report

July 2021

30 Mathers Preliminary Ecological Assessment

Submitted to:
Kilroy Ltd

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environmental consultants

Quality Assurance

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Table of Contents

Index to Figures

1.0 Introduction

The 30 Mathers Road plan change project site (the Site) is located on the north western urban fringe of Hamilton City (Figure 1). The purpose of this report is to present the findings of desktop assessment and site surveys of the ecological opportunities and constraints associated with the proposal. Specifically, this report seeks to provide:

- A high-level analysis of the potential indigenous biodiversity flora and fauna issues.
- A high-level analysis of the potential wetland and streams.
- Identify potential for any future Significant Natural Areas (SNA).
- A high-level assessment of the options for managing aquatic and terrestrial habitat and flora and fauna values.
- Recommendation of the suitability of the site for inclusion in the upcoming Future Proof review process as a specific future growth cell of Hamilton.

2.0 Stream Catchments

2.1 Mangaheka Stream

The Mangaheka Stream catchment is approximately 2,000 ha and is dominated by commercial and light industrial land use in the upper catchment and dairy farming in the lower catchment (Figure 1). The catchment area is generally defined by Onion Road in the north, the North Island Main Trunk Railway and Tasman Road in the east, Ngaruawahia Road in the west and Te Kowhai Road to the south (HCC – ICMP 2019).

The Mangaheka Stream is a tributary of the Waipa River. Watercourses within the Mangaheka Stream catchment are highly modified and provide poor to moderate habitat diversity, poor water quality and a benthic invertebrate community that is typical of poor water and habitat quality environments. The Tangirau Wetland is located in the lower Mangaheka Stream catchment and supports higher ecological values including black mudfish. Despite poor water and habitat quality the Mangaheka Stream catchment does support a range of native freshwater fish including banded kokopu. Short fin eel, longfin eel and black mudfish (HCC – ICMP 2019).

HCC (2019) classified the Mangaheka Stream within the Site as artificial farm drain with modified stream habitat immediately downstream of the Site and natural stream closer to Ngaruawahia.

2.2 Te Kowhai Stream

Tonkin and Taylor (2015) provides the following high level summary of the ecological conditions of the Te Kowhai Stream:

A site inspection of publicly accessible locations on the unnamed tributaries within the Structure Plan Area (SPA) was conducted on 9 April, 2014. Observations from site inspections concluded that the unnamed tributary to the Waipa River that flows north through Te Kowhai, was characterised by slow flow flowing open channel with excessive macrophyte growth. The likely factors contributing to excessive macrophyte growth are the lack of significant areas of riparian vegetation providing shade to the stream channel and the presence of nutrients in the stream. In-stream habitat at the sites inspected was generally limited to slow moving runs and pools with undercut banks, root mats and

overhanging vegetation present at some locations. Within the soft bottom sections there was a lack of large woody debris providing hard substrate habitat for macroinvertebrate species. No barriers to fish passage were identified within the Te Kowhai SPA. Stream Bank vegetation had been recently sprayed.

The National Freshwater Fish Database has a record of the At Risk, black mudfish (Neochanna diversus) within the SPA, in the wetland area upstream from the Horotiu Rd culvert (Goodman et al., 2014). Crack willow (Salix fragilis) is the dominant vegetation within this area with small strands of kahikatea (Dacrycarpus dacrydioides) and Cabbage tree (Cordyline australis) also present.

3.0 Watercourse and Wetland Definitions

3.1 Watercourse Classification

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

- ***Artificial*** – 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.
- ***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.
- ***Ephemeral*** – streams that flow continuously for at least three months between March and September but do not flow all year.
- ***Perennial*** – streams that flow year-round assuming average rainfall.

3.2 Natural Inland Wetlands

The NPS-FM defines natural wetlands meaning a wetland (as defined in the Act[1]) that is **not**:

a) a wetland constructed by artificial means (unless it was constructed to offset impacts on, or restore, an existing or former natural wetland); or,

b) a geothermal wetland; or,

c) any area of improved pasture that, at the commencement date, is dominated by (that is more than 50% of) exotic pasture species **and** is subject to temporary rain-derived water pooling.

The NPS-FM defines improved pasture as:

[1] Resource Management Act 1991. Wetland includes 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 of land where exotic pasture species have been deliberately sown or maintained for the purpose of pasture production, and species composition and growth has been modified and is being managed for livestock grazing"

The MfE Exposure Draft circulated 7 April 2021 for consultation further defines improved pasture as:

> "Management of species composition and growth includes fertiliser application, pasture seed sowing, and weeding"

In our determination of which species should be included under the definition of 'improved pasture' we considered introduced grass and herb species that met all of the following criteria as improved pasture species:

i. Introduced grasses or herbs that were actively grazed by stock, and maintained (i.e., fertiliser application, pasture seed sowing, and weeding).

ii. Introduced grasses or herbs where historic evidence could be found that they were originally introduced to New Zealand as pasture species (e.g., as listed in Grasslands of New Zealand (Levy, 1970); Pasture and Forage Plants for New Zealand (Stewart et al., 2014).

Hydrophytes (wetland vegetation)

Plant species capable of growing in soils that are often or constantly saturated with water during the growing season. The hydrophyte categories (wetland indicator status ratings: Clarkson (2013) and subsequent updates) are:

- Obligate (OBL): occurs almost always in wetlands (estimated probability >99% in wetlands).
- Facultative Wetland (FACW): occurs usually in wetlands (67–99%).
- Facultative (FAC): equally likely to occur in wetlands or non-wetlands (34–66%).
- Facultative Upland (FACU): occurs occasionally in wetlands (1–33%).
- Upland (UPL): rarely occurs in wetlands (<1%), almost always in 'uplands' (non-wetlands).

4.0 Assessment Methodology

4.1 Background

An initial desktop study of the Site was carried out using aerial photography (Google Earth, Waikato Maps and Retrolens) and reviewing relevant literature. This assisted in determining key areas of potential watercourses, wetlands and vegetation in which to carry out the preliminary survey.

4.2 Survey Timing

An initial black mudfish survey using eDNA sampling was undertaken on 7 March 2021 and

followed 8 mm of rain in the 2 days prior to the survey and 0.4 mm of rain on the day of the survey. A further survey of watercourses, wetlands, black mudfish and bat habitat was carried out 31 March 2021. There was 43.2 mm of rainfall over two days prior to the 31 March survey, and up to 33.6 mm of rainfall on the day of the field survey (National Climate Database).

4.3 Watercourse Classification

Watercourses within and immediate to the Site were classified in accordance with the definitions outlined in the WRP using field survey observations and desktop information including the Mangaheka ICMP (HCC 2019).

4.4 Fish Fauna

On 7 March 2021 environmental DNA (eDNA) sampling was carried out at one location in the modified section of the Mangaheka Stream near the western boundary of the site (Figure 2). The site was revisited on 31 March 2021 when additional eDNA samples were collected from five locations including drains at the northern, eastern and southern Site boundaries (Figure 2) and a section of the Mangaheka Stream at the western boundary.

One composite eDNA sample was collected from each location, by extracting water into a syringe and then forcing the water through two self-preserving filters using a caulking gun to assist with forcing the water through the filter. Because eDNA testing is highly sensitive the syringe and filters were not handled without gloves. New gloves were worn for each new sample. The filters were then sealed and site details including the water volume were recorded and then sent to the Wilderlab laboratory in Wellington for analysis within 24 hours of collection.

Overview of Environmental DNA

eDNA is a relatively new monitoring tool, which relies on the fact that organisms shed DNA in various forms into the environment. These fragments of DNA can be sampled from the environment in many ways, but for fish, this involves collecting water samples from which the DNA can be extracted and analysed. Some of the benefits of this technique include the fact that it is relatively cheap to carry out, it is also non-invasive and is highly sensitive.

A number of factors contribute to the persistence (and degradation) of DNA in the environment and these need to be taken into consideration when designing, implementing and also interpreting eDNA results. For example, abiotic factors such as: pH, UV penetration and the source of the DNA influence the persistence of DNA in the system of interest. Some species shed more DNA than others and the DNA of some species will inherently persist in the environment longer than others.

The interpretation of results without validation of live observations can lead to two potential ambiguous scenarios - false negatives and false positives.

False Positives

False positives can occur through mis-identification, but this is unlikely for black mudfish because of their unique DNA. If the presence at a particular location is of interest then factors influencing DNA transport need to be taken into consideration. In streams, this might be in the form of transportation downstream from upstream locations. Faeces from predatory species may also leave traces at particular locations, where the species of

interest is actually absent. False positives also arise from sample contamination. Positive eDNA results do not distinguish between living or dead organisms, however, the relatively short degradation rates of eDNA in water would suggest, that irrespective of this there is an indication that the specimen has been present at that site at least within the time frame of the degradation rate of its DNA.

False Negatives

False negatives can occur due to weak DNA signals, which might be indicative of a small population. False negatives also occur through poor sampling (design and technique) and might also occur due to the degradation of DNA in a system where the species of interest is not permanently present but uses a site as part of its foraging range.

4.5 Wetland Classification

Under the NPS-FM and NES-FW; wetlands are to be identified using the wetland delineation protocols (MFE, 2020); vegetation tool (2 x 2 m plots) (Clarkson, 2013), hydric soil tool (inspecting 50 cm soil cores) (Fraser et al., 2018), and hydrology tool (currently under development, but many of the main hydrology indicators, e.g., observation of surface or ground water are directly applicable). Approximately 8 vegetation plots (2 x 2 m) and soils cores (50 cm) were undertaken during the site visit.

Wetland delineation protocols require a thorough and detailed analysis of vegetation, soils and hydrology within each potential wetland in order to delineate exact boundaries and qualifying status. Due to time constraints, wetland boundaries are indicative only. Please contact the author if you have any queries.

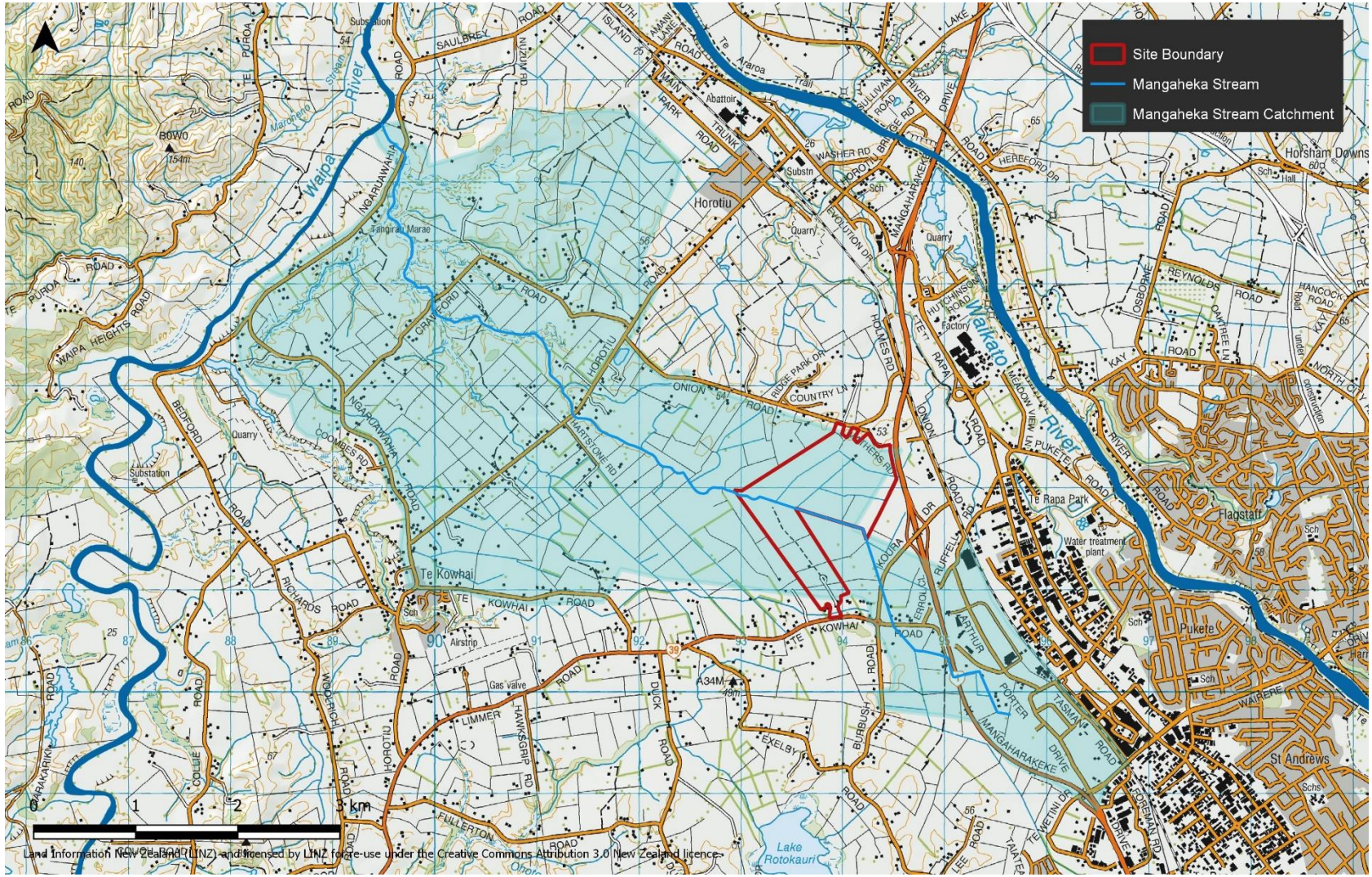

Figure 1: Site location.

5.0 Ecological Opportunities and Constraints

5.1 Freshwater Habitat

Streams

The freshwater habitat within the upper Mangaheka and Te Kowhai Stream catchments, including within the Site has been very highly modified through drainage and channelisation and as result the habitat values of the watercourses is currently very low (Figure 2). The Retrolens 1947 aerial photograph of the Site is presented in in Figure 3.

Watercourse classifications within the Site are shown in Figure 4. The Mangaheka Stream is the main watercourse on the Site. The mainstem of the Mangaheka Stream within the Site was classified as highly modified stream in Mangaheka ICMP. Due to the presence of a natural wetland area at the head of a small tributary and the evidence of an historical natural stream channels the watercourse downstream of the wetland area is likely to meet the WRC definition of a highly modified stream. The remainder of drain network within the was classified as artificial drains (Figure 4).

NPS-FM Wetlands

The Site is an operational dairy farm. Areas historically suspected to show wetland characteristics i.e., hydrology and vegetation of the 1946 Retrolens, appear to have been sufficiently drained, and no longer retain their former hydrological and vegetation wetland features at the time of the survey. Altered hydrology through extensive drainage networks and management (over the past 75 years) has effectively managed potentially damp areas over the entire site. This has facilitated productive grazing pastures, primarily ryegrass/clover (FACU).

There was 43.2 mm of rainfall over two days prior to the site visit, and up to 33.6 mm of rainfall on the day of field surveys (National Climate Database). Areas suspected to surface pool were not holding surface water at the time of survey. Vegetation plots within these areas were dominated by 50% or more of improved pasture species. Soils appeared to be no longer poorly drained. The addition of artificial drainage and pasture conversion has meant irrigation is necessary in some paddocks during the drier summer periods to maintain favoured moist growing conditions.

A small seepage wetland that is likely to qualify as a natural inland wetland (NPS-FM) using the MfE guidelines at the time of the survey (March 2021) was encountered. This area feeds the head of a highly modified watercourse - a tributary to the mainstem modified watercourse (Figure 4).

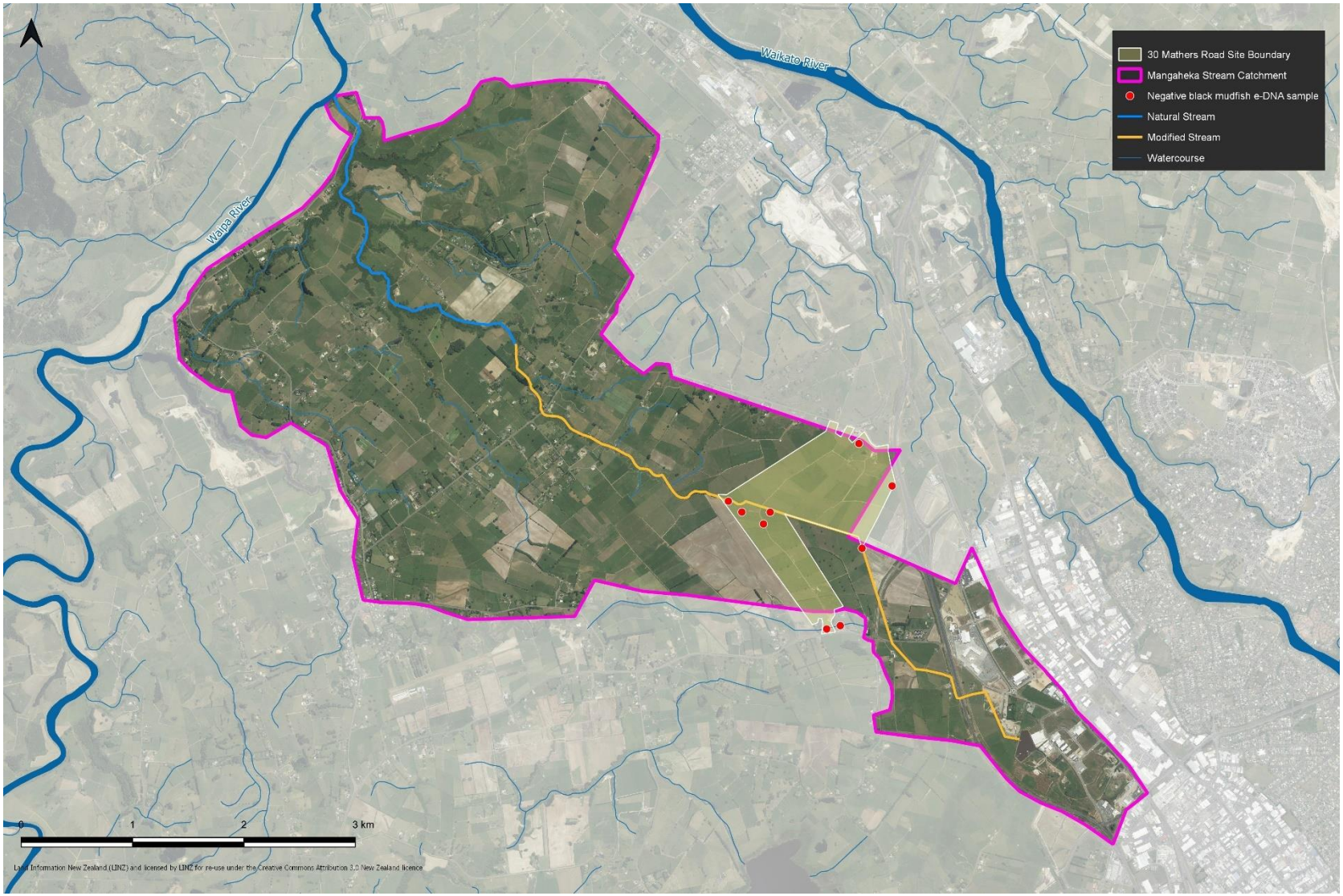

Figure 2. Catchment overview and Site mudfish records.

Figure 3. Aerial photograph of the site in 1947.

Figure 4: Watercourse classifications and mudfish records within and immediately upstream and downstream of the Site.

5.2 Native Fish

Despite the high level of modification, the Mangaheka Stream catchment supports a range of native fish (Figure 3). Based on this initial assessment there appears to be little if any suitable habitat within the Site for banded kokopu. Shortfin and longfin eel are likely to be common throughout the highly modified permanent watercourses within the Site. The level of connectivity between stream habitat upstream and downstream of the site is unknown. Barriers to fish passage, particularly downstream of the Site, could be limiting current and potentially future native fish values within the site. There are opportunities to naturalise and restore stream habitat and improve native fish habitat quality and values within the Site.

Black mudfish have been recorded in the lower Mangaheka Stream, in the Te Kowhai Stream and in the nearby Te Rapa Stream drain network at Onion Road. Black mudfish are common in wetlands and drains with suitable habitat and hydrological conditions throughout the Waikato and it is quite possible this species does occur in suitable habitat within the middle and upper catchment including within the Site. If black mudfish are widespread in the lateral artificial drains within the Site, then this could be a significant ecological constraint that will require careful assessment and management.

The results from the Site eDNA survey detected six species of fish at the Site on 7 March, including four introduced species (gambusia, goldfish, koi carp and brown bullhead catfish) and two native species (shortfin eel and longfin eel). On the second site visit on 31 March, the results showed that the same species were present as the first survey except longfin eel was not detected.

No black mudfish were detected at the Site during either of the March 2021 surveys. Black mudfish occur widely in the Waikato and have been recorded in proximity to the Site (Figure 2), in particular, at Onion Road, which is located on the other side of SH1 to the east of the Site.

Black mudfish have particular habitat preferences, such as intermittency in watercourses, overhanging vegetation, peaty substrates and are usually not found where there are gambusia and eels. All of these factors may contribute to the absence of black mudfish at the site, but the timing of the sampling may also explain the negative results.

The likelihood of black mudfish utilising much of the Site is considered to be low given that there appears to be some highly intermittent sections of the drainage network resulting in low connectivity between the drains. The possibility of finding mudfish in the permanent drain (Board Drain) is considered low as this drain supports a number of mudfish predators (eels and gambusia). The possibility of finding mudfish in the ephemeral lateral drains around the eastern side of the Site boundary is considered to be moderate because there are culverts connecting the neighbouring Onion Road site on the other side of SH1, which provide connectivity between the two locations.

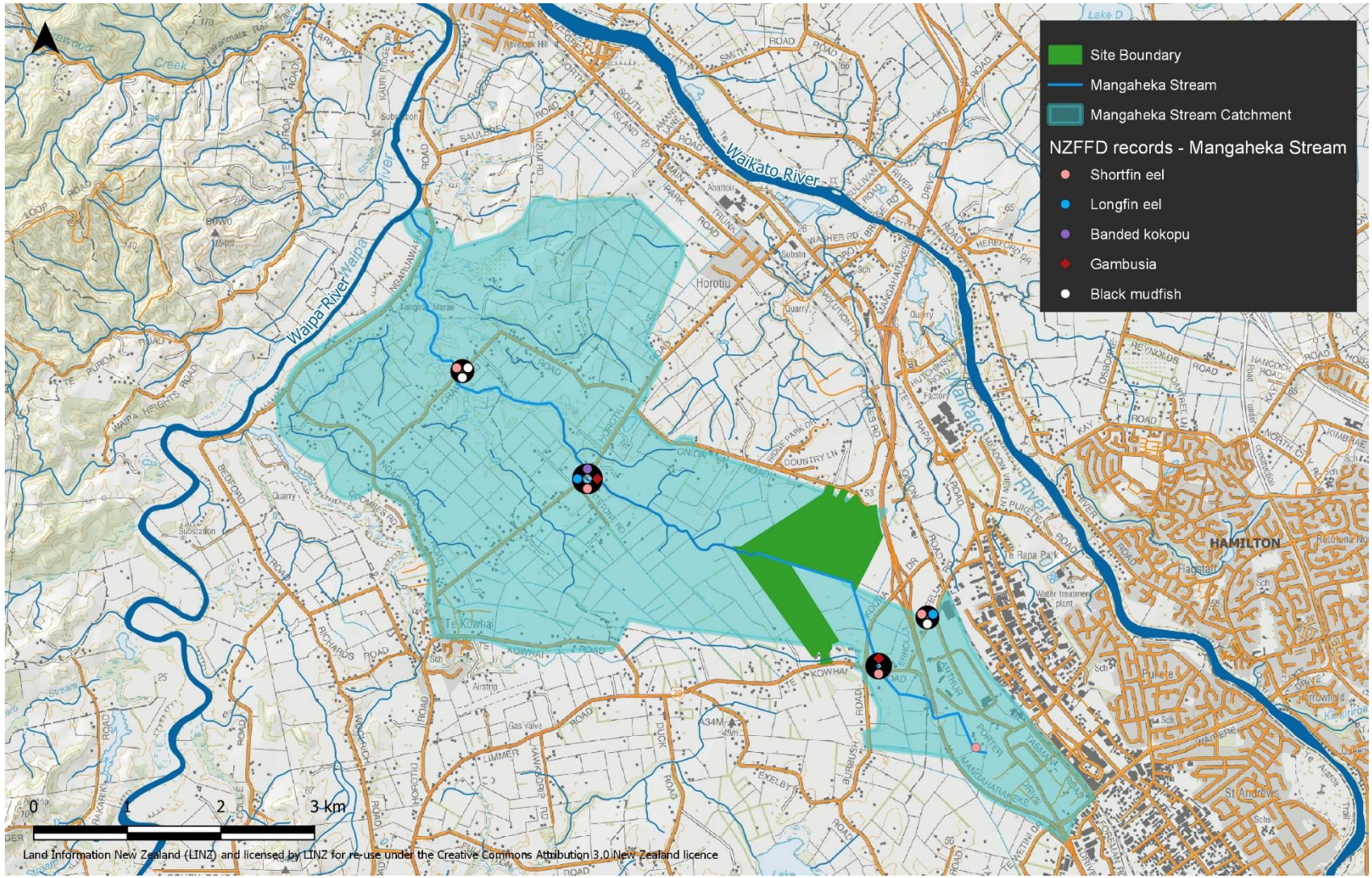

Figure 5: NZFFD records for the Mangaheka Stream catchment.

5.3 Terrestrial Ecological Values

There are no Significant Natural Areas (SNAs) located within the Site. The only SNA qualifying habitat within the Mangaheka Stream catchment appears to be the Tangirau Wetland in the lower catchment.

The vegetation cover is as expected on farmland dominated by exotic pasture with hedgerow vegetation and occasional specimen trees spread across the Site. Site vegetation is not assessed as a significant ecological constraint.

The potential lizard habitat within the Site is very limited and lizards are not assessed as a significant ecological constraint.

Long-tailed bats (*Chalinolobus tuberculatus*) forage over farmland and urban areas favouring forest edges, gully systems and riparian habitats, where they feed on aquatic and terrestrial insects. Long-tailed bats can cover up to 50 km in a single night and have home ranges extending > 100 km^2. Some habitats at site (e.g. linear landscape corridors; riparian margins/hedgerows, mature trees) may be used by long-tailed bats for foraging.

A recent bat survey records the presence of long-tailed bats within the wider area, with the closest record being at Te Otamanui Walkway (612 Horotiu Road, c. 3 km west of the site) (Dixon, 2020).

An automatic bat detector (ABM) was also deployed within a native forest remnant (primarily kahikatea, *Dacrycarpus dacrydioides*) at Burbush Road (adjacent to the Site entrance, c. 150 m south), although no bat activity was recorded at the corresponding ABM (Dixon, 2020).

Long-tailed bats are assessed as "*Threatened – Nationally Critical*" (O'Donnell et al. 2018). The presence of bats in the vicinity indicates that more specific survey for bats maybe warranted.

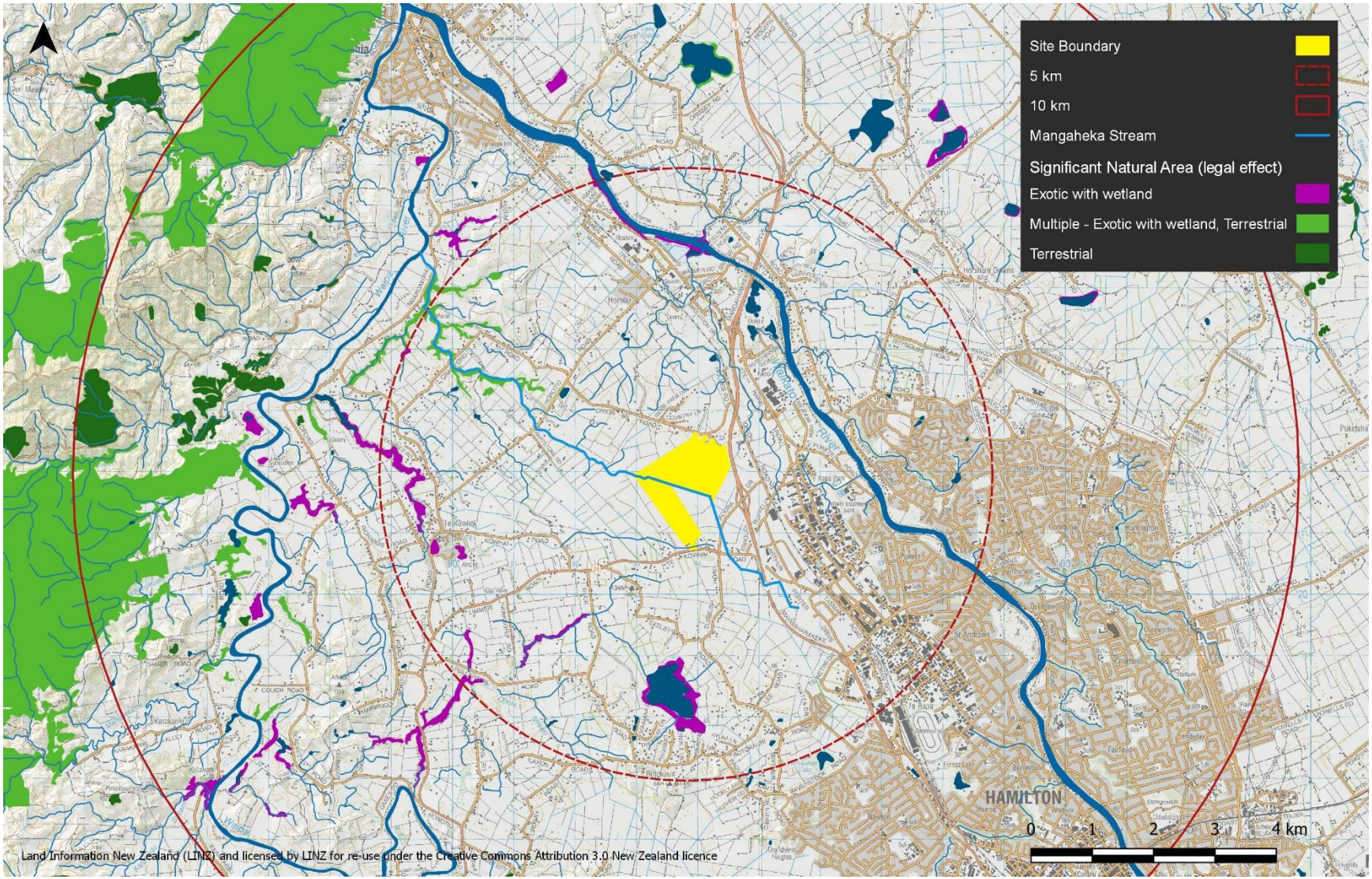

Figure 6: SNA's within a 10 Km radius of the Site.

6.0 Recommendations

The Site is located in the very highly modified upper reaches of the Mangaheka Stream catchment. The wider Mangaheka Stream catchment has been highly modified by agricultural and urban land use pressures. Despite this the catchment supports significant freshwater (e.g., banded kokopu and black mudfish) ecological values and there are opportunities to protect and enhance the ecological values within the Site. Opportunities to enhance the existing ecological values include:

- Improving connectivity of stream habitat through the removal of farm culverts.
- Improving the connectivity along the highly modified section of stream by undertaking riparian restoration.
- Undertaking development in a manner that reduces stormwater erosion effects within the Site and downstream.
- Protect and restore, where possible, the highly modified stream section.
- Identify and where possible protect and restore key black mudfish and longfin eel habitat.

With thorough assessment of ecological values and the implementation of suitable actions to avoid, remedy, mitigate and if necessary, offset significant adverse effects the 30 Mathers Road Site is suitable for inclusion in the upcoming Future Proof review process as a specific future growth cell of Hamilton. This recommendations follows:

- A thorough stream classification survey indicating that there are no watercourses that would present a significant impediment to large scale development.
- Black mudfish eDNA sampling indicated that this species are unlikely to utilise the Site.
- Low probability that bats utilise the Site.
- Low probability that lizards utilise the Site.

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