegetation clearance between September and February inclusive. If this is not possible, check trees prior to felling and if native bird species are nesting, leave the tree standing until the nest can be declared abandoned. Wildlife Act Authorisation NOT required. | **Very low** |
| | Bird habitat | Loss of bird habitat | **Low** | **Moderate** | **Low** | As above | **Very low - Positive** |
| | Lizards | Direct mortality of indigenous lizards during vegetation clearance | **Moderate** | **High** | **Moderate** | Implementation of LMP as outlined in EMP (ESL 2025). Vegetation clearance supervision and salvage. Wildlife Act Authorisation required. | **Low** |
| | Lizard habitat | Loss of indigenous lizard habitat | **Low** | **Moderate** | **Low** | Low and Very low effects should not normally be of concern, although normal design, construction and | **Very low - Positive** |

| Activity | Ecological Feature | Effect | Ecological value | Magnitude of effect | Level of effect (pre-effects management) | Proposed mitigation measures | Level of effect (post effects management) |
|---|---|---|---|---|---|---|---|
| | | | | | | operational care should be exercised to minimise adverse effects. Proposed plantings around site boundary and Waitoa River Esplanade Reserve plus habitat augmentation through the construction of 'eco stacks' or log piles should lead to a net increase in available lizard habitat in the long-term. | |
| | Bats | Injury or death of bats | **Very high** | **Very high (if present when felling occurs)** | **Very High** | Implementation of bat management plan and Department of Conservation Bat Roost Protocols as outlined in EMP (ESL 2025). Wildlife Act Authorisation NOT required | **Low** |
| | Bat habitat | Loss/displacement of bat habitat | **Moderate** | **Moderate** | **Moderate** | Implementation of bat sensitive design lighting, as laid out in the EMP (ESL 2025). If roost trees present, then offsetting will be offered, as laid out in the EMP (ESL 2025), involving provisioning of artificial roosts and predator control. | **Low** |
| **Installation of Solar Panels** | Birds | Mortality via bird strike on solar panels | **Low** | **High** | **Low** | Low and Very low effects should not normally be of concern, although normal design, construction and operational care should be exercised to minimise adverse effects. | **Very low** |

# 10.0 Assessment of Effects – Residential Community and Greenway

## 10.1 Introduction

This section assesses the actual and potential ecological effects associated with developing the residential development and Greenway as described in Section 1.2 and shown on the Ashbourne Master Plan presented in Figure 2. Activities that have potential to result in adverse ecological effects in the terrestrial and aquatic environments are:

***Terrestrial Effects***

- Terrestrial vegetation: vegetation clearance.
- Birds: loss of habitat; potential mortality of eggs, chicks, and/or adults attributable to vegetation clearance.
- Lizards: loss of habitat, and potential injury or mortality, attributable to vegetation clearance.
- Bats: loss of potential roosting, foraging and commuting habitat, and potential injury and mortality; and the introduction of increased artificial light at night potentially affecting bat behaviour patterns.

***Wetland Effects***

- Earthworks within 100 m of natural inland wetlands.
- Vegetation clearance within 10 m of natural inland wetland.

***Freshwater Effects***

- Reclamation of artificial farm drains.
- Stormwater discharge to the Waitoa River
- Rip-rap armouring of Greenway outlet

## 10.2 Effects on Terrestrial Ecological Values

### 10.2.1 Introduction

The nature and level of actual or potential effects of activities attributable to the development of the Residential Community and Greenway are addressed below. Positive and adverse effects, cumulative effects and residual effects are considered, and the assessment informs the nature and scale of impact management required.

### 10.2.2 Vegetation

It is anticipated that the 'low' ecological value exotic vegetation associated with residential development sites (23 exotic trees, 2 manuka/kanuka and c. 2.8 km of exotic hedgerows) will be removed. Exotic grassland will also be removed on the Site totalling c. 37 ha. In addition to vegetation removal, there will be the introduction of garden plantings which may present a risk/adverse effect for native plantings along the river (i.e. garden escapes).

The pre-effects management magnitude of effect on vegetation is expected to be 'very high', resulting in a pre-effects management level of effect of 'low' as set out in Table 11.

### 10.2.3 Birds and Bird Habitat

The proposed activities attributable to the development of the Residential Community and Greenway will result in the removal of low-quality potential bird nesting habitat in the form of exotic trees and hedgerows, and grassland for pipit. If vegetation clearance occurs between September and February, direct mortality or injury to birds could result due to the potential presence of nests and nesting birds. Consequently, the pre-effects management magnitude of effect on birds and bird habitat is expected to be 'moderate' leading to a pre-effects management level of effect of 'low' as set out in Table 11.

### 10.2.4 Lizards and Lizard Habitat

There are small areas of potential lizard habitat (i.e. rank grass, thick litter) along the small length of drains, hedgerows and fence lines within the Site. The presence of lizards on Site has not been confirmed; however, it is likely that copper skinks (At Risk – Declining) are present in low numbers. Consequently, vegetation clearance has the potential to cause injury or death to native lizards, leading to a pre-effects management magnitude of effect of 'high' and a pre-effects management level of effect of 'moderate' as set out in Table 11.

Vegetation clearance will also result in a loss of lizard habitat. Given the low value of this habitat on Site, the pre-effects management magnitude of effect on habitat is considered 'moderate' and the pre-effects management level of effect on habitat is 'low', as set out in Table 11.

### 10.2.5 Bats and Bat Habitat

Long-tailed bat activity on the Site has been confirmed; therefore, the felling of trees where bats may be roosting has the potential to kill or injure bats. Consequently, the pre-effects magnitude of effect on long-tailed bats is considered 'very high' and the pre-effects management, level of effect on bats is also 'very-high'.

Additionally, development of the Residential Community will increase the amount of artificial light at night such as street, security, vehicle and interior illumination which has the potential to disrupt bat behaviour resulting in adverse effects on bats and their ability to use the Site (Schamhart et al. 2024). Despite the Residential Community being located further away from the highest bat activity areas along the Waitoa river the pre-effects management magnitude of effects on bat habitat is considered 'high' with a pre-effects management level of effect of 'moderate' as set out in Table 11.

## 10.3 Effects on Wetland Ecological Values

### 10.3.1 Earthworks within 100 m of natural inland wetlands

Construction of the Greenway will involve earthworks within 100 m of an identified oxbow wetland along the Waitoa river. The natural hydrological regime supporting these wetlands is expected to be primarily governed by the Waitoa river. The proposed stormwater discharge from the Greenway is expected to supplement the existing hydrological regime thereby providing greater volumes and hydrological security than could be expected without these inputs. Consequently, the potential disruption or alteration of surface or ground water flows upslope of the identified wetlands is not expected to adversely impact wetland hydrology or reduce wetland extent. Consequently, the pre-effects management magnitude of effects on the wetlands within 100 m is likely to be 'low', resulting in a pre-effects management level of effect of 'low' as set out in Table 11.

### 10.3.2 Vegetation clearance within 10 m of natural inland wetland.

Construction of the Greenway outlet structure and associated rip-rap armour will also

involve vegetation clearance within 10 m of the oxbow wetlands. Vegetation clearance has the potential to adversely impact indigenous biodiversity and the ecological integrity of the wetland. Similar to the proposed earthworks, the extent of clearance is small (c. 25m$^2$) and it is not native vegetation, and standard sediment and erosion control measures are to be implemented to minimise the mobilisation of sediment. Consequently, the pre-effects management magnitude of effects is considered 'low' and the pre-effects management level of effect is 'low' as set out in Table 11.

## 10.4 Effects on Freshwater Ecological Values

### 10.4.1 Fish and Fish Habitat

The proposed development will result in the loss of c. 0.2 km of artificial farm drains. The ecological value of the drains themselves is considered 'negligible' and they require no effects management for their loss; however, due to their intermittent connectivity to the Waitoa River, the drains may support indigenous freshwater fish, such as eels, when inundated. Reclamation of these drains has the potential to result in the injury or death of indigenous fish if they are present when the drains are infilled. Consequently, the pre-effects management magnitude of effect on indigenous freshwater fish attributable to the reclamation of artificial farm drains is considered 'very high'. The resulting pre-effects management level of effect is considered 'high' as set out in Table 11.

### 10.4.2 Waitoa River

The stormwater treatment train for the Residential Community contains several water sensitive design elements delivering at source treatment of Water Quality Volume (WQV) for both Road and Lot areas. The treatment train includes the use of roadside rain gardens/soakage and private on-lot retention through soakage for lot areas, in line with Regional and District requirements for the catchment (Maven 2025).

The stormwater channel through the proposed Greenway is connected to the Residential Community development Basin B (Figure 15) and serves as an overall attenuation device for Catchment B, as well as a diversion for inflow from the farm drains within the southern Solar Farm and upstream catchments. The peak storage volume of Basin B and the Greenway channel will be 17,503.3m³ (10-year annual recurrence interval with climate change), with a peak water level of 66.92m RL (100-year annual recurrence interval with climate change). Discharge into the Waitoa River will be at a peak flow rate of 7.57m³/s (100-year annual recurrence interval with climate change).

All stormwater outfalls from the Residential Community development that discharge into the Waitoa river have been designed to include attenuation and treatment upstream, with flows directed either through dry basins, the Greenway or existing conveyance features. This discharge strategy ensures that post-development flows into the Waitoa river are maintained at or reduced from pre-development conditions, and energy dissipation structures are proposed to minimize erosion risk at outfall locations, as shown in (Maven 2025). The resulting pre-effects management level of effect is considered 'low' as set out in Table 11.

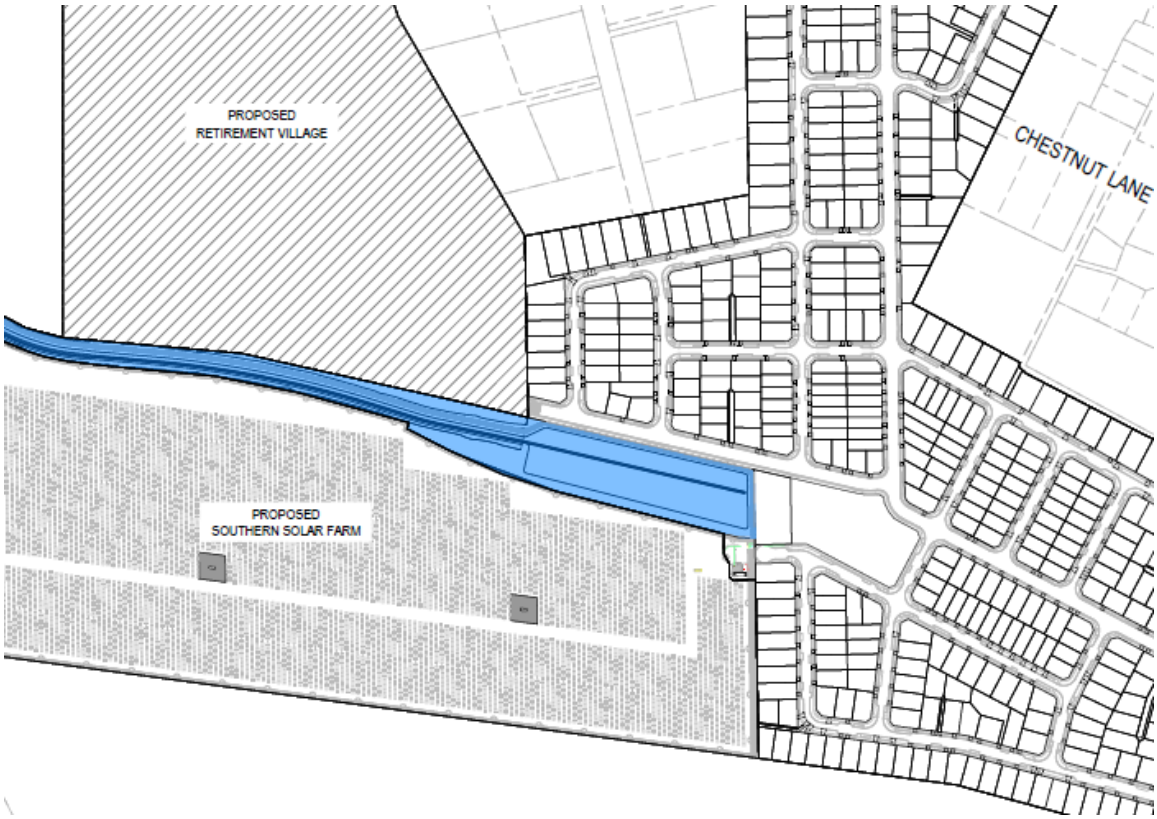


**Figure 15: Location of the Greenway stormwater channel and basin B, highlighted in blue. Provided by Maven Associates.**

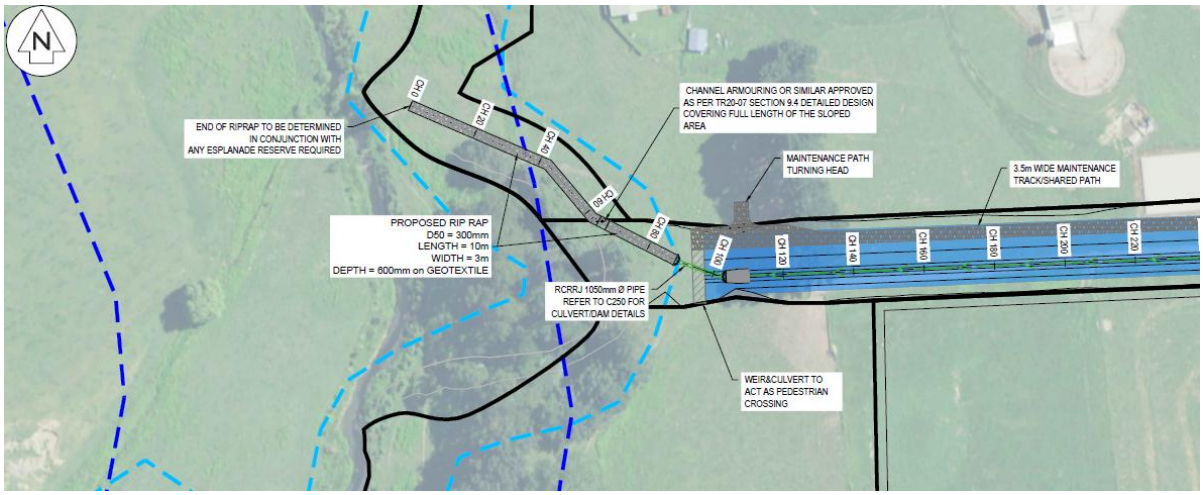


**Figure 16: Design of stormwater channel on western end of greenway, showing rip rap channel towards Waito River. Provided by Maven Associates.**

# 11.0 Effects Management – Residential Community and Greenway

## 11.1 Vegetation

As the level of effect, pre-effects management, is considered 'low' it is below what is normally of concern under the EcIAG and therefore no effects management is required. However, landscape/screen planting is proposed to take place throughout the Residential Community and Greenway, likely leading to an overall increase in indigenous tree cover across the Site. In addition, pest plant control will be undertaken across the Esplanade Reserve to ensure 'garden escapes' and weed ingress are minimised.

Considering the above, the post-effects management magnitude of effects on vegetation attributable to the development of the Residential Community and Greenway is considered 'very low' – 'positive' as set out in Table 11.

## 11.2 Birds and Bird Habitat

While the pre-effects management level of effect on birds was considered 'low' and therefore should not normally be of concern, almost all native birds are absolutely protected under the Wildlife Act 1953. Consequently, it is recommended that vegetation clearance be avoided between September and February inclusive. Where this is not practicable, pre-clearance nest checks should be undertaken by a suitably qualified ecologist. If native bird nests are identified, a 20m setback from the nest tree should be implemented and maintained until the nest has been determined to have failed or the chicks have fledged.

If the above effects management measures are implemented a Wildlife Act Authorisation from the Department of Conservation will not be required and the post-effects management level of overall effect is to be considered 'very low' as set out in Table 11.

## 11.3 Lizards and Lizard Habitat

Lizard and lizard habitat values, the potential and actual effects on those values attributable to the development of the Residential Community and Greenway and the proposed management of those effects are similar to those identified for the development of the Solar Farms outlined above. Consequently, the post-effects management magnitude of effects and overall level of effects are similar to those outlined in section 9.4, and as re-set out in Table 11.

## 11.4 Bats and Bat Habitat

Bat and bat habitat values, as well as the potential and actual effects on those values attributable to the development of the Residential Community and Greenway are similar to those identified for the development of the Solar Farms outlined above. While the effects of vegetation removal were deemed the same, it was recognised that the Residential Community development will result in greater artificial light being illuminated and therefore resulting in a greater magnitude of effect on bats than that of the Solar Farms. However, the overall effect and specific management measures to be applied are the same (e.g., BRPs and bat sensitive lighting design) and the resultant post-effects management magnitude of effects and overall level of effects are the same as those outlined in section 9.5, and as set out in Table 11.

## 11.5 Earthworks within 100m of natural inland wetland

While the pre-effects management level of effect on the oxbow wetland attributable to earthworks within a 100m is considered 'low' and therefore should not normally be of concern, normal design, construction and operational care such as erosion and sediment control measures will be exercised to minimise adverse effects. Erosion and sediment control measures are outlined in an erosion and sediment control plan under a separate cover.

## 11.6 Vegetation clearance within 10m of natural inland wetland

While the pre-effects management level of effect on the oxbow wetland attributable to vegetation clearance within 10m is considered 'low' and therefore should not normally be of concern, normal design, construction and operational care such as erosion and sediment control measures will be exercised to minimise adverse effects. Erosion and sediment control measures are outlined in an erosion and sediment control plan under a separate cover.

## 11.7 Fish and Fish Habitat

The reclamation of artificial farm drains has the potential to injure or kill indigenous fish if they are present when the reclamation occurs. Consequently, a fish management plan (FMP) has been prepared as part of the Ecological Management Plan (ESL 2025) which outlines the fish management measures to be implemented to ensure the protection of indigenous freshwater fish. Specifically, the FMP will outline the timing and protocols for fish capture and relocation prior to drain reclamation activities commencement. If the above effects management measures are implemented the post-effects management level of overall effect on indigenous fish attributable to the development of the Residential Community and Greenway will be 'very low' as set out in Table 11.

## 11.8 Waitoa River

While the pre-effects management level of effect on of stormwater discharge to the Waitoa river is considered 'low' and therefore should not normally be of concern, normal design, construction and operational care such as erosion and sediment control measures will be exercised to minimise adverse effects. Details of sediment and erosion control associated with the outlet to the river are generally referred to as part of the Stormwater Management Plan (Maven 2025) with construction and detailed design sediment and erosion control measures prepared under a separate cover(s).

**Table 11: Magnitude and level of effects for the proposed Residential Community and Greenway development post- and pre-effects management.**

| Activity | Ecological Feature | Effect | Ecological value | Magnitude of effect | Level of effect (pre-effects management) | Proposed mitigation measures | Level of effect (post effects management) |
|---|---|---|---|---|---|---|---|
| Vegetation Removal | Exotic trees, hedgerows and grassed pasture | Loss of botanical value | Low | Low | Very low | Low and Very low effects should not normally be of concern. Landscape planting of indigenous trees throughout the development and Greenway will likely have a positive effect. | Very low/Positive |
| | Birds | Injury or mortality to birds. | Low | Moderate | Low | Low and Very low effects should not normally be of concern. Implementation of Bird Management protocols outlined in the EMP (ESL 2025): Avoid vegetation clearance between September and February inclusive. If this is not possible, check trees prior to felling and if native bird species are nesting, leave the tree standing until the nest can be declared abandoned. Wildlife Act Authorisation NOT required. | Very low |
| | Bird Habitat | Loss of bird habitat | Low | Moderate | Low | As above. Proposed plantings throughout the Residential Community and Greenway should lead to a net increase in available bird habitat in the long-term. | Very low - Positive |
| | Lizards | Direct mortality of indigenous lizards during vegetation clearance | Moderate | High | Moderate | Implementation of LMP as outlined in EMP (ESL 2025). Vegetation clearance supervision and salvage. Wildlife Act Authorisation REQUIRED. | Low |
| | Lizard habitat | Loss of indigenous lizard habitat | Low | Moderate | Low | Low and Very low effects should not normally be of concern. Proposed plantings along the Greenway and Waitoa River Esplanade Reserve and inclusion of lizard refuge should lead to a net | Very low - Positive |

| Activity | Ecological Feature | Effect | Ecological value | Magnitude of effect | Level of effect (pre-effects management) | Proposed mitigation measures | Level of effect (post effects management) |
|---|---|---|---|---|---|---|---|
| | | | | | | increase in available lizard habitat in the long-term. | |
| | Bats | Injury or death of bats | **Very high** | **Very high (if present when clearance occurs)** | **High** | Implementation of BMP and Department of Conservation Bat Roost Protocols as outlined in EMP (ESL 2025). Wildlife Act Authorisation NOT required | **Low** |
| | Bat habitat | Loss/displacement of bat habitat | **Moderate** | **High** | **Moderate** | Implementation of bat sensitive design lighting, as laid out in the EMP (ESL 2025). If roost trees present, then offsetting will be offered, as laid out in the EMP (ESL 2025), involving provisioning of artificial roosts and predator control. | **Low** |
| **Earthworks within 100 m of a natural inland wetland** | Oxbow wetlands | Potential loss of extent due to hydrology alteration | **High** | **Low** | **Low** | Low and Very low effects should not normally be of concern. Implementation of erosion and sediment control measures. | **Very low** |
| **Vegetation clearance within 10 m of a natural inland wetland** | Oxbow wetlands | Potential impact of wetland flora | **High** | **Low** | **Low** | Low and Very low effects should not normally be of concern. Implementation of erosion and sediment control measures. | **Very low** |
| **Reclamation of Farm Drains** | Indigenous freshwater fish | Injury or death of indigenous fish stranded in drains | **Moderate** | **Very High** | **High** | Implementation of FMP, as described in the EMP (ESL 2025). | **Low** |
| **Stormwater Discharge to Waitoa River** | Waitoa river | Alteration of river flows and water quality | **High** | **Low** | **Low** | Low and Very low effects should not normally be of concern. | **Low** |

# 12.0 Assessment of Effects – Retirement Living

## 12.1 Introduction

This section assesses the actual and potential ecological effects associated with developing the retirement living as described in Section 1.2 and shown on the Ashbourne Master Plan presented in Figure 2. Activities that have potential to result in adverse ecological effects in the terrestrial and aquatic environments are:

***Terrestrial Effects***

- Terrestrial vegetation: vegetation clearance.
- Birds: loss of habitat; potential mortality of eggs, chicks, and/or adults attributable to vegetation clearance.
- Lizards: loss of habitat, and potential injury or mortality, attributable to vegetation clearance.
- Bats: loss of potential roosting, foraging, and commuting habitat, and potential injury and mortality; and the introduction of increased artificial light at night potentially affecting bat behaviour patterns.

***Freshwater Effects***

- Reclamation of artificial drains.
- Stormwater discharge

## 12.2 Effects on Terrestrial Ecological Values

### 12.2.1 Vegetation

It is anticipated that the 'low' ecological value exotic vegetation associated with the Retirement Living village site (e.g., isolated trees (32), hedgerows (c. 860 m) and pasture (c. 34 ha)) will be cleared.

Vegetation values, as well as the potential and actual effects on those values attributable to the development of the Retirement Living village are similar to those identified for the development of the Residential Community outlined above. The pre-effects management magnitude of effects and level of effects are similar to those outlined in section 10.2.2, and as re-set out in Table 12.

### 12.2.2 Birds and Bird Habitat

Bird and bird habitat values, as well as the potential and actual effects on those values attributable to the development of the Retirement Living village are similar to those identified for the development of the Residential Community outlined above. The pre-effects management magnitude of effects and level of effects are similar to those outlined in section 10.2.3, and as re-set out in Table 12.

### 12.2.3 Lizards and Lizard Habitat

Lizard and lizard habitat values, as well as the potential and actual effects on those values attributable to the development of the Retirement Living village are similar to those identified for the development of the Residential Community outlined above. The pre-effects management magnitude of effects and level of effects are similar to those outlined in section 10.2.4, and as re-set out in Table 12.

### 12.2.4 Bats and Bat Habitat

Bat and bat habitat values, as well as the potential and actual effects on those values attributable to the development of the Retirement Living village are similar to those identified for the development of the Residential Community outlined above. The pre-effects management magnitude of effects and level of effects are similar to those outlined in section 10.2.5, and as re-set out in Table 12.

## 12.3 Effects on Freshwater Ecological Values

### 12.3.1 Fish and Fish Habitat

The development of the Retirement Living village will result in the reclamation of c. 2.3km of artificial farm drains. Fish and fish habitat values, as well as the potential and actual effects on those values attributable to the development of the Retirement Living village are similar to those identified for the development of the Residential Community outlined above. Consequently, the pre-effects management magnitude of effects and level of effects are similar to those described in section 10.4.1, and as re-set out in Table 12.

### 12.3.2 Waitoa River

The stormwater treatment train for the Retirement Living village contains several water sensitive design elements delivering at source treatment of Water Quality Volume (WQV) for both Road and Lot areas. The treatment train includes the use of roadside rain gardens/soakage and private on-lot retention through soakage for lot areas, in line with Regional and District requirements for the catchment (Maven 2025). Stormwater outflow from the proposed retirement village will be onto Station Road, and into the stormwater infrastructure of the proposed Greenway (points A and B on Figure 17).

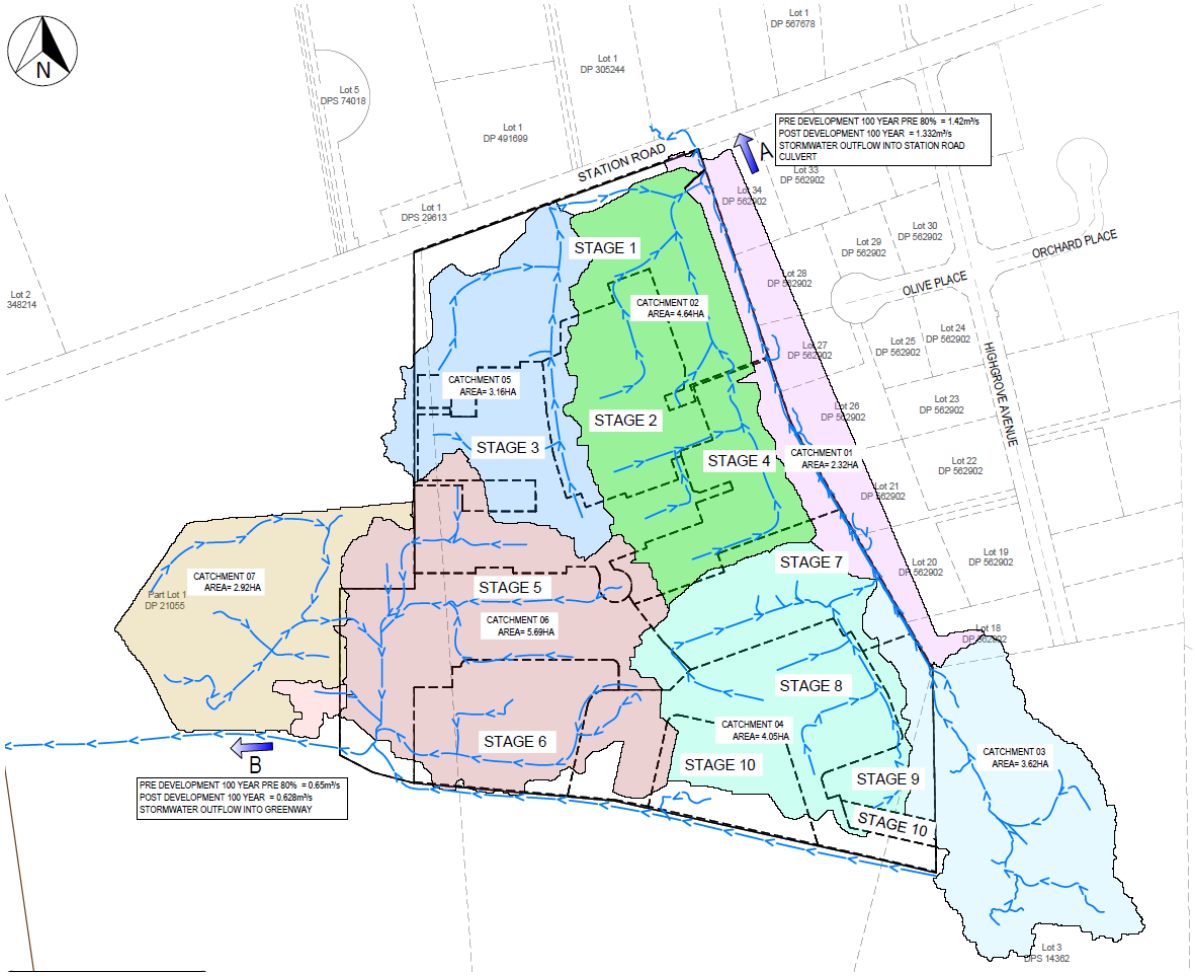


**Figure 17: Stormwater discharge plans for the proposed Retirement Village, as provided by Maven Associates.**

All stormwater outfalls from the Retirement Living village that discharge have been designed to include attenuation and treatment upstream, with flows directed either through dry basins, or existing conveyance features. This discharge strategy ensures that post-development flows into the Waitoa river are maintained at or reduced from pre-development conditions, and energy dissipation structures are proposed to minimize erosion risk at outfall locations. Consequently, the pre-effects management magnitude of effects and level of effects are similar to those described in section 10.4.2, and as re-set out in Table 12.

# 13.0 Effects Management – Retirement Living village

## 13.1 Vegetation

As the level of effect, pre-effects management, is considered 'low' it is below what is normally of concern under the EcIAG and therefore no effects management is required. However, landscape/screen planting is proposed to take place throughout the Retirement Living village, likely leading to an overall increase in indigenous tree cover across the Site. In addition, pest plant control will be undertaken within the Esplanade Reserve to ensure 'garden escapes' and weed ingress are minimised.

Considering the above, the post-effects management magnitude of effects on vegetation attributable to the development of the Retirement Living village is considered 'very low' – 'positive' as set out in Table 12.

## 13.2 Birds and Bird Habitat

While the pre-effects management level of effect on birds was considered 'low' and therefore should not normally be of concern, almost all native birds are absolutely protected under the Wildlife Act 1953. Consequently, it is recommended that vegetation clearance be avoided between September and February inclusive. Where this is not practicable, pre-clearance nest checks should be undertaken by a suitably qualified ecologist. If native bird nests are identified, a 20m setback from the nest tree should be implemented and maintained until the nest has been determined to have failed or the chicks have fledged.

If the above effects management measures are implemented a Wildlife Act Authorisation from the Department of Conservation will not be required and the post-effects management level of overall effect is to be considered 'very low' as set out in Table 12.

## 13.3 Lizards and Lizard Habitat

Lizard and lizard habitat values, the potential and actual effects on those values attributable to the development of the Retirement Living village and the proposed management of those effects are similar to those identified for the development of the Residential Community outlined above. Consequently, the post-effects management magnitude of effects and overall level of effects are similar to those outlined in section 11.3, and as re-set out in Table 12.

## 13.4 Bats and Bat Habitat

Bat and bat habitat values, the potential and actual effects on those values attributable to the development of the Retirement Living village as well as the proposed management of those effects are similar to those identified for the development of the Residential Community outlined above. Consequently, the post-effects management magnitude of effects and overall level of effects are the same as those outlined in section 11.4, and as re-set out in Table 12.

## 13.5 Earthworks within 100m of natural inland wetland

While the pre-effects management level of effect on the oxbow wetland attributable to earthworks within a 100m is considered 'low' and therefore should not normally be of concern, normal design, construction and operational care such as erosion and sediment control measures will be exercised to minimise adverse effects. Erosion and sediment control measures are outlined in an erosion and sediment control plan under a separate cover.

## 13.6 Vegetation clearance within 10m of natural inland wetland

While the pre-effects management level of effect on the oxbow wetland attributable to vegetation clearance within 10m is considered 'low' and therefore should not normally be of concern, normal design, construction and operational care such as erosion and sediment control measures will be exercised to minimise adverse effects. Erosion and sediment

control measures are outlined in an erosion and sediment control plan under a separate cover.

## 13.7 Fish and Fish Habitat

The reclamation of artificial farm drains has the potential to injure or kill indigenous fish if they are present when the reclamation occurs. Consequently, a fish management plan (FMP) has been prepared as part of the Ecological Management Plan (ESL 2025) which outlines the fish management measures to be implemented to ensure the protection of indigenous freshwater fish. Specifically, the FMP will outline the timing and protocols for fish capture and relocation prior to drain reclamation activities commencement. If the above effects management measures are implemented the post-effects management level of overall effect on indigenous fish attributable to the development of the Retirement Living village will be 'very low' as set out in Table 12.

## 13.8 Waitoa River

While the pre-effects management level of effect on of stormwater discharge to the Waitoa river is considered 'low' and therefore should not normally be of concern, normal design, construction and operational care such as erosion and sediment control measures will be exercised to minimise adverse effects. Details of sediment and erosion control associated with the outlet to the river are generally referred to as part of the Stormwater Management Plan (Maven 2025) with construction and detailed design sediment and erosion control measures prepared under a separate cover(s

**Table 12: Magnitude and level of effects for the proposed Retirement Living village pre and post-effects management.**

| Activity | Ecological Feature | Effect | Ecological value | Magnitude of effect | Level of effect (pre-effects management) | Proposed mitigation measures | Level of effect (post effects management) |
|---|---|---|---|---|---|---|---|
| **Vegetation Removal** | Exotic trees, hedgerows and grassed pasture | Loss of botanical value | **Low** | **Low** | **Very low** | Low and Very low effects should not normally be of concern. Landscape planting of indigenous trees throughout the development and Greenway will likely have a positive effect. | **Very low/Positive** |
| | Birds | Injury or mortality to birds. | **Low** | **Moderate** | **Low** | Low and Very low effects should not normally be of concern. Implementation of Bird Management protocols outlined in the EMP (ESL 2025): Avoid vegetation clearance between September and February inclusive. If this is not possible, check trees prior to felling and if native bird species are nesting, leave the tree standing until the nest can be declared abandoned. Wildlife Act Authorisation NOT required. | **Very low** |
| | Bird Habitat | Loss of bird habitat | **Low** | **Moderate** | **Low** | As above. Proposed plantings throughout the residential community and Greenway should lead to a net increase in available bird habitat in the long-term. | **Very low - Positive** |
| | Lizards | Direct mortality of indigenous lizards during vegetation clearance | **Moderate** | **High** | **Moderate** | Implementation of LMP as outlined in EMP (ESL 2025). Vegetation clearance supervision and salvage. Wildlife Act Authorisation REQUIRED. | **Low** |
| | Lizard habitat | Loss of indigenous lizard habitat | **Low** | **Moderate** | **Low** | Low and Very low effects should not normally be of concern. Proposed plantings along the Greenway and Waitoa River Esplanade Reserve and inclusion of lizard refuge should lead to a net increase in available lizard habitat | **Very low - Positive** |

| Activity | Ecological Feature | Effect | Ecological value | Magnitude of effect | Level of effect (pre-effects management) | Proposed mitigation measures | Level of effect (post effects management) |
|---|---|---|---|---|---|---|---|
| | | | | | | in the long-term. | |
| | Bats | Injury or death of bats | Very high | Very high (if present when clearance occurs) | High | Implementation of BMP and Department of Conservation Bat Roost Protocols as outlined in EMP (ESL 2025). Wildlife Act Authorisation NOT required | Low |
| | Bat habitat | Loss/displacement of bat habitat | Moderate | High | Moderate | Implementation of bat sensitive design lighting, as laid out in the EMP (ESL 2025). If roost trees present, then offsetting will be offered, as laid out in the EMP (ESL 2025), involving provisioning of artificial roosts and predator control. | Low |
| **Earthworks within 100 m of a natural inland wetland** | Oxbow wetlands | Potential loss of extent due to hydrology alteration | High | Low | Low | Low and Very low effects should not normally be of concern. Implementation of erosion and sediment control measures. | Very low |
| **Vegetation clearance within 10 m of a natural inland wetland** | Oxbow wetlands | Potential impact of wetland flora | High | Low | Low | Low and Very low effects should not normally be of concern. Implementation of erosion and sediment control measures. | Very low |
| **Reclamation of Farm Drains** | Indigenous freshwater fish | Injury or death of indigenous fish stranded in drains | Moderate | Very High | High | Implementation of FMP, as described in the EMP (ESL 2025). | Low |
| **Stormwater Discharge to Waitoa River** | Waitoa river | Alteration of river flows and water quality | High | Low | Low | Low and Very low effects should not normally be of concern. | Low |

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# APPENDIX A

## Botanical Species List

| **Ferns and fern allies** | * = Native species |
|---|---|
| *Histiopteris incisa** | water fern |
| *Pteridium esculentum* | bracken |
| *Pteris tremula* | shaking brake |

| **Dicot herbs** | |
|---|---|
| *Apium nodiflorum* | water celery |
| *Conyza parva* | fleabane |
| *Callitriche stagnalis* | starwort |
| *Galium palustris* | marsh bedstraw |
| *Hypochaeris radicata* | cat's ear |
| *Leontodon taraxacoides* | hawkbit |
| *Lotus pedunculatus* | lotus |
| *Ludwigia palustris* | water purslane |
| *Lycopus europaeus* | gypsywort |
| *Persicaria hydropiper* | water pepper |
| *Persicaria maculosa* | willow weed |
| *Phytolacca octandra* | inkweed |
| *Plantago lanceolata* | narrow-leaved plantain |
| *Plantago major* | broad-leaved plantain |
| *Prunella vulgaris* | selfheal |
| *Ranunculus flammula* | spearwort |
| *Ranunculus repens* | creeping buttercup |
| *Rumex conglomeratus* | clustered dock |
| *Rumex obtusifolius* | broadleaved dock |
| *Solanum nigrum* | black nightshade |
| *Taraxacum officinale* | dandelion |
| *Trifolium repens* | white clover |
| *Trifolium pratense* | red clover |

| **Dicot Trees and Shrubs** | |
|---|---|
| *Berberis glaucocarpa* | barberry |
| *Crataegus monogyna* | hawthorn |
| *Eucalyptus spp.* | eucalyptus |
| *Fraxinus excelsior* | European ash |
| *Quercus robur* | European oak |
| *Ligustrum lucidum* | tree privet |
| *Ligustrum sinense* | small-leaved privet |
| *Melicytus ramiflorus** | mahoe |
| *Myrsine australis** | mapou |
| *Pittosporum eugenioides** | lemonwood |
| *Platanus × hispanica* | London plane |
| *Poplar x canadensis* | Robusta Poplar |
| *Populus nigra* | Lombardy poplar |
| *Prunus campanulata* | bell-flowered cherry |
| *Salix babylonica* | weeping willow |
| *Salix fragilis* | crack willow |
| *Solanum mauritianum* | woolly nightshade |
| *Ulex europeus* | gorse |

| **Conifers** | |
|---|---|
| *Dacrycarpus dacrydioides** | kahikatea |
| *Dacrydium cupressinum* | rimu |
| *Hesperocyparis macrocarpa* | Macrocarpa |
| *Podocarpus tōtara** | tōtara |
| *Pseudotsuga menziesii* | Douglas fir |

| **Monocots** | |
|---|---|
| *Agrostis capillaris* | creeping bent |
| *Cordyline australis** | ti kouka / cabbage tree |
| *Cortederia selloana* | pampas grass |
| *Dactylis glomeratus* | cocksfoot |
| *Glyceria declinata* | glaucous sweetgrass |
| *Holcus lanatus* | Yorkshire fog |
| *Lolium arundinaceum* | tall fescue |
| *Lolium mutiflorum* | Italian rye grass |
| *Lolium perenne* | perennial rye grass |
| *Paspalum dilatatum* | paspalum |
| *Paspalum distichum* | Mercer grass |
| *Phormium tenax** | NZ flax/harakeke |

| **Rushes and Sedges** | |
|---|---|
| *Cyperus eragrostis* | nut sedge |
| *Juncus acuminatus* | shap-fruited rush |
| *Juncus articulatus* | jointed rush |
| *Juncus effusus* | soft rush |

| **Dicot Lianes** | |
|---|---|
| *Rubus fructicosus* agg. | blackberry |
| *Lonicera japonica* | Japanese honeysuckle |
| *Muehlenbeckia australis* | large-leaved muehlenbeckia |

# APPENDIX B

## EcIAG Tables

Table 4: **Attributes to be considered when assigning ecological value or importance to a site or area of vegetation/habitat/community (EcIAG 2018)**

| 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 locally19 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<br>utilisation |
| Ecological context | • Site history, and local environmental conditions which have influenced the development of habitats and<br>communities<br>• The essential characteristics that determine an ecosystem's integrity, form, functioning, and resilience (from<br>"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<br>genetic material |

| | |
|---|---|
| | • Species role in ecosystem functioning – high level, key species identification, habitat as proxy |

Table 5 **Factors to consider in assigning value to terrestrial species for EcIA (EcIAG 2018)**

| **Determining Factors** | |
|---|---|
| Nationally Threatened species, found in the ZOI either permanently or seasonally | **Very High** |
| Species listed as At Risk – Declining, found in the ZOI, either permanently or seasonally | **High** |
| Species listed as any other category of At Risk, found in the ZOI either permanently or seasonally | **Moderate** |
| Locally (ED) uncommon or distinctive species | **Moderate** |
| Nationally and locally common indigenous species | **Low** |
| Exotic species, including pests, species having recreational value | **Negligible** |

Table 6 **Scoring for sites or areas combining values for four matters in Table 4 (EcIAG 2018).**

| **Value** | **Description** |
|---|---|
| Very High | Area rates High for 3 or all of the four assessment matters listed in Table 4. Likely to be nationally important and recognised as such. |
| High | Area rates High for 2 of the assessment matters, Moderate and Low for the remainder, or Area rates High for 1 of the assessment maters, Moderate for the remainder. Likely to be regionally important and recognised as such. |
| Moderate | Area rates High for one matter, Moderate and Low for the remainder, or Area rates Moderate for 2 or more assessment matters Low or Very Low for the remainder Likely to be important at the level of the Ecological District. |
| Low | Area rates Low or Very Low for majority of assessment matters and Moderate for one. Limited ecological value other than as local habitat for tolerant native species. |
| Negligible | Area rates Very Low for 3 matters and Moderate, Low or Very Low for remainder. |

# APPENDIX C

## Qualifications

**Chad Croft – Senior Ecologist**

Chad Croft is a terrestrial and freshwater ecologist with 20+ years experience delivering on a wide range of ecology projects and programmes from small scale land development to large scale infrastructure, public and private land management and landscape scale restoration. He has extensive experience in planning, managing and implementing both terrestrial and freshwater impact assessments, ecological surveys, ecosystem restoration, mitigation strategies, preparation of ecological management plans and residual effects management through offset and compensation design.

Chad has prepared and presented evidence to various Council level hearings associated with proposed private plan changes, notice of requirements, and resource consent applications, for a range of small and large-scale land development projects.

***Dr Gary Bramley – Director and Senior Terrestrial Ecologist, PhD***

Gary's whakapapa includes Ngāti Kahu ki Whaingaroa and Ngāpuhi ki Whangaroa, two Northland based hapū. Gary started The Ecology Company in 2016 and heads our terrestrial ecology team. He is a highly experienced terrestrial ecologist with a wealth of experience working for a wide range of clients throughout New Zealand, particularly in the mining sector including gold, coal, mineral sand mining and quarrying clients. His project experience spans assessments of effects for mining, port and energy sector projects, land development, roading, forestry as well as private plan changes and implementation of consent conditions - preparation of restoration plans, management plans (including hapū management plans) and peer review.

Gary has carried out research and ecological assessments in a variety of forest, agricultural, shrubland, grassland, urban, coastal, alpine and wetland settings between Nightcaps in the south and Ngataki in the north. This work has included risk assessments, ecological due diligence/estimates of future liability, assessments of ecological opportunities and constraints, ecological surveys, monitoring, design and management of pest control programmes, translocation of threatened and other native species, the planning and management of restoration projects and the management of external contractors and ecological projects. Gary has prepared and presented evidence to the Environment Court and the Environmental Protection Agency for a range of large scale land development and mining projects.

**Richard Montgomerie – *Director and Senior Freshwater Ecologist***

Richard is the founder and managing director of Ecological Solutions and specialises in providing freshwater environmental services to address management issues. Richard has held senior roles at Kingett Mitchell Ltd, the Water Research Centre (UK), Golder Associates and was the founder and managing director of Freshwater Solutions Ltd.

Richard holds an MSc in Zoology from the University of Otago and has over 27 years of ecology consulting experience. Throughout the past 27 years, Richard has led or supported assessments of the ecological effects of small and large scale land development, hydro schemes, primary industry, forestry and mining throughout New Zealand.

Richard's technical expertise includes water quality assessment, freshwater ecological values and effects assessments of streams, lakes and wetlands, aquatic plant, benthic invertebrate, native and introduced fish assessments and management the assessment of recreational and commercial freshwater fishery values.