Plan Change 17: Te Rapa

Ecological Values and Effects Assessment

Report prepared for

Fonterra Limited

Prepared by

RMA Ecology Ltd

Report number and date

Job 2271

December 2024

BETTER ECOLOGICAL OUTCOMES

PREPARED FOR:

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Project No. 2271

Version date: 06 December 2024

Version status: Issued & final

Citation:

RMA Ecology Ltd. December 2024. Plan Change 17: Te Rapa: Ecological values and effects assessment. Report prepared for Fonterra Limited. 38 pages.

Revisions

Revision	*Date*	*Description*

Contents

1.0 Introduction

1.1 Background

Fonterra Limited (Fonterra) is preparing a Private Plan Change application ('PC17') for an a 91-hectare area in Northern Hamilton (the 'Plan Change Area').

The Plan Change Area is located between the Waikato River and the North Island Main Trunk railway corridor, with the existing Fonterra Te Rapa Dairy Manufacturing Site located along the eastern border (Figure 1).

The objectives of PC17 are to:

a. Live-zone all Fonterra-owned land to Te Rapa North Industrial zone;

b. Protect the Te Rapa Dairy Manufacturing Site from incompatible surrounding land use and reverse sensitivity risk; and

c. Future proof rail access on the North Island Main Trunk Line.

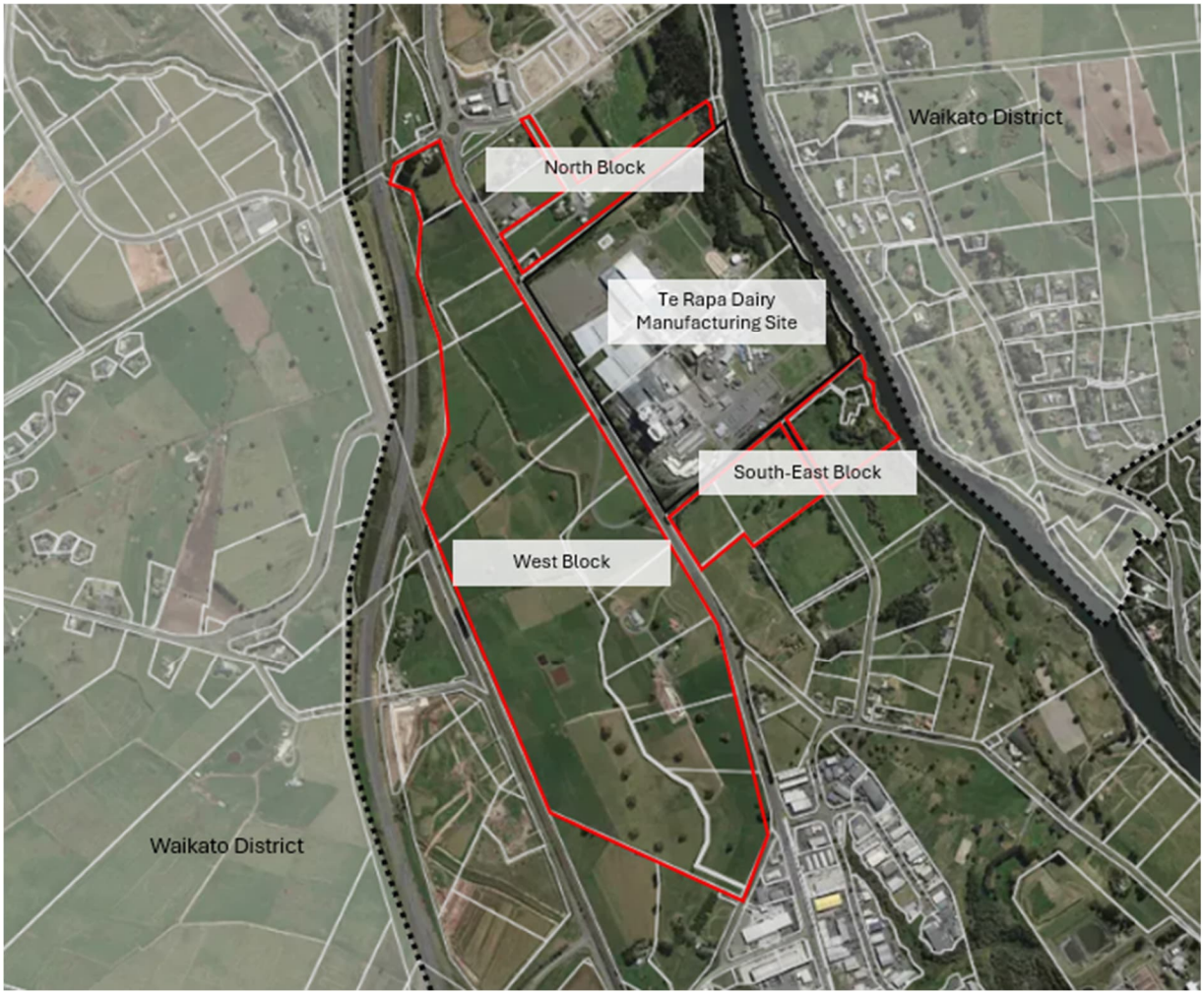

Figure 1. Plan Change Area Boundaries (red outlines).

The existing land use is predominantly pastoral agriculture and is currently zoned as Te Rapa North Industrial Zone under the Hamilton District Plan but is overlaid with the 'Deferred Industrial Zone' Area. PC17 would enable the Plan Change Area to be developed for industrial activities.

The Plan Change Area includes the following properties:

West Block:

- Section 1 & Section 3 SO 456626 (Sikh Society);
- Lot 1 – 6 DPS 11087;
- Part Lot 2 DPS 10804;
- Lot 1 DPS 34481; and
- Part Lot 1 DPS 10804;

North Block:

- Lot 1 DP 551065; and
- Lot 1 DPS 8230.

South-East Block:

- Lot 5 DPS 18043;
- Lot 1 DPS 85687; and
- Lot 1-3 DPS 61136 (Lot 1-2: Francis Vincent Rog, Karen Elizabeth Rog & Lot 3: J W Trustees Limited)

The underlined parcels are those not in the ownership of Fonterra.

1.2 Purpose and scope

Fonterra has engaged RMA Ecology Ltd to undertake an assessment of the ecological values of the Plan Change Area and the effects of PC17.[1] We understand that Fonterra intends to use this report as part of the PC17 application. We have prepared this report by using a combination of desktop-based assessment (covering the entire Plan Change Area) and field-based survey (covering most of the Plan Change Area). The approach included assessment of both aquatic and terrestrial values and provides the following:

- A description of the vegetation types that exist within the Plan Change Area and their ecological significance (as meeting the significance criteria within the Waikato Regional Policy Statement ('WRPS'));
- A classification and description of the streams within the Plan Change Area based on the definitions within the Waikato Regional Plan ('WRP');
- A delineation and classification of wetlands within the Plan Change Area based on the definitions within the Resource Management Act 1991 ('RMA') and the National Policy Statement for Freshwater Management 2020 (last amended January 2024) ('NPS-FM'); and

[1] Offer of service dated 18 October 2022.

- An assessment of the likelihood of native wildlife (birds, bats, lizards, fish) being present within the Plan Change Area.

This report contains the following:

- An overview of the methods used to identify, classify, and assess ecological features, and the ecological significance of those features; and
- A quantitative and qualitative summary of ecological features and significance, and how these features may function as constraints and opportunities for the PC17 process.

The next phase of ecology reporting (not reported here) would normally include the following, once resource consent applications are being prepared to enable subdivision and land use development:

- An assessment of the type and magnitude of potential effects associated with the development, construction, and operational activities, including potential habitat loss and degradation, and direct mortality or injury of indigenous fauna; and
- Recommendations to address adverse effects.

2.0 Methods

Desktop and field assessments were used in combination to identify and classify ecological features and determine their ecological value and significance.

Following this, an ecological management lens was applied based on standard practice in Hamilton which includes recommended setbacks from streams, wetlands, and native vegetation as protection and/or restoration buffers. Additional restoration opportunities representing best practice underpinned by ecological theory are also presented.

2.1 Desktop assessment

A desktop assessment of the Plan Change Area and the nearby surrounding area was undertaken to provide insight into the recent history of the Plan Change Area and to identify potential or mapped ecological features by reviewing:

- Historic and present-day aerial images;
- New Zealand Freshwater Fish Database;
- National Amphibian and Reptile Database System (Herpetofauna);
- Bird Atlas of New Zealand;
- Department of Conservation (DOC) bat database; and
- iNaturalist records.

Areas mapped as Significant Natural Areas ('SNA') under Schedule 9C and Proposed Plan Change 9 to the Hamilton City Operative District Plan ('ODP') were identified. The National Policy Statement – Indigenous Biodiversity 2023 ('NPS-IB') and WRPS criteria for determining significance of indigenous biodiversity were also applied.

The WRPS criteria for determining significance of indigenous biodiversity was also applied to areas of indigenous vegetation which were not already listed as SNAs, but which support ecology values such that they may be considered to be 'SNA-qualifying'. Individual species were recorded, and their conservation status checked against the national threatened species classification list for plants[2].

For species that were assessed as possibly being present, their conservation status was checked against the national threatened species classification lists for fish[3], birds[4], bats[5], and reptiles[6].

[2] de Lange, Peter J., Jeremy R. Rolfe, John W. Barkla, Shannel P. Courtney, Paul D. Champion, Leon R. Perrie, Sarah M. Beadel, Kerry A. Ford, Ilse Breitwieser, Ines Schönberger, Rowan Hindmarsh-Walls, Peter B. Heenan and Kate Ladley (2017). Conservation status of New Zealand indigenous vascular plants. New Zealand Threat Classification Series 22. 82p.

[3] Dunn, N.R., Allibone, R.M., Closs, G.P., Crow, S.K., David, B.O., Goodman, J.M., Griffiths, M., Jack, D.C., Ling, N., Waters, J.M., Rolfe, J.R. (2018) Conservation status of New Zealand freshwater fishes, 2017. New Zealand Threat Classification Series 24. Department of Conservation, Wellington. 11 p

[4] Robertson, Hugh A., Karen A. Baird, Graeme P. Elliott, Rodney A. Hitchmough, Nikki J. McArthur, Troy Makan, Colin M. Miskelly, Colin. J. O'Donnell, Paul M. Sagar, R. Paul Scofield, Graeme A. Taylor and Pascale Michel (2021). Conservation status of birds in Aotearoa New Zealand. New Zealand Threat Classification Series 36. Department of Conservation, Wellington. 43p.

[5] O'Donnell, C. F. J., K.M. Borkin, J.E. Christie, B. Lloyd, S. Parsons and R.A. Hitchmough (2017). Conservation status of New Zealand bats New Zealand Threat Classification Series 21. 4p.

[6] Hitchmough, Rod, Ben Barr, Carey Knox, Marieke Lettink, Joanne M. Monks, Geoff B. Patterson, James T. Reardon, Dylan van Winkel, Jeremy Rolfe and Pascale Michel (2021). Conservation status of New Zealand reptiles. New Zealand Threat Classification Series 35. Department of Conservation, Wellington. 15p.

2.2 Field assessment

Field surveys were undertaken on 20-23 March 2023, 6-10 June 2023, and 16 April 2024. The field surveys were limited to the land parcels within the Plan Change Area owned by Fonterra (the 'Surveyed Area').

The balance of the lots included in the Plan Change Area (approximately 6.5 ha) were not surveyed due to access constraints.

The parcels that were not surveyed (see yellow shading) are shown in Figure 2 below. The lack of survey of these areas is not considered to affect the conclusions in this assessment as it is recommended that site-specific ecological assessments be undertaken at the resource consent stage prior to any future development, enabled by PC17, occurring.

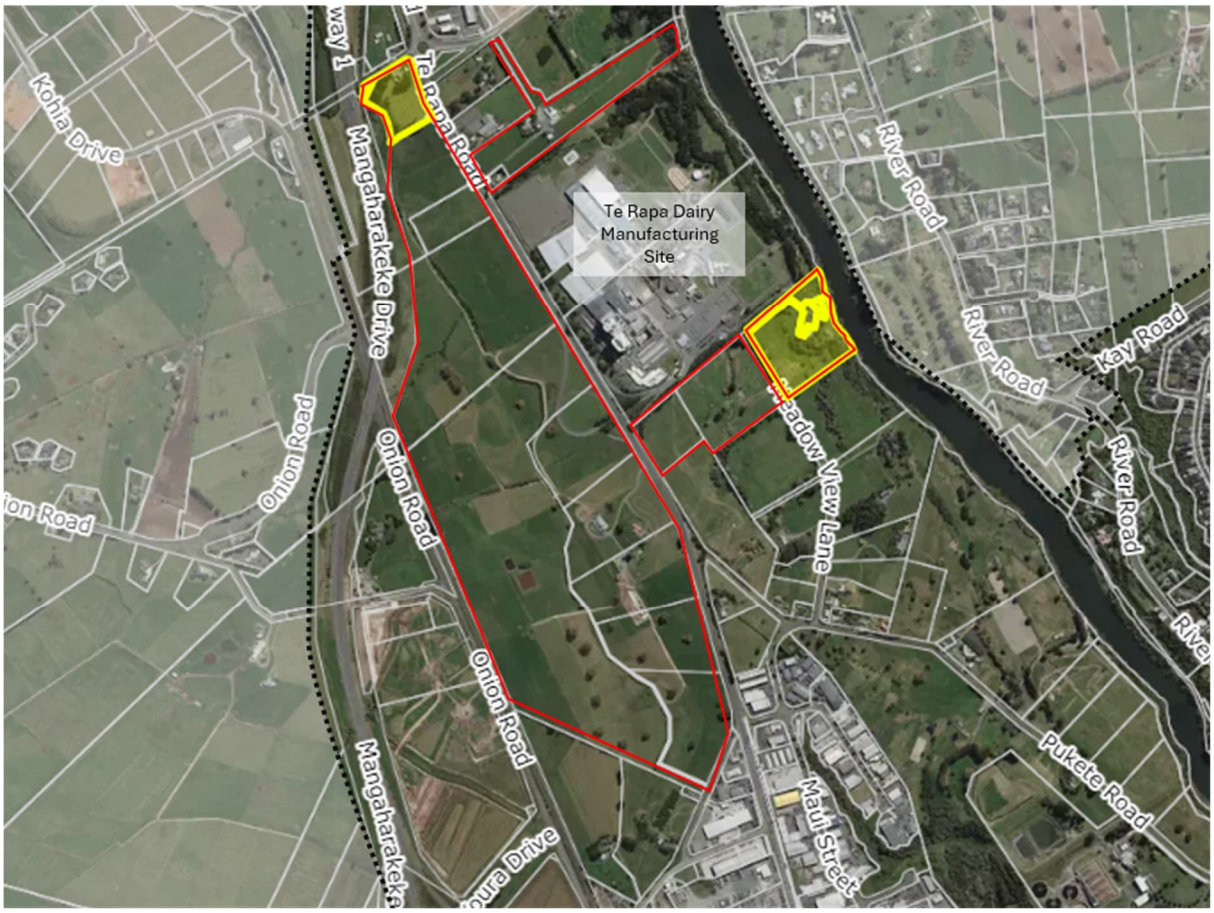

Figure 2. Parcels not included in the Surveyed Area (shaded yellow).

2.2.1 Wetlands

The surveyed area was assessed for wetlands based on the definition in the WRP and the RMA. Loss of any wetland area is discouraged by Waikato Regional Council ('WRC'). All wetlands that are dominated by indigenous vegetation are considered to be critically threatened environments where protection should be prioritised.

The Surveyed Area was also assessed for 'natural inland wetlands' based on the definition within the NPS-FM.

The 'natural inland wetland' definition under the NPS-FM uses the RMA definition as a starting point which requires a stepwise assessment based on vegetation, soils, and hydrology.[7] Exclusions are then applied based on factors that include the percentage abundance of pasture species or whether the wetland has developed in or around a deliberately constructed water body.

We understand that the National Environmental Standards for Freshwater 2020 ('NES-F') and NPS-FM require councils to ensure that the loss of values and extent of 'natural inland wetlands' is avoided in most instances (excluding urban development). The NPS-FM and NES-F also restrict activities within a 10 m buffer around 'natural inland wetlands',[8] and place controls on the level of potential adverse effects (from, for example, discharge of water or diversion of water) that can occur within 100 m from a 'natural inland wetland'.[9]

The methodology applied for the identification of wetlands for the Surveyed Area was as follows:

- Visual assessment of areas where the vegetation composition includes species that are scored as wetland obligate, facultative wetland, or facultative (e.g., rushes, wet pasture or 'wetland-type' vegetation) as assessed by Clarkson *et al.*[10];
- Where these compositions exist, an assessment of vegetation, soils, and hydrology is required according to the wetland delineation protocols[11]:
    - Vegetation is assessed through plant identification and percentage cover estimates (as per the method described by Clarkson[12]) of 2 m x 2 m plot areas within each potential wetland area;
    - Soils are assessed by applying the criteria outlined in Fraser (2018)[13] for identifying hydric (wetland) soils – which involves excavation and examination for gleyed, mottled, peaty, or wet soils; and
    - Hydrology is assessed by applying the criteria outlined in the Ministry for the Environment tool[14].

The above methodology is used to determine whether an area is a wetland as defined in the RMA as "*permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions.*"

An area can be classified as a wetland based on the definition within the ODP and the RMA, but not be classified as a 'natural inland wetland' under the NPS-FM because the definition of the latter includes some exclusions:

"*Natural inland wetland means a wetland (as defined in the [Resource Management] Act) that is not:*

[7] *Wetland Delineation Protocols: Delineating Wetlands under the Resource Management Act* (RMA) 1991 and the National Policy Statement for Freshwater Management 2020 (NPS-FM) (Ministry for the Environment, ME 1713, December 2022).

[8] NES-F, regs 38–47.

[9] For instance, see NES-F, reg 46(3).

[10] Clarkson B. R., Fitzgerald N. B., Champion P. D., Forester L., Rance B. D. (2021). New Zealand wetland plant indicator status ratings 2021: Data associated with Manaaki Whenua - Landcare Research contract report LC3975 for Hawke's Bay Regional Council.

[11] Ministry for the Environment. (2022). Wetland delineation protocols. Wellington: Ministry for the Environment

[12] Clarkson, B. (2013). A vegetation tool for wetland delineation in New Zealand. Report prepared for Meridian Energy Limited by Landcare Research.

[13] Fraser S., Singleton P., Clarkson B. (2018). Hydric soils – field identification guide. Envirolink Tools Contract C09X1702. Manaaki Whenua – Landcare Research Contract Report LC3233 for Tasman District Council.

[14] Ministry for the Environment. (2021). Wetland delineation hydrology tool for Aotearoa New Zealand. Wellington: Ministry for the Environment.

(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 this National Policy Statement, in which case the exclusion in (e) does not apply"

The boundaries of potential wetland areas are delineated by carrying out assessments of the various vegetation communities and through professional judgement.

In assessing potential wetlands within the Surveyed Area, we were also mindful that:

- Artificially created waterbodies (for examples stock or irrigation ponds) with wet-adapted vegetation cannot be considered natural inland wetlands.

- The wetland guidance documents provided by the Ministry for the Environment that accompany the NPS-FM are guidance only, and recent Environment Court decisions have emphasised that this guidance is 1) non-statutory and 2) should be considered alongside expert judgment.

- A recent Court of Appeal decision(2024-NZCA-51) reinforced that the definition of natural inland wetlands requires consideration of both vegetation and animal communities that live within an area, rather than only vegetation.

2.2.2 Watercourses

Watercourses were mapped and classified for the Plan Change Area informed by desktop analysis and, field assessments of the Surveyed Area, in accordance with the following definitions within the WRP:

> "River: A continually or intermittently flowing body of fresh water, and includes a stream and modified watercourse; but does not include any artificial watercourse (including an irrigation canal, water supply race, canal for the supply of water for electricity power generation, and farm drainage canal).
>
> Perennial stream: A stream that flows all year round assuming average annual rainfall.
>
> 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.

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.

Farm drainage canal: An artificial watercourse on a farm that contains no natural portions from its confluence with a river or stream to its headwaters, and includes a farm drain or a farm canal."

2.2.3 Native vegetation

Vegetation was mapped and described in terms of its composition and values using desktop methods with the quality of vegetation within the Surveyed Area assessed during field visits. Areas listed as SNAs under Schedule 9C and Proposed Plan Change 9 of the ODP were identified using Hamilton City Council ('HCC') GIS. Areas with ecological values that were not listed as ecologically significant were assessed against the WRPS criteria for determining significance of indigenous biodiversity.

The NPS-IB became active on 4 August 2023. It seeks to achieve an objective of maintaining indigenous biodiversity so that there is, at the least, no overall reduction nationally. Seventeen policies are required to be implemented to achieve this objective. The identification of SNAs is central to the technical implementation of the NPS-IB. Appendix 1 of the NPS-IB lays out criteria for the identification of SNAs, including representativeness, rarity, diversity and pattern, rarity and distinctiveness, and ecological context. These are the same core criteria used by the WRC to identify SNA.

2.2.4 Wildlife

At each survey general observations were made of potential habitat and wildlife.

For lizards, debris (e.g., logs, corrugated iron) was inspected; however, this did not constitute a comprehensive survey using a range of methods (e.g., the use of artificial cover objects, pitfall traps).

For fish, survey methods included the use of fyke nets and Gee's minnow traps set over multiple nights at a range of locations that sampled the diversity of habitats (e.g., wetlands, pools, runs, drains) within the Surveyed Area (Figure 3). The full diversity of habitats within the visited area were sampled (wetlands, pools, runs, drains), but with a focus on potential black mudfish (*Neochanna diversus*) habitat.

Black mudfish have a threat status of At Risk–Declining and are known to inhabit farm drains and wetlands in parts of the Waikato. Fine mesh (3 mm) Gee's minnow traps were used at prime mudfish habitat, such as areas of shallow water likely to dry out in summer, within close proximity of tree roots.

Figure 3. Locations of gees minnows (blue dots) and fyke nets (red dots) for the survey of native fish.

All birds seen or heard during the field visits were recorded. Locations with potential habitat (shallow water with dense cover) were surveyed at dusk over several days for the more elusive wetland birds, including marsh crake, spotless crake, fernbird, and bittern.

Blue Wattle Ecology Ltd conducted a bat survey at the Fonterra-owned land within the Plan Change Area between 17 October and 2 November 2023, and an additional survey was conducted between

10 – 29 November 2023. A visual inspection was undertaken to analyse potential habitat features of trees, other vegetation, and waterbodies for long-tailed bats.

Four Automated Bat Monitors (ABMs) of the DOC model 'AR4' were strategically deployed for a duration of 16 nights from 17 October – November 2023. Failure of some of the ABMs meant that an additional survey using four different monitors at the same locations was conducted later in 2023, from 10 – 29 November 2023. All of these ABMs remained operational for a minimum of 12 valid survey nights, aligning with best practice (Figure 4). No bats were detected, indicating that there is no evidence to suggest that long-tailed bats are using the Plan Change Area as foraging or commuting habitat at this point in time.

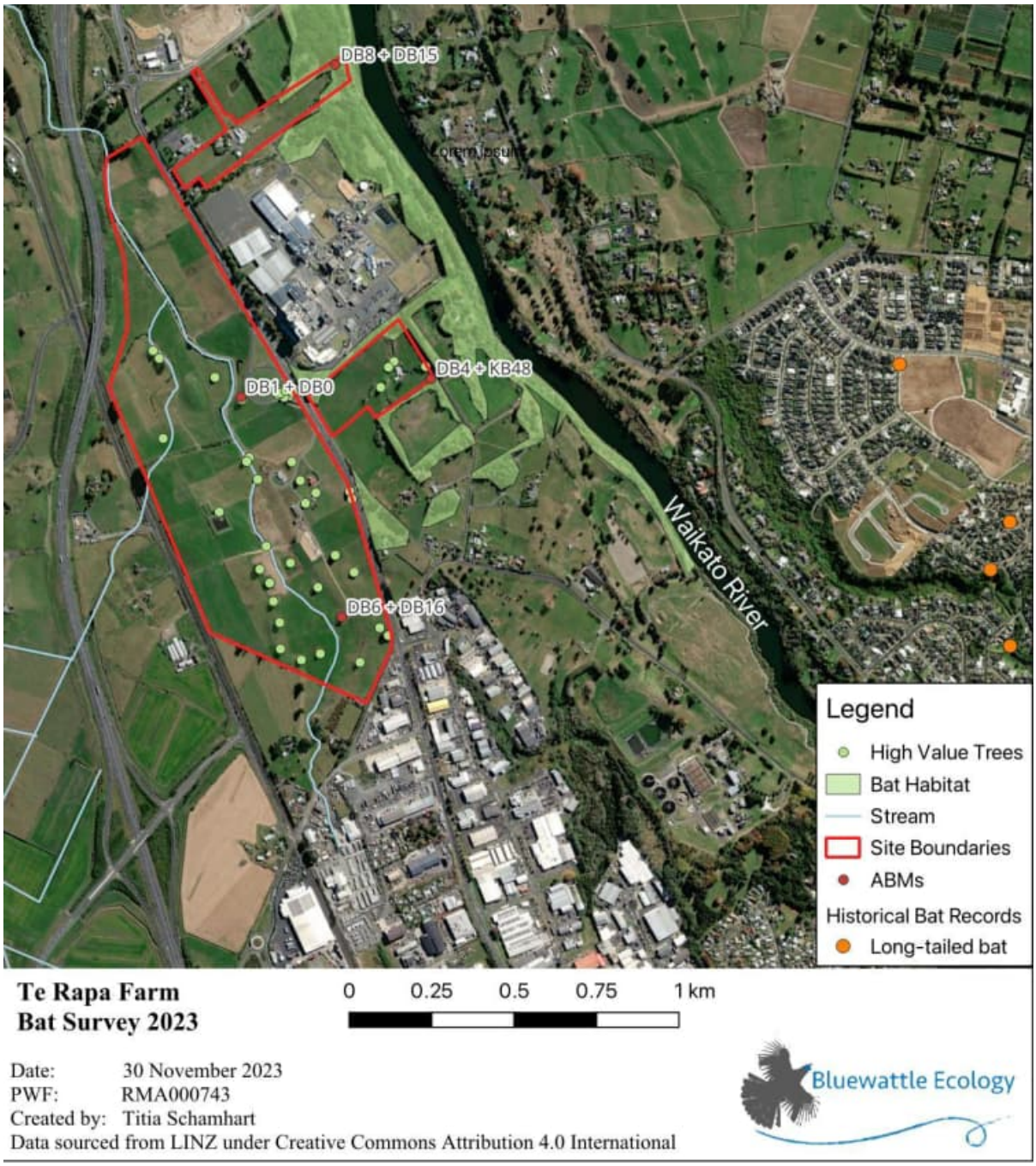

Figure 4. Locations of bat detectors (numbered locations on the map) during the 17 October – 2 November and 10 – 29 November 2023 deployment at the Fonterra-owned land within the Plan Change Area (red outlines).

3.0 Results

3.1 Ecological context

The approximately 91-hectare Plan Change Area is within the Hamilton Ecological District which would have originally been almost completely forested. Most of the forest within the Plan Change Area was likely cleared in the 1800s for timber and to transition the land use to pastoral agriculture which predominates to this day.

The Plan Change Area is typical of the Hamilton rural environment in that original vegetation has been cleared, watercourses have been modified to various degrees, most wetlands have been drained or modified, and pasture is the dominant vegetation cover with occasional riparian plantings and scattered individual exotic and native trees. The Plan Change Area is mostly surrounded by rural and semi-rural land except to the south where the Plan Change Area adjoins Te Rapa Park – a developed industrial zone.

The Waikato River runs along the eastern boundary of the Plan Change Area and a tributary (known informally as Te Rapa Stream) runs through the Plan Change Area parallel to the Waikato River. The flood plain of Te Rapa Stream is the dominant topographical feature of the Plan Change Area along with a higher terrace between Te Rapa Stream and the Waikato River. Several additional tributaries flow through the Plan Change Area into Te Rapa Stream or directly into the Waikato River. The altitudinal range of the Plan Change Area is 20-40 m above sea level.

3.2 Terrestrial ecology

3.2.1 Vegetation

The original vegetation extent is modelled as:

- Tōtara, matai, ribbonwood forest (WF2) along the riparian edge of the Waikato River;
- Kāhikatea, pukatea forest (WF8) further back from the river on the upper terrace; and
- Tawa, mangeao forest (MF7-1) along Te Rapa Stream[15].

However, boundaries between ecosystem types are typically on a gradient and the modelled extents are estimated at a coarse scale. Therefore, the exact extent of the different vegetation communities is not precise. Nevertheless, the species that comprise the aforementioned vegetation types are likely to have been present within the Plan Change Area and in the surrounding area. None of this original vegetation remains at the Plan Change Area.

The existing vegetation can be categorised into three communities which are depicted in Figure 5 and further described below.

[15] Singers, N. J. D. unpublished. Potential Vegetation of the Waikato Region (2014). Updated in 2015 and based upon N J D Singers & G M Rogers (2014). A classification of New Zealand's terrestrial ecosystems. Science for Conservation 325. Department of Conservation, Wellington. Cited in: Vare, M & Rolfe, P. (2018). Local Indigenous Biodiversity Strategy: Hamilton City Pilot Project. Waikato Regional Council Policy Series 2019/05.

Figure 5. Vegetation cover within the Plan Change Area (turquoise outlines). Any areas not classified as one of the three vegetation types, is managed pasture or pasture-related/dairy-production related land use.

1. Exotic pasture: Exotic grassland, as managed for pastoral agriculture, is the most common vegetation community within the Plan Change Area and is often dominated by perennial ryegrass (*Lolium perenne*), paspalum (*Paspalum dilatatum*), cocksfoot (*Dactylis glomerata*), narrow-leaved plantain (*Plantago lanceolata*), and white clover (*Trifolium repens*). In wetter areas, creeping bent (*Agrostis stolonifera*), Mercer grass (*Paspalum distichum*), waterpepper (*Persicaria hydropiper*), and sweet reed grass (*Glyceria maxima*) become prevalent – although these are actively managed to maintain a productive pasture grass sward for dairy stock. Mature trees are scattered throughout the Plan Change Area and include oak (*Quercus* sp.), she-oak (*Casuarina* sp.) and tōtara (*Podocarpus totara*) (Plate 1).
2. Planted native: Planting has been undertaken in a patchy manner along Te Rapa Stream and in other discrete locations. The plantings are comprised of common restoration species including kānuka (*Kunzea robusta*), kōhuhu (*Pittosporum tenuifolium*), tarata (*Pittosporum eugenioides*), mānuka (*Leptospermum scoparium*), harakeke / flax (*Phormium tenax*), tī kōuka / cabbage tree (*Cordyline australis*), akeake (*Dodonaea viscosa*), and mānatu (*Plagianthus regius* subsp. *regius*). The riparian plantings are usually less than 10 m wide and less than 5 m tall, but provide important shading and bank stability services (Plates 2 & 3).
3. Exotic scrub: Neglected areas have developed into exotic scrub dominated by exotic gorse (*Ulex europaeus*), woolly nightshade (*Solanum mauritianum*), tree privet (*Ligustrum lucidum*), Japanese honeysuckle (*Lonicera japonica*), Chinese privet and hawthorn. There are occasional native kānuka and tarata.

There are no SNAs listed within the Plan Change Area under Schedule 9C of the ODP. There are, however, two SNAs (C59 & C76) listed within the Plan Change Area under the Proposed Plan Change 9 of the ODP. These SNAs are located alongside the Waikato River and although they are dominated by exotic vegetation, they have been deemed significant due to their buffering of the river, connectivity to other SNAs, and the presence of the At Risk little black shag (*Phalacrocorax sulcirostris*) and the At Risk black mudfish (*Neochanna diversus*). These two SNAs extend outside the Plan Change Area extent and together they comprise 19.52 ha (Figure 6).

Figure 6. SNAs (light green polygons) listed at and near the Plan Change Area (turquoise outlines) under Proposed Plan Change 9 of the ODP. Two proposed SNAs intersect the Plan Change Area along the Waikato River.

All other vegetation within the Surveyed Area was assessed for significance based on the WRPS criteria for determining significance of indigenous biodiversity. No other vegetation was deemed to be significant.

There are two additional SNAs within 100 m of the Plan Change Area (F66 & F67) listed under Schedule 9C of the ODP which contain stands of mature kahikatea and which together comprise 0.82 ha.

There are ample opportunities to improve the terrestrial biodiversity within the Plan Change Area especially along watercourses where enhanced native plantings would provide multiple environmental benefits that would result in improved water quality.

3.2.1.1 Threatened plants

Two species which have a threat status: mānuka (At Risk – Declining) and kānuka (Threatened – Nationally Vulnerable) were identified within the Surveyed Area. Both of these species are members of the Myrtaceae family which (along with all native species in the Myrtaceae family) were only recently afforded a higher threat status due to the emerging threat of myrtle rust (*Austropuccinia psidii*). It is well recognised by ecologists and councils that mānuka, kānuka and other common native species in the Myrtaceae family should not receive a higher level of protection for individuals (or vegetation communities that they are a part of) compared to 'Not Threatened' species.

Plate 1. Typical vegetation cover within the Plan Change Area: grazed exotic pasture, scattered exotic trees, and patchy planted native riparian vegetation (e.g., tī kōuka / cabbage tree – centre).

Plate 2. Fenced riparian area with planted native vegetation on left, and grazed pasture on right.

Plate 3. Fenced riparian area with planted native vegetation on left, and grazed pasture on right.

3.2.2 Birds

Seven native bird species and eight exotic bird species typical of rural or peri-urban Hamilton were recorded within the Surveyed Area (Table 1). The loss of original vegetation at and surrounding the Plan Change Area and the lack of comprehensive pest animal control across the Surveyed Area suggests that rare or threatened species are either at very low density or are absent.

There are records of various species of shags in Hamilton and it is likely that they transit along the Waikato River and may use riparian vegetation within the Plan Change Area for roosting and /or breeding although no evidence was observed of this during the field assessments. The riparian areas along the Waikato River where they would most likely be present are protected as SNAs. The possible shag species are little shag (*Microcarbo melanoleucos*; At Risk – Relict), black shag

(*Phalacrocorax carbo*; At Risk – Relict), pied shag (*Phalacrocorax varius*; At Risk – Recovering), and little black shag (*Phalacrocorax sulcirostris*; At Risk – Naturally Uncommon).

Table 1. List of bird species detected within the Surveyed Area.

Species	Common name	Conservation status
Acridotheres tristis	Common myna	Introduced and naturalised
Anas platyrhynchos	Mallard	Introduced and naturalised
Carduelis carduelis	European goldfinch	Introduced and naturalised
Circus approximans	Kahu / harrier hawk	Not Threatened
Columba livia	Rock pigeon	Introduced and naturalised
Egretta novaehollandiae	White faced heron	Not Threatened
Gymnorhina tibicen	Australian magpie	Introduced and naturalised
Hirundo neoxena	Welcome swallow	Not Threatened
Passer domesticus	House sparrow	Introduced and naturalised
Phasianus colchicus	Common pheasant	Introduced and naturalised
Porphyrio melanotus	Pūkeko	Not Threatened
Rhipidura fuliginosa	Pīwakawaka	Not Threatened
Turdus merula	Blackbird	Introduced and naturalised
Vanellus miles	Spur-winged plover	Not Threatened
Zosterops lateralis	Silvereye	Not Threatened

3.2.3 Bats

Long-tailed bats/pekapeka (*Chalinolobus tuberculatus*; Threatened – Nationally Critical) are common in and around Hamilton. A bat survey for the Plan Change Area in 2018 by Tonkin & Taylor using Automatic Bat Detectors (ABMs) found no bats. There are, however, four records of individual bats between 1.3–1.8 km south-east of the Plan Change Area between 2018 and 2020.

A further two surveys by BlueWattle Ecology Ltd in 2023 did not detect bats at the Fonterra-owned land within the Plan Change Area.

3.2.4 Lizards

Seven native lizard species and one exotic lizard species are known to be present in the Hamilton area (Table 2). Most are unlikely to be present within the Plan Change Area due to the lack of suitable habitat. However, the native copper skink (*Oligosoma aeneum*) and the exotic plague skink (*Lampropholis delicata*) are the most likely to be present.

A cursory lizard survey was undertaken during the initial field visit. No lizards were detected. Habitat was recorded in the form of piles of branches and logs, rank grass, hedges, and wood stacks but generally the Plan Change Area is inhospitable for native lizards as it supports closely grazed pasture.

Table 2. Lizard species which are known in the area surrounding the Plan Change Area, conservation status, preferred habitat, and likelihood of presence.

Species	Common name	Conservation status	Preferred habitat	Presence likelihood
Dactylocnemis pacificus	Pacific gecko	Not Threatened	Arboreal/ terrestrial including forest, scrub, clay banks, rock, dense ground cover.	nil
Lampropholis delicata	Plague skink	Introduced	Wide range of habitats including gardens and rough pasture. Typically found in low dense vegetation and leaf litter.	High
Mokopirirakau granulatus	Forest gecko	At Risk - Declining	Arboreal species which live in forest and scrub.	nil
Naultinus elegans	Elegant gecko	At Risk - Declining	Strongly arboreal often inhabiting pioneer scrubland and regenerating forest.	nil
Oligosoma aeneum	Copper skink	At Risk - Declining	Grasslands, shrubland and forest. Also found in urban areas, most commonly in thick rank grass, compost heaps, or under rocks, logs and other debris.	Moderate
Oligosoma ornatum	Ornate skink	At Risk - Declining	Forested areas and shrubland; found amongst leaf litter, in dense low foliage, thick rank grass and under rocks or logs.	nil
Oligosoma robinsoni	Crenulate skink	At Risk - Declining	Range of habitats from dune systems and boulder beaches on the coast, to open forest, scrub or pasture at inland plan change areas.	nil
Oligosoma striatum	Striped skink	At Risk - Declining	Range of habitat types, but primarily arboreal in habit, occupying mature forest canopies. Strong preference for damp habitats. May persist in or under rotting logs and dense vegetation (such as pampas shelter belts) in pasture where mature forest has been cleared.	nil

3.3 Aquatic ecology

3.3.1 Wetlands

Ten (10) NPS-FM qualifying 'natural inland wetlands' are present within Surveyed Area, all of which are located within the riparian margins of Te Rapa Stream or its tributaries (Figure 7). Most are within a stream channel, and could be considered stream channel macrophytes, rather than wetlands; however, we have applied a precautionary approach to our classifications.

Figure 7. Location of wetlands within the Surveyed Area (labelled orange shaded areas). See Figures 7a – 7c for closer views.

Several of the wetlands mapped within the Surveyed Area are located on bankside margins of established streams, and may have formed on sediments historically excavated from stream channels as part of farm maintenance works to keep channels clear for water conveyance.

Most wetlands within the Surveyed Area are dominated by exotic herbs and grasses, primarily water pepper (*Persicaria hydropiper*) and creeping buttercup (*Ranunculus repens*); several are dominated by the native wetland plant rautahi (*Carex geminata*).

All wetlands are fenced from stock access, and although they lack plant diversity, they generally provide a well-developed vegetation cover that has value as habitat for spawning fish, habitat for eels, or (for bankside wetlands) habitat for pūkeko.

Other parts of the Surveyed Area include low-lying paddocks that retain water after heavy rain, which have been subject to dairy cattle grazing for many decades and are regularly subjected to pasture maintenance, including weed spraying and re-sowing with pasture grasses.

The NPS-IB wetland classification guidance documents rely upon expert judgement as well as on-site measurement. We have not mapped areas of pasture weeds – including Mercer grass (*Paspalum distichum*) and creeping bent (*Agrostis stolonifera*)– as natural wetlands in grazed pasture paddocks which are subject to ongoing management for farm grazing and pasture sward management, as those areas do not support a natural community of wet-adapted plants and animals, and they are under continual pasture improvement practices.

There are ample opportunities to restore these wetlands, particularly through the provision of setbacks and planting of indigenous vegetation, and managed to control pest weeds and animals.

Plates 4 – 16 provide photos of each of the wetlands.

Figure 7a. Location of Wetlands 3 -7.

Figure 7b. Location of Wetland 1 (left) and Figure 7c (right) Wetlands 9 and 10.

Plate 16. Wetland 10 within an excavated stream channel filled with reed sweet grass.

Plates 4 – 7. Wetland 1 along the mainstem stream taken at points along Stream 1 (Te Rapa Stream) from the south (top left) to central (top right and bottom left) and northern part of Wetland 1 (bottom right). All of the areas mapped as wetland are either within the stream channel (and are macrophytes) or are established on the excavated stream banks. Wetland vegetation comprises exotic weedy growths of sweet reed grass, Mercer grass, water pepper, creeping bent and creeping buttercup.

Plates 8 - 11. Wetland 2 (top left) along the channel margin of Stream 1 (Te Rapa Stream) which supports Mercer grass and sweet reed grass; Wetland 3 is a rautahi lined excavated side tributary stream (top right); Wetland 4 is another channel margin of Stream 1 (Te Rapa Stream) which support Mercer grass (bottom left); Wetland 5 lines the channel and banks of the lower part of Stream 1 (Te Rapa Stream) and supports mostly sweet reed grass (bottom right).




Plates 12 - 15. Wetlands 6 and 7 are a continuation of Wetland 5 along the channel and margins of Stream 1 (top left and top right); Wetland 8 is a patch of dense sweet reed grass along the margins of Stream 1 (Te Rapa Stream) (bottom left); Wetland 9 is a shallow depression in an otherwise flat paddock that is fenced and supports water pepper and Mercer grass (bottom right).

3.3.2 Watercourses

The Surveyed Area contains watercourses that are predominantly soft-bottomed owing to the low-gradient and high amount of sedimentation that is typical of a deforested rural lowland catchment (Figure 8). The watercourses would have originally been meandering but have been subject to some straightening and deepening, including extensive earthworks in the 1970s-1980s (Figure 9). A network of artificial farm drainage canals has been created which has further modified the hydrological regime. Despite these modifications, the Plan Change Area retains a fairly natural flow regime with minimal piped inflows and a natural substrate.

Figure 8. Watercourses at the Surveyed Area.

Figure 9. Aerial image from 1971 showing the perennial Te Rapa Stream (1), ephemeral streams 1.04 and 1.04.01, and the location of the modified watercourse 1.05 (purple line). The latter is classified as a modified watercourse as opposed to an artificial watercourse because it is connected to a natural channel in its headwaters. Also note the extensive earthworks being undertaken. Source: Retrolens.

Currently, there are six watercourses that can be defined as *rivers*, two of which are *perennial streams* that amount to 2,235 m, and four of which are *ephemeral streams* that amount to 1,159 m, for a total length of *rivers* of 3,394 m. There are a further 17 *farm drainage canals* that amount to 1,858 m (Plate 17). The total length of watercourses in the Surveyed Area is 5,252 m (Table 3; Figure 8). The Waikato River flows from south to north close to the eastern boundary of the Plan Change Area.

One of the perennial streams (1.05) is also classified as a modified watercourse because the channel has been created, but the channel connects to an upstream natural channel. All of the other perennial and ephemeral watercourses within the Plan Change Area have been subject to some level

of modification but still follow their approximate historic alignment and therefore have not been classified as a modified watercourse.

All *rivers* and some *farm drainage canals* have narrow native plantings along some of their length and are fenced from stock. The plantings provide some shading, bank stability and organic matter inputs, while the fencing prevents sedimentation and bank collapse from stock access, as well as direct effluent discharge. The streams have a high level of suspended sediment and the habitat is typically poor, although there is some habitat heterogeneity in the form of occasional pools, runs, and undercut banks.

Most of the watercourses have been artificially deepened or are incised and therefore have limited connectivity to the floodplain. A likely raised level of nutrients (from fertiliser application within the catchment, diffuse effluent discharge, and possible additional discharges from the industrial estate upstream) and a lack of good shading means that macrophytes smother the entire channel in some places.

Te Rapa Stream is the dominant hydrological feature at the Plan Change Area (Plate 18). Its upstream catchment is industrial estate and downstream there are multiple culverts that may be barriers to fish passage. Te Rapa Stream is on average 1.6 m wide and has been straightened in places but mostly follows its historic alignment. A Stream Ecological Valuation was undertaken along Te Rapa Stream and was calculated to be 0.393, which indicates a poor-quality stream environment.

There are ample opportunities for restoring these watercourses including the planting of a 10 m wide planted riparian margin on each side (total 20 m wide corridor) so as to provide a wide enough corridor to be resilient to ecological weeds, to buffer environmental effects (light and wind in particular), and to support tall-growing trees and shrubs that will shade the stream and provide adequate organic inputs by way of detritus, woody debris, and food for aquatic fish and invertebrates.

Plate 17. A farm drainage canal fenced from stock.

Plate 18. A portion of the straightened Te Rapa Stream fenced from stock, with some shading from sparse planted native vegetation and macrophyte growth.

Table 3. List of watercourses at the Plan Change Area and their classification and length.

Label	River			Artificial watercourse	Length (m)
	Perennial stream	Ephemeral stream	Modified watercourse	Farm drainage canal	
1	✓				1,917
1.01				✓	102
1.02				✓	29
1.02.01				✓	11
1.03				✓	43
1.04		✓			325
1.04.01		✓			311
1.05	✓		✓		318
1.05.01				✓	134
1.05.02				✓	356
1.06				✓	38
1.07				✓	110
1.07.01				✓	72
1.08				✓	117
1.09				✓	143

1.10			✓	95
1.10.01			✓	29
1.11			✓	62
2	✓			89
2.01			✓	262
2.02			✓	165
3	✓			434
3.01			✓	90

3.3.3 Fish

We undertook two fish surveys within the Surveyed Area using fyke nets and Gee's minnow traps that sampled the diversity of habitats (e.g., wetlands, pools, runs, drains). For the initial survey on 20-23 March 2023, eleven devices were set overnight. For the second more thorough survey (June 2023), 38 devices were set over four nights and checked daily.

We recorded five native and two exotic fish species (Table 4). The native species were banded kokopu (*Galaxias fasciatus*; Not Threatened), common bully (*Gobiomorphus cotidianus*; Not Threatened), shortfin eel (*Anguilla australis*; Not Threatened), longfin eel (*Anguilla dieffenbachia*; At Risk – declining), and giant kokopu (*Galaxias argenteus*; At Risk – declining). The exotic species were gambusia (G*ambusia affinis*) and goldfish (*Carassius auratus*).

The New Zealand Freshwater Fish Database was reviewed. An additional six species have been recorded in the Te Rapa Stream catchment within the last 17 years (Table 4) including At Risk īnanga (*Galaxias maculatus*) and At Risk black mudfish (*Neochanna diversus*). There is suitable habitat at the Plan Change Area for both īnanga and black mudfish – the absence of evidence of these species at the Surveyed Area from our surveys does not confirm their absence overall, but does indicate that if they are present, they are in low numbers. Mudfish especially can be difficult to survey for, and often require multiple surveys over time to confirm absence.

If watercourses are proposed to be infilled or realigned at the resource consent stage, further surveys for mudfish may be required to confirm the tentative conclusions reached in this report about mudfish absence from the Plan Change Area.

Table 4. List of fish species that have been recorded from the wider catchment (summarised from national database records of surveys at sites outside of the Plan Change Area).

Scientific name	Common name	Conservation status	Nearest recorded location	Presence likelihood on this plan change area
Ameiurus nebulosus	Catfish	Introduced	1,700 m downstream	Moderate
Anguilla australis	Shortfin eel	Not Threatened	At Plan Change Area	Confirmed
Anguilla dieffenbachii	Longfin eel	At Risk – Declining	At Plan Change Area	Confirmed
Carassius auratus	Goldfish	Introduced	At Plan Change Area	Confirmed

Cyprinus carpio	Koi carp	Introduced	700 m downstream	Moderate
Galaxias argenteus	Giant kokopu	At Risk – Declining	At Plan Change Area	Confirmed
Galaxias fasciatus	Banded kokopu	Not Threatened	At Plan Change Area	Confirmed
Galaxias maculatus	Inanga	At Risk – Declining	700 m downstream	Moderate
Gambusia affinis	Gambusia	Introduced	At Plan Change Area	Confirmed
Gobiomorphus cotidianus	Common bully	Not Threatened	At Plan Change Area	Confirmed
Neochanna diversus	Black mudfish	At Risk – Declining	200 m SW of Plan Change Area	Low
Retropinna retropinna	Common smelt	Not Threatened	1,700 m downstream	Low
Scardinius erythrophthalmus	Rudd	Introduced	700 m downstream	Moderate

3.4 Summary of ecological values

Overall, the ecology values reflect a highly modified landscape. Although most ecological features have been lost or are degraded, there are pockets of ecological value. There is substantial opportunity to enhance the remaining features and return biodiversity and ecological function to the plan change area.

This assessment identified the following features:

- Context: The predominant existing land use of the Plan Change Area is pastoral agriculture.
- Vegetation: All original vegetation within the Plan Change Area has been removed. There are two SNAs listed within the Plan Change Area under the Proposed Plan Change 9 to the ODP located alongside the Waikato River. No other vegetation constitutes significant indigenous vegetation under any plan or statute.
- Birds: Seven native and eight exotic bird species typical of rural or peri-urban Hamilton were detected within the Surveyed Area – none of which are At Risk, Threatened, or rare at a national, regional, or local scale. Four At Risk shag species may utilise the Waikato River and riparian vegetation alongside the Plan Change Area.
- Bats: Bat surveys over 2023 found no bats at the Fonterra-owned land within the Plan Change Area. See the bat survey report by BlueWattle ecology Ltd (2024) for further details.
- Lizards: One native lizard – copper skink – is likely to be present within the Plan Change Area, although not within areas of grazed and managed pasture.
- Wetlands: There are 10 NPS-FM qualifying wetlands within the Surveyed Area. They are all located within the channel or along the margins of existing watercourses, all comprise weedy exotic plant species and all are of low ecological value.
- Streams: There are 3,083 m of streams and rivers within the Surveyed Area and 5,252 m of farm drainage canals. The streams are typically degraded from deforestation and sedimentation.

- Fish: Native banded kokopu, common bully, giant kokopu, shortfin eel and longfin eel were recorded within the Surveyed Area. An additional three native fish have been recorded in the catchment and may be present within the Plan Change Area, including īnanga and black mudfish, although our surveys did not detect these species.

4.0 Assessment of Structure Plan and Provisions

A Structure Plan has been developed for PC17 to guide the development of the future industrial area enabled under PC17. Objectives, policies, and provisions are proposed to support the Structure Plan and achieve the objectives of PC17 and the RMA, including in relation to ecological outcomes.

The Structure Plan and proposed provisions incorporate the results of our ecological surveys and workshop design sessions that were held as part of this design process. The proposed provisions (guided by the proposed objectives and policies) along with the existing provisions within the ODP and other statutory documents, would enable future development that aligns with good practice regarding ecological management. PC17 incorporates ecological considerations through several key design drivers, including:

- Enhancing connectivity between features within the Plan Change Area and to neighbouring sites;
- Restoring and improving ecological functions, energy flows and habitats;
- Preserving the existing hydrology and strengthening water management systems;
- Creating buffers around ecological features.

The Structure Plan layout aligns roads parallel to the Te Rapa Stream and limits crossings to two, while holding land on either side of the stream, its tributaries, and associated wetlands for ecological and stormwater purposes. It demonstrates a viable lot arrangement and transport network can be achieved that generally maintains the current alignment of and minimises disturbance to the Te Rapa Stream and the minor streams arising from Te Rapa Stream or flowing to the Waikato River.

As such, the Structure Plan provides guidance at a high-level that is sympathetic to the existing alignment of the watercourses within the Plan Change Area.

Wetlands located along streams (especially Te Rapa Stream) will be conserved and restored, and in some cases expanded upon or incorporated into re-created wetlands that have an additional function as stormwater detention / buffering devices.

The details of how Te Rapa Stream, any of its or the Waikato River's tributaries and their related wetlands may be impacted by future development will be determined at the resource consent stage and subject to design specific ecological assessments. The proposed provisions along with those existing in the ODP and other statutory documents are considered in the following paragraphs. The proposed plan provisions provide the greatest indication of how future development may impact the ecological values of the Plan Change Area. This assessment considers the proposed building setbacks, landscaping/buffer planting provisions and ecological compensation provisions for their effectiveness and provides recommendations for how potential effects arising from future development could be managed.

The proposed provisions for the Te Rapa North Industrial Zone include a minimum 10 m average setback from the banks of the Te Rapa Stream. This is consistent with setbacks recommended in national literature for streams of this size[16]. The proposed provisions also specify that required riparian yard setbacks are to be planted in native vegetation for the purpose of providing shade,

[16] Parkyn, S. 2004. Review of riparian buffer zone effectiveness. Research paper prepared by MAF; MAF Technical paper No. 2004/05.

shelter, and improved ecological functions of the stream. A 10 m setback will provide substantial ecological benefits, if planted in multi-tiered native vegetation.

The proposed setbacks of 5 m for any other streams within the Plan Change Area, such as the headwater streams arising from Te Rapa Stream on the Plan Change Area (Streams 1.04, 1.04.01, and 1.05), are considered appropriate. Again, this depth along with the requirement for planting of the riparian yards with native vegetation is considered sufficient to provide for essential aquatic functions, and to ensure that these watercourses would be appropriately restored and their ecological values protected or enhanced.

Proposed Chapter 3.9, which guides the implementation of the Structure Plan, includes a clause preferencing arch culverts or bridge designs to cross Te Rapa Stream. These design types would reduce potential impacts on the stream bed and or margin comparative to standard culverts. However, actual potential impacts of the Te Rapa Stream crossings would be assessed at the resource consent stage, including the need for any offset enhancement works elsewhere to address loss of stream values. Any proposal to modify the bed of any stream within the Plan Change Area will be accompanied by an effects assessment, a fish management plan (for the salvage and relocation of native freshwater fish), and an assessment against the culvert design standards laid out in NES-F Clause 70 which ensure that structures do not create barriers to the passage of native fish.

Based on the proposed provisions, future development resulting from PC17 will achieve overall ecological gains for waterways and aquatic biodiversity compared to the current state, even if the above ecological ideals are not included as minimum standards in the provisions.

Ecological design at the resource consent stage should consider the following.

1. For Te Rapa Stream, large sections of the margins are proposed to be reserved as Open Space and as stormwater management devices. Ensuring that as much land area on the margins of Te Rapa Stream are planted in tall-growing native forest and shrub species will provide adequate protection to Te Rapa Stream, in addition to the proposed 10 m setback on either side. Landscape planting plans designed at the resource consent stage should emphasise the need to achieve a minimum overall average of 10 m wide native shrubland/forest planting either side of Te Rapa Stream; this level of riparian protection should be prioritised ahead of providing infrastructure for public access and recreation.
2. The 5 m protected riparian margin on either side of the channel edge for side tributaries to Te Rapa Stream, and for streams within the Plan Change Area that discharge to the Waikato River, should be included in landscape designs at resource consent stage.
3. Stormwater devices that incorporate or adjoin natural wetlands should be created and planted to support native wetland plant communities that are self-supporting and which prioritise biodiversity restoration and protection; that is, they should not be subject to ongoing engineering controls such as sediment and vegetation management.
4. Natural wetlands should be restored to enhance ecological function and values.
5. Where adverse effects on stream or natural wetland extents and/or values are unavoidable, the residual adverse effect on ecological values will be assessed and the effects management hierarchy followed to provide equivalent and adequate ecological redress, where that consenting pathway is appropriate.

PC17 supports the protection of all natural wetlands and the enhancement of existing streams on the Plan Change Area, and their connectivity throughout the south-north axis of the Plan Change

Area. This preserves opportunities to provide for greater restoration and connectivity at adjoining properties in the future.

Although the entire Plan Change Area was not visited during the field assessment, there is a requirement for site-specific ecological assessments prior to development when resource consent stage is reached. As such, these parcels would be subject to site specific assessments and the existing and proposed provisions as discussed above.

The proposed provisions will contribute to substantial ecological benefits compared to the existing degraded values of the Plan Change Area. With an ecologically-focussed set of design guidelines at the resource consent stage, there is the potential to provide resilient ecological buffer planting to all streams, and to restore and integrate existing natural wetlands to provide for cohesive ecological restoration of aquatic and terrestrial biodiversity, and greatly improved ecological functions, processes, and values.

5.0 Conclusion

The identification of the ecological values documented in this report will assist in their recognition once the resource consent stage is reached for PC17.

Overall, PC17 provides for significant enhancements to the condition and connectivity of waterways, riparian margins, wetlands, and habitats for wildlife. The overall outcome from PC17 will be a clear, positive, net-benefit for indigenous biodiversity values and ecological services. This net-gain will be most evident through the wide setbacks required along the riparian margins Te Rapa Stream and its tributaries, which will incorporate extensive native revegetation, together with the restoration and integration of natural wetlands.

The NPS-FM / NES-F, NPS-IB, Wildlife Act 1953, WRPS, the ODP and the provisions proposed for the ODP provide a comprehensive set of objectives and policies that would support the protection and enhancement of the identified ecological features within the Plan Change Area. From an ecological perspective, these rules are appropriate to address relevant effects that may be generated at the time of resource consent.