Ecological Impact Assessment at Pencarrow Road, Tamahere

Prepared for Waikato Thoroughbred Racing



AWA ECOLOGY
ECOLOGICAL CONSULTANTS

Table of Contents

1 Introduction 2
1.1 Scope 2
1.2 Declaration of experience 3
1.3 Site description 3
1.4 Ecological context 3
1.5 Historic imagery 4
2 Methodology 6
2.1 Desktop review 6
2.2 Terrestrial Ecology - Te papa whanui 6
2.2.1 Long-tailed bat (Pekapeka-tou-roa) surveys 6
2.3 Wetland - Repo 7
2.3.1 Wetland definition 7
2.3.2 Wetland delineation protocols 7
2.4 Freshwater Ecology – Te wai mauri 8
2.5 Ecological Impact Assessment Methods 9
2.5.1 Assessment of Ecological Significance 9
2.5.2 EIANZ Assessment 9
3 Description of Ecological Features 10
3.1 Terrestrial vegetation/habitat characterisation – Te papa whanui 10
3.1.1 Kahikatea treeland stand (0.95 ha – total protection area of 2.71 ha) 10
3.2 Terrestrial fauna 11
3.2.1 Long-tailed bats - Pekapeka-tou-roa bioacoustics survey results 11
3.2.2 Long-tailed bats - key habitats 14
3.2.3 Avifauna – manu 15
3.2.4 Lizards - mokomoko 15
3.3 Wetlands - Repo 16
3.4 Freshwater – Te wai mauri 18
3.4.1 Freshwater fauna 19
4 Ecological value 20
4.1 Component Representativeness, Rarity/distinctiveness, Diversity and Pattern, 20
5 Assessment against relevant policies and plans 22
5.1.1 Te Ture Whaimana o te Awa o Waikato 22
5.1.2 Tai Tumu Tai Pari Tai Ao (Waikato-Tainui Environmental Plan) 23
5.1.3 Waikato Regional Policy Statement criteria 23
5.1.4 National Policy Statement for Freshwater Management and National Environmental Standards for Freshwater 23
5.1.5 National Policy Statement for Indigenous Biodiversity 23
5.1.6 Fast Track Approvals Act 2024 24
6 Assessment of Ecological Effects 25
6.1 Overview of Potential Adverse Effects 25

6.2 Effects on Terrestrial Vegetation 25
6.3 Effects on Terrestrial Fauna 26
6.3.1 Long-tailed bats - Pekapeka-tou-roa 27
6.3.2 Avifauna - Manu 29
6.3.3 Lizards - Mokomoko 30
6.4 Effects on freshwater habitats and biota - Te wai mauri 30
6.4.1 Sediment and erosion 30
6.4.2 Stormwater 31
7 Summary 32
8 References 34
Appendix 1: Proposed Site Master Plan
Appendix 2: Stakeholder feedback nad applicant response
Appendix 3: Watercourse classification memo and email agreement from Waikato Regional Council
Appendix 4: Historic and retrolens imagery
Appendix 5: Summary of weather conditions during the bat survey period at Hamilton airport
Appendix 6: EcIA guideline tables
Appendix 7: Vegetation plot photos
Appendix 8: Restoration and Management requirements for the remnant kahikatea stand

Project number	Author	Review	Version	Date
BCD.0093	Brenda Bartels & Alicia Williams	Gerry Kessels (Bluewattle Ecology)	Draft	5/12/2025
BCD.0093	Brenda Bartels & Alicia Williams	Gerry Kessels (Bluewattle Ecology)	Final	18/12/2025
BCD.0093	Brenda Bartels & Alicia Williams	Gerry Kessels (Bluewattle Ecology)	Final 1.1	24/02/2026
BCD.0093	Brenda Bartels & Alicia Williams	Gerry Kessels (Bluewattle Ecology)	Final 1.2	26/03/2026
BCD.0093	Brenda Bartels & Alicia Williams	Gerry Kessels (Bluewattle Ecology)	Substantive Draft	27/08/2026
BCD.0093	Brenda Bartels & Alicia Williams	Gerry Kessels (Bluewattle Ecology)	Substantive Final	30/09/2026

Disclaimer: The report has been prepared for BCD Group Ltd by Awa Ecology and may only be used for the purpose agreed. The content set out in this report is limited to the agreed scope of work.

EXECUTIVE SUMMARY

BCD Group Ltd on behalf of Waikato Thoroughbred Racing have engaged Awa Ecology to prepare an Ecological Impact Assessment (EcIA) for the proposed development of the site at Pencarrow Road, Tamahere. The site is bordered by State Highway 1, Pencarrow, Hooker and Duncan Roads and is currently a working dairy farm. Areas within the farm are comprised of pasture with hedgerows, scattered trees, a remnant kahikatea stand with a small area of wetland, and a network of artificial watercourses and associated artificial wetlands. This assessment focused on identifying the terrestrial, freshwater and wetland ecological values present on the site.

Fauna ecological values range from very high for 'Threatened – Nationally Critical' long-tailed bats to low for common indigenous bird species and shortfin eel.

Across most of the proposed development site the ecological value of the vegetation and habitats range from negligible to low. However, the kahikatea 'treeland' stand and the area of natural wetland found on site are both underrepresented indigenous vegetation types and the kahikatea stand also provides habitat for bats, a threatened species. It is thus considered to meet two of the 11 criteria to be classed as a site of significant indigenous vegetation and habitats of indigenous fauna as detailed in section 11A of the Waikato Regional Policy Statement.

Specific values and requirements for lizards are detailed in the RMA Ecology (2026) report.

Long tailed bat values are described in this report, a detailed effects assessment is provided in the Bluewattle Ecology (2026) memo and is summarised in this report.

Please refer to the detailed assessments for further information.

Potential adverse effects on biodiversity values because of the development can be addressed through the following measures:

- The kahikatea stand will be retained and restored. This area is an underrepresented vegetation type and provides a high-value habitat for bats. Most adverse effects can be compensated at this location through restoration and management measures including fencing, planting and pest control. Details have been provided in the Ecological Management Plan prepared for the Project.
- Restoration of the kahikatea stand will include additional wetland creation and restoration, further enhancing the ecological values of the site.
- The potential effects on long-tailed bats and their habitat use on site are addressed by a range of measures, including protection and enhancing the kahikatea treeland, outdoor lighting controls to create dark zones through the residential lifestyle block area, and measures to reduce the risk of harming bats if felling any potential roost trees. Further monitoring events are required to confirm if there is a remaining residual effect risk which will need compensation. A draft Bat Management Plan has been prepared to provide a framework on achieving implementation of these measures.
- Impacts to native fish, namely shortfin eel can be minimised by undertaking a site-specific Fish Management Plan, including fish recovery in any wetted watercourse to be disturbed.
- Impacts regarding stormwater and sediment discharges to the receiving environment can be avoided by following best practice guidelines and regulations.
- Areas of bare earth will need to be immediately vegetated or covered to reduce the risk of erosion and sedimentation and weed colonisation on bare ground.
- Implementation of these ecological avoidance, remediation and mitigation measures have been detailed in the Management Plans prepared for the Project.

1 INTRODUCTION

1.1 Scope

BCD Group Ltd on behalf of Waikato Thoroughbred Racing commissioned Awa Ecology to prepare an Ecological Impact Assessment (EcIA) for a c.160 ha block of land at Pencarrow Road, Tamahere (Figure 1). This assessment focused on identifying the terrestrial, freshwater and wetland ecological values present on the site.

The site is bordered by State Highway 1, Pencarrow, Hooker and Duncan Roads and is currently a working dairy farm comprised of pasture with hedgerows, scattered exotic trees, a maize crop, a remnant kahikatea stand with a small area of wetland, and a network of artificial watercourses and associated artificial wetlands.

The purpose of this report is to prepare an EcIA associated with the proposed development of the site into a horse racecourse, harness racing and associated facilities (see proposed site plans in Appendix 1). The purpose of the Project is to create a unique, world class greenfield racing hub designed for horse training, racing and other equine related activities, while bringing the expertise and strength of the local racing fraternity together in a centralised location.

This enables the local racing industry to be more streamlined, competitive, sustainable and future focused while bringing potential international investment and creating a 'destination' for horse racing in New Zealand, also increasing tourism opportunities for the wider region.

A key driver behind the proposed greenfield equine hub and racecourses is enabling the consolidation of four separate racecourse facilities (Te Rapa, Waipa and Cambridge thoroughbred courses, and the Cambridge harness track). These facilities duplicate assets and resources and, given their current condition require significant levels of upgrades and investment to provide fit-for-purpose facilities that meet the higher standards of the modern-day racecourse experience. The retirement of these areas also frees up significant tracts of land within existing urban areas for future development, increasing housing supply.

To support the development's financial viability and enhance the site's long-term vibrancy as a racing, entertainment, commercial and community precinct, the proposal includes a range of complementary activities on the remaining land. These include equine support services, rural residential housing, a retirement living community, a village centre and a bloodstock sales precinct.

This report:

- Describes the existing terrestrial, wetland and freshwater ecological characteristics and values;
- Describes ecological effects on these values that are expected to result from the proposed development, as well as recommending measures to avoid, remedy or mitigate effects;
- Provides mitigation, offset and compensation recommendations for addressing residual effects (as and if required); and
- Presents an overall conclusion on the level of actual and potential ecological effects of the Project after all recommended effects management measures have been undertaken.

Ecological surveys of the site were undertaken in November and December 2025, using methods outlined in section 2 of this report. The results of these surveys are detailed in section 3, and an assessment of ecological value, assessment of ecological effects and effects management recommendations are presented in sections 3, 4, 5 and 6.

Feedback from Waikato Regional Council (WRC) and the Department of Conservation (DOC) was sought during the referral application stage of the fast-track process. This feedback has been considered and incorporated into this updated EcIA, which forms part of the substantive application, with a summary of the feedback provided in Appendix 2. As part of this update, the assessments of potential effects on lizards and bats have also been updated.

1.2 Declaration of experience

The primary author of this report has been prepared by Brenda Bartels, who is a qualified and experienced ecologist.

Brenda Bartels is a senior ecologist and hold a Bachelor and Master of Science degree from the University of Waikato. Her relevant experience involves over 19 years of professional practice across the areas of general ecology, specialising in freshwater ecology. She is a Waikato based ecologist who is considered sufficiently qualified to undertake an assessment of this kind.

Although this document has not been written as a statement of expert evidence, I confirm that at all times I have complied with the Environment Court's Code of Conduct for Expert Witnesses contained in its Practice Note 2023.

I declare that in relation to my role in providing expert ecological assessment and advice for this project I am not, to the best of my knowledge, subject to any real or perceived conflicts of interest.

1.3 Site description

The property is c.160 ha in size and is situated south of Hamilton City, in Tamahere. The property is surrounded by a mix of farms and lifestyle properties and is bordered by State Highway 1, Pencarrow, Duncan and Hooker Roads. The property is positioned in the Hamilton Ecological District (ED) within the Waikato District and lowland bioclimatic zone. The Hamilton ED has been highly modified for agricultural production and little indigenous vegetation remains.

The property is surrounded by a mix of farms and lifestyle properties and is flat, with a land use of dairying with some maize cropping on the eastern boundary. The site is currently comprised of two working dairy farms with associated infrastructure including milking sheds, animal shedding, feed storage, and multiple residential properties. The site is highly modified, and farming practices include the creation of a network of artificial watercourses [1,2] (refer to Appendix 3 for classification memo details) and recontouring of some paddocks into a hump and hollow formation. Vegetation includes grazed pastoral land, a network of exotic hedgerows and scattered mature trees. There is a remnant kahikatea stand at the southern end of the property with a small area of wetland, which likely provides important habitat for indigenous species.

1.4 Ecological context

The site is located within the Hamilton ED, which covers an area of 159,344 ha (McEwan, 1987) and is located in central Waikato around Hamilton City and the surrounding basin.

The Hamilton Basin is one of the most heavily degraded management zones in the Waikato District, with only small, scattered indigenous forest remnants remaining. Historically, the Hamilton ED was covered mostly in a mixture of podocarp forest and wetlands (Singers & Rogers, 2014). The Hamilton

[1] Pencarrow Road Watercourse classification memo October 2025 – Ecology NZ
[2] Waikato Thoroughbreds Pencarrow Road Site – Water body classification email chain with Waikato Regional Council

ED has largely been cleared of its original vegetation for agricultural purposes, and only 1.2% of the district (1900 ha) remains in indigenous forest, of which 0.2% is primary forest (Leathwick et al. 1995). The site is also located within the Hamilton Basin which is comprised of four main landform units: hills, alluvial plains, gullies, and peatlands. This property is located along the alluvial plains of the Waikato Awa and was likely once dominated by kahikatea-pukatea-swamp maire forest (Clarkson *et al*., 2007).

In terms of fauna, threatened species that have been observed within the Hamilton ED include the Threatened – Nationally Critical long-tailed bat (*Chalinolobus tuberculatus*), Threatened – Nationally Increasing bush falcon (*Falco novaeseelandiae ferox*) and At Risk – Recovering North Island kākā (*Nestor meridionalis septentrionalis*). These three species are considered very mobile and often have wide feeding and home ranges. Copper skink (*Oligosoma aeneum*) is the only indigenous lizard species likely to be present in small, isolated kahikatea remnants. Although the elegant gecko (*Naultinus elegans*) (At Risk – Declining) and speckled skink (*Oligosoma infrapunctatum*) (Data Deficient) have also been recorded within the Hamilton ED, they are highly unlikely to be found at this site, preferring mature native forest and adjacent scrubland.

1.5 Historic imagery

Historical aerial imagery from Retrolens[1] was viewed for the subject property (Appendix 4). This imagery shows historic landcover (dating back to 1953), and how landcover at the site has evolved over the years (August 1953, February 1995, January 2008, January 2013, April 2018 and February 2025). By 1953 land clearance activities were well advanced with large areas of pasture observed and similar to what is seen in current day. The kahikatea stand at the southern end of the property was denser and more intact, which appears to be relatively unchanged until sometime after 1995. The site in 1953 had a series of wet areas, likely overland flow paths to the northeastern area of the property, and these areas have disappeared over time. However, flow paths were still seen on imagery in 2025.

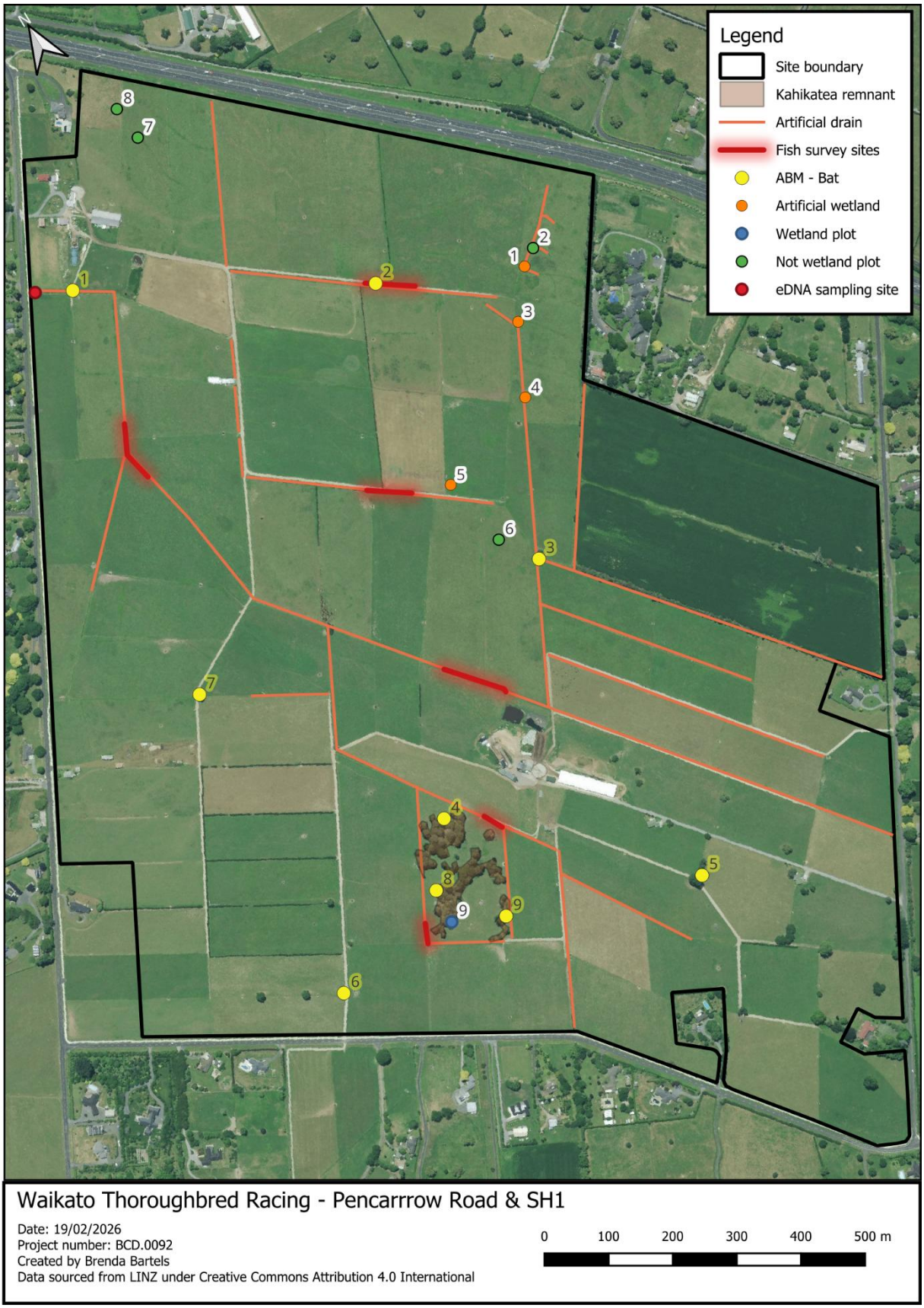


Figure 1: Waikato Thoroughbred Racing site showing features of the site.

2 METHODOLOGY

2.1 Desktop review

A desktop literature review was undertaken to determine the ecological context of the site. Resources reviewed included:

- Retrolens historic imagery[3]
- The New Zealand Freshwater Fish Database (NZFFD)[4];
- The BioWeb Database[5], and the National Bat database[6]; Waikato Regional Council bat distribution map[7]and,
- iNaturalist[8], New Zealand Birds online[9], and the New Zealand bird atlas[10].

2.2 Terrestrial Ecology - Te papa whanui

Field surveys and ecological assessments were undertaken on the 13 and 14 November 2025. During the field surveys the vegetation was assessed, classified, and mapped. All vascular plants encountered during the site visit were recorded and vegetation composition and plant communities described.

- A bat survey was undertaken in November and December 2025 using nine acoustic Automated Bat Monitors (ABMs).
- Notes were made of all birds seen or heard during the field surveys. These were supplemented by a desktop survey of existing database and literature sources.
- A survey for lizards was carried out in conjunction with vegetation surveying using daytime habitat searches. This method involves visual searches of habitat (using the naked eye and binoculars) for basking and/or feeding skinks and geckos, and physical search of daytime lizard retreats, e.g. tree bark, rocks, logs, standing dead trees, vegetation, leaf litter, for inactive lizards.

2.2.1 Long-tailed bat (Pekapeka-tou-roa) surveys

A long-tailed bat survey was carried out at the site, during which nine DOC type "AR4" ABMs were deployed. Six ABMs were deployed for 14 nights, from 13 November to 27 November 2025. A further three ABMs were redeployed for six nights from 27 November to 3 December 2025.

The locations of the ABMs are shown in Figure 1. The data was analysed according to the protocols described by Sedgeley et al (1999). ABMs record any sound that may be a bat call or echolocation. When the ABM is triggered by a potential bat pass it records one file for each pass. When detectors are placed close to roosts or swarming sites there can be multiple overlapping calls sequences from many bats (Lloyd, 2017). The recordings are prepared in a form of a compressed image of a spectrogram and are saved onto an SD card in the form of bitmap format images. The images were

[3] https://retrolens.co.nz/
[4] The New Zealand Freshwater Fish Database (NZFFD) administered by the National Institute of Water and Atmospheric Research (NIWA) accessed on 31 August 2023.
[5] BioWeb Database. Administered by the Department of Conservation (DOC).
[6] National Bat Database. Administered by DOC.
[7] Waikato long-tailed bat distribution (waikatoregion.govt.nz)
[8] https://www.inaturalist.org/observations
[9] http://nzbirdsonline.org.nz/
[10] https://ebird.org/atlasnz/home

viewed using BatSearch 3.12 software (DOC 2017). Most calls from long-tailed bats are search phase calls. In spectrograms of search phases calls frequencies sweeping down from 80 to 35 kHz (Lloyd, 2017). The frequency spectrum assessed ranges from 0 Hz to 88 kHz and images represent 1-6 seconds of recording.

All detectors were calibrated to have the same time and date settings (NZST) and were pre-set to start monitoring one hour before sunset until one hour after sunrise. The recorders were suspended at least 2 m above the ground to reduce superfluous detections caused by terrestrial insects (usually cicada species) and rats. Weather conditions were reasonable for bat emergence (O'Donnell, 2001) for most of the survey period and are displayed in Appendix 5.

2.3 Wetland - Repo

An initial desktop mapping assessment was undertaken using recent and historic aerial imagery before the site visit. This mapping identified areas that were likely to be wetlands and required further assessment in the field.

The entire site was walked or driven on the 13th and 14th of November 2025, and areas that appeared to support hydrophytic vegetation were assessed

2.3.1 Wetland definition

A wetland is defined in the Resource Management Act as follows:

'*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.*'

Any areas that appeared to support hydrophytic vegetation were assessed to determine if they meet the definition of a natural inland wetland as defined in the NPS-FM (MfE, 2020a):

natural inland wetland means 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 this National Policy Statement, in which case the exclusion in (e) does not apply

2.3.2 Wetland delineation protocols

The protection of wetlands has become part of national policy, with the National Policy Statement for Freshwater Management (NPS-FM) which came into force in September 2020 (with subsequent updates). The Essential Freshwater package introduced policies and regulations to protect 'natural wetlands' with nationally consistent standards.

Wetland assessments were based on the Wetland Delineation Protocols (MfE 2020b) following requirements in the National Policy Statement for Freshwater Management (NPS-FM) (MfE 2020a). The wetland delineation protocols have been developed to give a robust method for delineating wetlands, using three criteria: vegetation, soils, and hydrology. Where wetlands were present, the extent was tracked using a handheld GPS.

Vegetations classified using the vegetation tool (Clarkson, 2013) categorise plant species, based on the proportion of coverage in a 2m x 2m plot as:

- Obligate (OBL): plant species that occur almost always in wetlands (estimated probability greater than 99 % in wetlands).
- Facultative Wetland (FACW): plant species that occur usually in wetlands (67 % to 99 %).
- Facultative (FAC): plant species equally likely to occur in wetlands or non-wetlands (34 % to 66 %).
- Facultative Upland (FACU): plant species that occur occasionally in wetlands (1 % to 33 %).
- Upland (UPL): plant species that rarely occur in wetlands (less than 1 %).

To pass the rapid test the vegetation present within the 'wetland' area across all strata must be dominated by species that are classified as OBL or FACW species. To pass the dominance test the most abundant plant species that immediately exceed 50 % of the total cover for each stratum, plus any additional species comprising 20 % or more of the total cover for the stratum must be OBL, FACW, or FAC. The prevalence test assigns a weighted index score for the species present, with score less than 3 indicating wetland vegetation. Areas can be excluded as natural wetlands if they are classified as 'artificial' or 'improved pasture'.

The hydrophytic vegetation tool on its own is a useful tool for delineating wetlands for most wetland types and can be used on its own to delineate wetlands if both the Dominance Test and the Prevalence Index pass.

2.4 Freshwater Ecology – Te wai mauri

The freshwater environments and habitats at the site were visually inspected and qualitative habitat assessment was conducted. An initial site walkover was carried out to inspect any watercourses and identify areas where water was flowing in the channelised waterways. Representative sections of each channel were walked, and the stream bed was assessed for pooling water, wet soils, and macrophyte species.

In areas where water was present, a more detailed assessment was carried out looking at channel shape, streambed type, flow, instream habitat, shading, and riparian condition.

To assess the aquatic fauna residing in the watercourses of the property, fine mesh gee minnow traps (GMTs) were deployed overnight where water depths allowed. GMTs could be deployed to ascertain fish presence, where depths were greater than 15 cm. The GMTs were deployed on the 13 November and retrieved on the 14 November. Five sites were surveyed (Figure 1) following the mudfish sampling methodology. Ten GMTs were set at each site except one where there was insufficient habitat and nine GMTs were set instead (a total of 49 GMTs were set). Given the shallow nature of the watercourses, GMTs were dug into the sediment in places. Most of the watercourses onsite were likely ephemeral (although some may retain water permanently), and trapping was undertaken during the ideal trapping time for mudfish (September to November) when detection probabilities are the highest.

In addition, four replicate Environmental DNA (eDNA) samples were taken on the 24 September 2025 at the outlet of the artificial watercourse network in the northwestern border of the property (Figure 1), by Ecology NZ during an initial site visit to determine the opportunities and constraints of the site. The samples were analysed for the presence of fish species by Wilderlab.

2.5 Ecological Impact Assessment Methods

2.5.1 Assessment of Ecological Significance

Ecological significance was assessed based on the criteria outlined in Section 11A of the Waikato Regional Policy Statement (WRPS) (Waikato Regional Council, 2016). The assessment of each criterion followed Table 1 of "Updated Guidelines for determining areas of significant indigenous vegetation and habitats of indigenous fauna in the Waikato Region" (WRC and Wildland Consultants 2023).

In addition, the National Policy Statement for Indigenous Biodiversity (NPS-IB) was used to determine ecological significance for indigenous flora and fauna and their habitats.

2.5.2 EIANZ Assessment

The ecological effects assessment was undertaken in accordance with the Ecological Impact Assessment Guidelines (EcIA) developed by the Ecological Institute of Australia and New Zealand (Roper Lindsay, 2018). The use of the standard framework and matrix approach within these guidelines as well as professional ecological judgement provides a robust, consistent and transparent ecological effects assessment which is considered best practice.

A EcIA guidelines uses a standard framework to determine the following:

- Step one - Assessing the ecological value of the environment (Appendix 6)
- Step two - Assessment of the magnitude of ecological effect from the proposed activity (Appendix 6).
- Step three - Determining the overall level of effect to determine if further mitigation, offset or environmental compensation is required (Appendix 6).

3 DESCRIPTION OF ECOLOGICAL FEATURES

3.1 Terrestrial vegetation/habitat characterisation – Te papa whanui

The majority of the site is comprised of exotic pasture and was dominated by common improved pasture grasses including rye grass (*Lolium* spp.), rough-stalked meadow grass (*Poa trivialis*), sweet vernal (*Anthoxanthum odoratum*), Yorkshire fog (*Holcus lanatus*) and herbs such as clover (*Trifolium* spp.), dock (*Rumex* spp.), lotus (*Lotus pedunculatus*), plantain (*Plantago* spp.) and Californian thistle (*Cirsium arvense*) (Photo 1). Wetter areas of pasture were vegetated with scattered buttercup (*Ranunculus* spp.) and water pepper (*Persicaria hydropiper*). At the time of the site visit, an area to the east had recently been planted in maize, with two large, mature gum trees present in the middle of this crop.

Scattered (mostly individual) mature exotic trees were present throughout the property and included poplar (*Poplus* sp.), birch (*Betula* sp.), grey willow (*Salix cinerea*), and oak (*Quercus* sp). An extensive network of hedgerows was present around the perimeter of the property and between many of the internal paddocks and farm races. The hedgerows were predominately comprised of hawthorn (*Crataegus laevigata*) and barberry (*Berberis glaucocarpa*) (Photo 2).



Photo 1: Exotic grassland.



Photo 2: Well-maintained hedgerow along a farm race and drain.

3.1.1 Kahikatea treeland stand (0.95 ha – total protection area of 2.71 ha)

A remnant kahikatea (*Dacrycarpus dacrydioides*) stand is present at the southern end of the property, near the boundary with Hooker Road (Photo 3). This area totals 0.95 ha in size and as part of this proposal will be restored to a total area of 2.71 ha. This area is not fenced from stock and has reduced in extent when compared to historic imagery prior to 1995, currently it is best described as a modified treeland[11]. Kahikatea is the dominant species present, however there are few scattered mature pōkākā

[11] "treeland" is defined as a vegetation type where the tree canopy cover is between 20% and 80%, but the canopy is discontinuous above a lower layer of non-woody vegetation (such as grass or sedges). Atkinson (1985)

(*Elaeocarpus hookerianus;* DBH [12] 70 cm), titoki (*Alectryon excelsus;* DBH 60 cm) and tawa (*Beilschmiedia tawa*) present in the centre of the stand. A large matai (*Prumnopitys taxifolia;* DBH c.90 cm) was present in the southeastern corner (Photo 4). A pukatea (*Laurelia novae-zelandiae*), and the small leaved milk tree (*Paratrophis microphylla*) were also observed. There are a few dead kahikatea trees located within the stand, and kahikateas at the southwestern portion are more exposed to the elements and are looking stressed (leaf loss, root buttressing) (Photo 3).

The understorey within the stand is sparse, with the occasional inkweed (*Phytolacca octandra*), barberry and blackberry (*Rubus fruticosus*) present. The groundcover is dominated by pastoral grasses and herbs, such as hairy buttercup (*Ranunculus sardous*), perennial ryegrass, broad-leaved dock, creeping buttercup (*Ranunculus repens*), Californian thistle and annual poa grass (*Poa annua*).

As with many remnant kahikatea stands in the Hamilton Basin, there has been significant modification, including hydrological modification with drains following the fenceline around the stand. These drains contained shallow water at the time of the assessment.

Although this remnant has been significantly modified and degraded. This kahikatea stand is indigenous vegetation that is under-represented (20% or less of its known or likely original extent remaining), with about 1.2% of original forest remaining in Hamilton ED. Kahikatea stands are also underrepresented regionally and nationally.



Photo 3: Remnant kahikatea stand. Note the sparse leaf coverage on the kahikatea toward the right of the image.

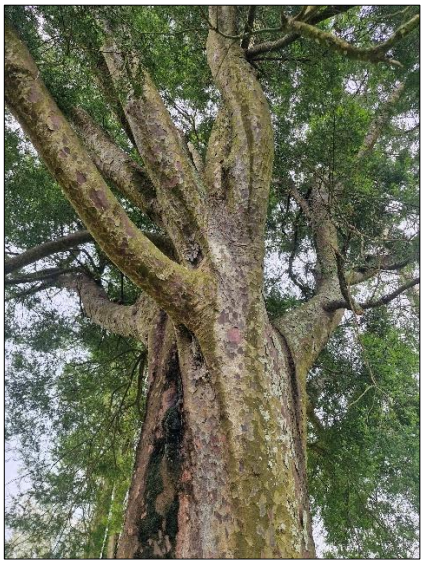


Photo 4: Large matai tree with a DBH of c.90 cm.

3.2 Terrestrial fauna

3.2.1 Long-tailed bats - Pekapeka-tou-roa bioacoustics survey results

Pekapeka-tou-roa or long-tailed bats (*Chalinolobus tuberculatus*, Threatened - Nationally Critical) (O'Donnell et al., 2022) are considered to have been in population decline for the last 150 years.

[12] DBH= Diameter at breast height, measured at 1.3 metre above the ground by measuring trunk circumference at this height and divide by pi.

Pekapeka-tou-roa have a threat classification of nationally critical (O'Donnell *et al*., 2018). Long-tailed bats have been recorded in the surrounding landscape[13].

During the onsite bioacoustic surveys using ABMs, long-tailed bat activity ranged from low in areas of farmland to relatively high within the kahikatea stand (Tables 1 and 2; Figures 2-6).

Temperature at dusk remained suitable for bat emergence for all nights of the survey period (data from detector log device). According to MetService, Hamilton had a reasonably high month of daily rainfall, with five days exceeding 10mm of daily rain (Appendix 5). This may have affected bat emergence, particularly on 19 November and 30 November 2025 which was reflected in the data where there were no bat passes at Site 4 (Northern point of kahikatea stand) on 19 November.

3.2.1.1 Survey

Eight of nine detectors recorded long-tailed bats over the duration of survey period.

Across all survey nights and ABMs there was a total of 191 bat passes (Table 1; Figure 1). Site 4 had the highest rate of bat activity, with an average of 9.2 bat passes per night (Table 1), and seven feeding buzzes (rapid sequences of echolocation pulses during prey capture) (Table 2 and Figure 2). These results indicate a relatively high level of bat activity at site 4 (Figure 3, 4, 5 and 6). Three of the survey nights detected 19 bat passes, with bats detected every night of the survey period except the 19th, likely due to high rainfall. The majority (73) of the bat passes at Site 4 occurred between 00:00-01:00, which is around four hours after sunset (approximately 20:00). Bats are likely passing through site 4 as a commuting corridor and occasional feeding passage. There was a possible social call within the dataset (23 November at 1:50AM). Although most of the bat activity occurred during the night, after dusk, the presence of a nearby roost cannot be ruled out.

Site 9 (Southeastern point of the kahikatea stand) had a relatively high rate of bat activity, which is consistent with the surrounding Tamahere area where bat activity is above average, with an average 7 bat passes per night. This detector was deployed for 6 nights in total. Like Site 4, most of the activity was during the middle of the night (in this case between 01:00 and 02:00). Six feeding buzzes were recorded.

Table 1: Long-tailed bat survey results blue text highlights ABMs in kahikatea stand.

Site	Detector number	Night's detector was functioning	Total number of bat passes	Bat passes per night	Feeding buzz?	Notes
1	BW35	6	0	0.0	N	
2	BW26	15	1	0.1	N	
3	BW49	8	3	0.4	N	
4	BW55	14	129	9.2	Yes - see Table 2	
5	BW23	14	2	0.1	Yes - see Table 2	
6	BW51	14	6	0.4	N	
7	BW26	6	1	0.2	N	Redeployed on 27 November
8	BW55	6	7	1.2	N	Redeployed on 27 November
9	BW51	6	42	7.0	Yes - see Table 2	Redeployed on 27 November

[13] Waikato long-tailed bat distribution

Table 2: Feeding buzz register.

Site	Date	Time	Notes
4	20 November 2025	12:37 am	Possible feeding buzz
4	20 November 2025	12:39 am	
4	23 November 2025	1:27 am	
4	23 November 2025	1:55 am	
4	24 November 2025	1:33 am	
4	26 November 2025	12:21 am	
4	27 November 2025	12:43 am	
5	24 November 2025	10:30pm	
9	29 November 2025	1:11 am	
9	29 November 2025	1:15 am	
9	3 December 2025	12:58 am	
9	3 December 2025	1:03 am	
9	3 December 2025	1:07 am	
9	3 December 2025	1:31 am	



Figure 2: Example of a sequence of long-tailed bat feeding buzzes (red circle) at Site 9 on 3 November at 12:58am.

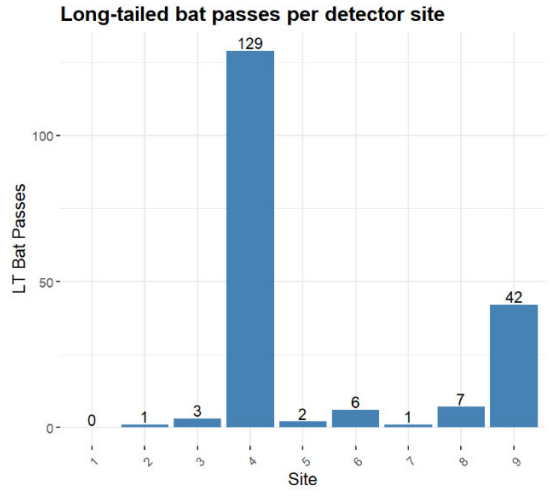


Figure 3: Total bat passes per site across the survey period.

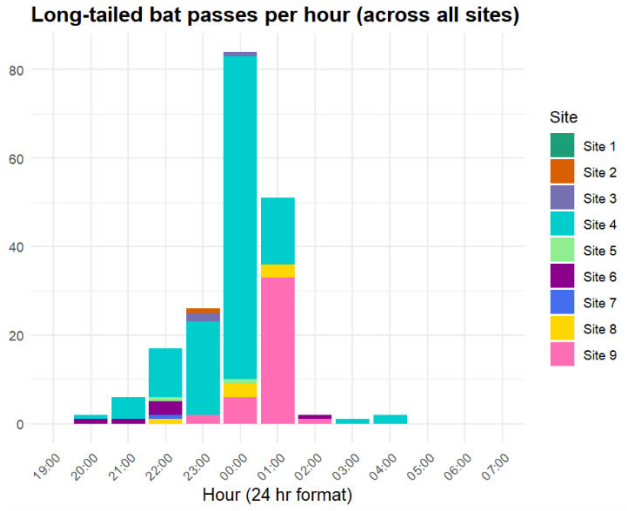


Figure 4: Total bat passes per hour, per site

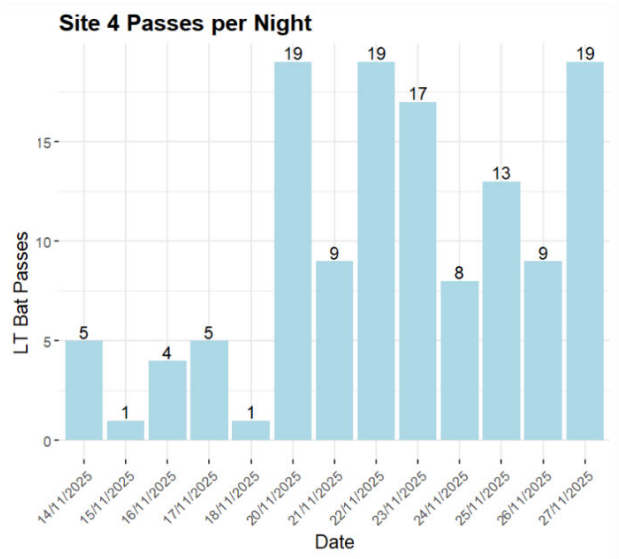


Figure 5: Total bat passes per night at Site 4.

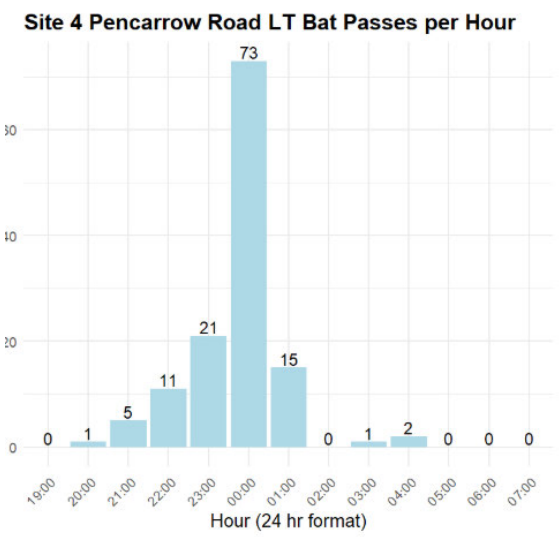


Figure 6: Total bat passes per hour at Site 4.

3.2.2 Long-tailed bats - key habitats

The key habitat at the site is likely within the kahikatea stand. In general terms, there were several trees within the kahikatea stand, particularly the dead kahikatea trees that had cavity bearing properties and these provide moderate to high potential bat roost trees (Photo 5). The open pasture areas are of lesser value with low bat activity, but pasture and associated trees and shelter belts will still be used for foraging and commuting cues.

Potential bat roost trees on the site meet the following criteria of having a DBH ≥15cm and at least one identified roost feature being:

- Cracks, crevices, cavities, fractured limbs, or other deformities, large enough to suppose roosting bat(s);
- Sections of loose flaking bark (Photo 5) large enough to support roosting bat(s); and
- Deadwood in canopy or stem of sufficient size to support roost cavities or hollows.



Photo 5: Example of a dead kahikatea with bat roost potential

3.2.3 Avifauna – manu

Manu species seen and/or heard during the site visit are recorded in Table 3. Mature exotic tree species throughout the site and the remnant kahikatea stand, provides nesting and resource areas for native birds. The open grassland areas provided foraging opportunities for a range of native species such as welcome swallow, pied stilt and pukeko. The site likely provides habitat for a range of indigenous birds, from common tui, NZ fantail, swamp harrier and kereru, and may provide occasional habitat for less common species such as North Island kaka, however none of these species were observed during the site visit. Ecology NZ observed swamp harrier, pukeko and white-faced heron whilst on site in September 2025. Other bird species such as common starling (*Sturnus vulgaris*) and yellowhammer (*Emberiza citrinella*) were detected in the eDNA sampling Ecology NZ undertook in September 2025.

No species with a threat status are expected to regularly utilise the site, which is comprised of dairy farmland and is fringed by roads on all four sides, including State Highway 1. However, bird species that can travel long distances, such as North Island kaka (*Nestor meridionalis septentrionalis*; At Risk – Recovering) may occasionally visit the site.

Table 3: Manu seen/heard on-site.

Common Name	Latin Name	Threat status (Robertson et al., 2021)
Pied stilt	*Himantopus leucocephalus*	Native, Not Threatened
Pukeko	*Porphyrio melanotus melanotus*	Native, Not Threatened
Welcome swallow	*Hirundo neoxena neoxena*	Native, Not Threatened
Paradise duck	*Tadorna variegata*	Native, Not Threatened
Kingfisher	*Todiramphus sanctus vagans*	Native, Not Threatened
Spur-winger plover	*Vanellus miles*	Native, Not Threatened
Australian magpie	*Gymnorhina tibicen*	Introduced and Naturalised
Eurasian skylark	*Alauda arvensis*	Introduced and Naturalised
Mallard duck	*Anas platyrhynchos*	Introduced and Naturalised
Rock pigeon	*Columba livia*	Introduced and Naturalised
House Sparrow	*Passer domesticus*	Introduced and Naturalised
Ring-necked Pheasant	*Phasianus colchicus*	Introduced and Naturalised
Blackbird	*Turdus merula*	Introduced and Naturalised
Song thrush	*Turdus philomelos*	Introduced and Naturalised
Chaffinch	*Fringilla coelebs*	Introduced and Naturalised

3.2.4 Lizards - mokomoko

RMA Ecology were engaged to assess native lizard/mokomoko values at the site (RMA Ecology, 2026) that report concluded the following.

Copper skink (*Oligosoma aeneum*; At Risk – Declining) is the only native lizard recorded near the site. No other native skinks or geckos are recorded within 10 km. The nearest gecko records are 15–25 km away. The site would once have supported several gecko and skink species, but its original vegetation has long since been cleared.

At least 98 % of the site is intensively managed pasture with no lizard habitat. Hedgerows, buildings, road margins and most drain margins are also assessed as having nil likelihood of lizards. There are only two locations where lizards could possibly be present, and both rate as very low likelihood:

- **The kahikatea stand.** This could support arboreal geckos, but it is small, isolated by 800–1,000 m from other treeland, and has had no pest control.
- **Parts of the main stream/drain margins.** Copper skinks could occur only where the margins carry wide, rank grass. This is about 5 % of the drain margin length.

Lizards were searched for briefly by rolling logs in the kahikatea stand and other cover that appeared potentially suitable, though no lizards were observed.

3.3 Wetlands - Repo

A wetland is an ecosystem that is either permanently or intermittently saturated with water. Wetlands support a distinct assemblage of organisms that are adapted to wet conditions. Wetlands perform important ecosystem services and functions including protecting and improving water quality, providing fish and wildlife habitats, storing floodwaters, maintaining surface water flow during dry periods and carbon storage.

The entire site was walked or driven, and potential wetlands were identified by the presence of hydrophytic vegetation. Where there was uncertainty of the status of the vegetation (wetland or non-wetland) a wetland delineation plot was undertaken. A total of nine 2x2 m plots were assessed across the site.

Four plots were assessed as non-wetlands (Table 4; Figure 1) these plots (2, 6, 7 and 8) failed both the dominance and prevalence tests and had no hydrology indicators. Two of these sites were also dominated by improved pasture species. Ryegrass and clover were the dominant species in all of these non-wetland plots.

Four plots (1, 3, 4 and 5) were assessed as artificial wetlands and not natural wetlands (Figure 1). These plots met the vegetative criteria for a wetland, however, were associated with artificial drainage channels, that were dug between 1953 and 1995 based on historical imagery (See Appendix 4). These plots were dominated by creeping bent, water pepper and hairy buttercup. Lesser amounts of starwort, toad rush (*Juncus bufonius*), annual poa grass, glaucous sweetgrass (*Glyceria declinata*) and perennial ryegrass were also present. Standing water was present in plots 1, 3 and 4. Plot 5 did not have standing water and has been assessed as an artificial wetland as it is the result of land contouring (pre-1995) as part of farming practices to form a hollow. In addition, the area is bordered by a track to the south with gate access, and a water trough to the west, providing evidence of continued modifications.

Plot 9 has been assessed as a natural wetland. This plot was dominated by water pepper and starwort (*Callitriche stagnalis*) with lesser amounts of dock and rough stalked meadow grass. This area contained standing water at the time of the assessment, passing the primary hydrology test. Any kind of artificial modification to the area cannot be seen in aerial imagery due to the presence of mature kahikatea trees, but given the fact that kahikatea are often naturally swampy wetlands it is likely that this area naturally supported a wetland. This area measures c.25 m^2.

Wetland plot photos are available in Appendix 7.

Table 4: Wetland plot results. Green shading shows non-wetland, orange shading shows artificial wetlands and blue shading is natural wetland.

Common name	Species code	Status	Plot number and coverage (%)								
			1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
Creeping buttercup	RANrep	FAC	3	7	7			6		5	8
Loosestrife	LYThys	FACW	3		2		8				
White clover	TRIrep	FACU	5	5	1	1		2	4	30	
Hairy buttercup	RANsar	FAC	6	7	4	35	5	2	18	12	
Toad rush	JUNNbuf	FACW	10		6		2	7			
Annual Poa	POAann	FACU	7	25	5	15	24		2	15	
Starwort	CALsta	OBL	2		5		15	4			15
Glaucous sweetgrass	GLYdec	OBL	23	8	7	8	8				
Broad-leaved plantain	PLAmaj	FACU	1		1		1	3			
Creeping bent	AGRsto	FACW	20		14						4
Water pepper	PERhyd	FACW	20	1	19	1	10	30			40
Ryegrass	LOLper	FAC		39	24	30	5	40	70	24	
Rough stalked meadow grass	POAtri	FACU			5			6	1		10
Broad-leaved dock	RUMobt	FAC					6		3	8	4
Track rush	JUNten	FACU					1				
Californian thistle	CIRarv	FACU								3	
Hedge Mustard	SISoff								2	3	
Bare earth				8		10	15				19
Total cover			100	100	100	100	100	100	100	100	100
Improved pasture			NO	NO	NO	NO	NO	NO	YES	YES	NO
Dominance test			YES	NO	NO	YES	NO	NO	NO	NO	YES
Prevalence index			2.1	3.28	2.64	1.95	1.96	3.06	3.69	3.63	1.79
Prevalence test			YES	NO	YES	YES	YES	NO	NO	NO	YES
Soil											
Natural Wetland			**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**

3.4 Freshwater – Te wai mauri

There is a network of artificial watercourses throughout the property which drain to the northwestern boundary with Pencarrow Road. This watercourse connects into the Mangaone Stream further downstream and then into the mainstem of the Waikato River. The network of watercourses is shown in Figure 1. The onsite watercourses were classified as artificial in October 2025, and this classification was confirmed in agreement with the Waikato Regional Council (see Appendix 3).

The artificial watercourses on the property range from 0.2 to 2 m wide and 0.05 to 0.2 m deep. The channels were very slow flowing, and the substrate was comprised of a mixture of deposited silt and sand. The smaller watercourses in the northern portion of the property were generally clear, however the channels in the southern portion, around the cowshed were highly turbid, likely due to farm track run off and the recently excavated artificial channels around the eastern side of the property.

Macrophytes were present within all assessed channels, with the exotic starwort, water pepper, watercress (*Nasturtium officianle*), water purslane (*Ludwigia palustris*), and the native swamp willow weed (*Persicaria decipiens*), and duckweed (*Lemna* sp.) observed. Short filamentous green algae and medium green mat were occasionally observed throughout the channels.

The watercourses had an open canopy, with shading on some channels provided by nearby hedgerows, or incised banks. There was no riparian buffer present and bankside vegetation was mostly comprised of exotic pastoral grasses and herbs. A single electric wire was usually present along the watercourses (Photos 8 and 9). The occasional native ferns, kiokio (*Blechnum novae-zelandiae*) and shaking brake (*Pteris tremula*) were observed throughout the site and pukio (*Carex virgata*), and *Juncus* sp. were noted on the banks of the watercourses surrounding the kahikatea stand.

The watercourses on the property are likely ephemeral (only flow for part of the year) and therefore dry out during summer, with some already dry during the site visit. The network of artificial watercourses is likely to be impacted as a result of the proposed development.



Photo 6: Artificial watercourses present on site



Photo 7: Watercourse surrounding kahikatea stand. Note Carex sp. present.

3.4.1 Freshwater fauna

Due to depth restrictions throughout the site, only Gee Minnow Traps (GMTs) could be deployed to ascertain fish presence. No fish or large invertebrates were captured during the fish survey in November 2025.

Previous eDNA samples were taken in September 2025 by Ecology NZ, at the outlet of the artificial watercourse network in the northwestern border of the property. The eDNA results detected the presence of shortfin eel/tuna (*Anguilla australis*).

The watercourses on the proposed site flow downstream into the Mangaonua Stream catchment and then into the mainstem of the Waikato Awa. Records from the FFDB[14] show that a range of native freshwater fish species have been recorded in the Mangaonua Stream catchment, downstream of the site. These species include the At-Risk-Declining longfin eel (*Anguilla dieffenbachii*), giant kokopu (*Galaxias argenteus*) and smelt (*Retropinna retropinna*). The At-Risk -Naturally uncommon Crans bully (*Gobiomorphus basalis*). The Threatened-Nationally vulnerable inanga (*Galaxias maculatus*), and the not threatened common bully (*Gobiomorphus cotidianus*), shortfin eel and the freshwater crayfish or koura (*Paranephrops planifrons*) (Dunn et al., 2025). However, habitat onsite is not considered suitable for most of these species including smelt, giant kokopu or koura.

[14] NIWA administered Freshwater Fish Database (FFDB).

4 ECOLOGICAL VALUE

The ecological values of the terrestrial, freshwater and wetland habitats within the proposed development area have been assessed against the EIANZ criteria and criteria for determining the significance of indigenous biodiversity within Section 11A of the WRPS.

The remnant kahikatea stand, exotic trees and network of hedgerows likely provide habitat for several indigenous birds as well as habitat for pekapeka (long-tailed bats).

The kahikatea stand is not mapped as a Significant Natural Area (SNA) in the Waikato District Plan. However, it is ecologically significant as it meets at least two of the Waikato Regional Council RPS Criteria for Significant Indigenous Ecosystems (refer to section 5.1.3). Although this stand has been significantly modified and degraded and is treeland rather than forest, lowland podocarp forests remnants are under-represented (20% or less of its known or likely original extent remaining. Most of the natural ecosystems of the Hamilton ED have been cleared and/or modified for agriculture and urban development; there remains less than 2% of historic vegetation cover within the ED. The ED also has approximately 0.4% of its area in wetland (Leathwick et al. 1995). Kahikatea stands are also underrepresented regionally and nationally.

4.1 Component Representativeness, Rarity/distinctiveness, Diversity and Pattern,

The ecological values of the habitat present within the proposed development site vary from **high** within the remnant kahikatea stand which provides potential roosting, commuting and foraging habitat for threatened long-tailed bats to **low** in the areas of pasture and artificial watercourses. As long-tailed bats have a critically endangered national threat status, and the site is likely regularly used as habitat by a population of this species, the site has a **very high** ecological value ranking in accordance with the EIANZ guidelines.

The ecological values associated with fauna are provided in Table 5.

The ecological value of the habitats within the proposed development are summarised in Table 6. Habitats have also been assessed against criteria for determining significance of indigenous biodiversity within Section 11A of the Waikato Regional Policy Statement (WRPS).

Table 5: Ecological value of fauna present or likely to be present at the site using the EIANZ criteria.

Species	Threat status	Ecological Value	Ecological context
Pekapeka-tou-roa	Threatened – Nationally Critical	**Very High**	Long-tailed bats are a nationally critically threatened species, and locally rare in the Waikato Region. Bats were confirmed to occur on-site.
Copper skink	At Risk - Declining	**Moderate**	Habitat on-site is limited. At least 98 % of the site is intensively managed pasture with no lizard habitat. There are only two locations where lizards could possibly be present, and both rate as very low likelihood.
Locally common indigenous bird species (e.g., tui, fantail)	Not threatened	**Low**	There were no threatened avifauna recorded at the site, and a low diversity of native species were recorded. Habitat on-site is used by a range of commonly occurring native and exotic species.
Locally common indigenous aquatic fauna (Shortfin tuna/eels)	Not threatened	**Low**	Shortfin tuna/eels were confirmed to be present onsite via eDNA analysis. The artificial drains are likely ephemeral and dry out in summer, meaning that they provide seasonal habitat.

Table 6: Ecological value of the vegetation and habitat at the site using the EIANZ criteria.

Habitat type	Representativeness	Rarity/ Distinctiveness	Diversity & pattern	Ecological Context
Artificial wetland ***Negligible to low ecological value***	Low-Moderate – Wetlands are under-represented. Comprised of exotic species and is not representative of what would have naturally occurred here.	Negligible– Highly disturbed environment.	Low - Dominated by a few exotic species. Exhibits seasonal changes in hydrology.	Negligible – The area is considered to have low quality habitat for indigenous fauna and provides little connectivity or buffering to other habitats. Does not meet any of the WRPS significance criteria.
Remnant kahikatea stand with associated wetland ***High ecological value***	High – Kahikatea stands are under-represented and now only account for <1.2% historic cover. Also comprised of other mature indigenous species. Wetlands are under-represented. Comprised of exotic species and is not representative of what would have naturally occurred here.	High – Vegetation provides commuting and foraging and potentially roosting habitat for threatened mobile species, such as long-tailed bats. Wetland was disturbed.	Moderate – The canopy is dominated by indigenous species, with an understory of exotic grasses and herbs. Wetland was dominated by a few exotic species.	High– This vegetation provides connectivity or buffering to other habitats. Several of these large trees may provide potential bat roosting habitat. Wetland is connected to kahikatea stand and has restoration potential. Meets WRPS criteria 3 and 4 and is considered to be ecologically significant.
Exotic grassland, scattered exotic trees and hedgerows ***Negligible -Low ecological value***	Negligible - Exotic vegetation comprising grasses, herbs, hedgerows and scattered exotic trees are not representative of the vegetation that would have naturally occurred here.	Low – Moderate Exotic vegetation provides commuting and foraging and potentially roosting habitat for threatened mobile species, such as long-tailed bats, and potential habitat for copper skink.	Negligible – The vegetation is dominated by exotic species. The hedgerows comprise hawthorn and barberry which are considered weedy species[15].	Low– The area is considered to have low quality habitat for indigenous fauna. Trees are limited to scattered individuals or clusters of a few trees. Does not meet any of the WRPS significance criteria.
Artificial watercourses ***Low ecological value***	Low - Comprised almost entirely of exotic species, ephemeral in places and were artificially created.	Low – Appears to seasonally support one indigenous common species (shortfin eel)	Low - Dominated by exotic species.	Low - Moderate – Exotic habitat which provides intact connectivity or buffering to other habitats (i.e. Mangaone Stream) when watercourses are flowing.

[15] Weed List • Weedbusters

5 ASSESSMENT AGAINST RELEVANT POLICIES AND PLANS

5.1.1 Te Ture Whaimana o te Awa o Waikato

Te Ture Whaimana o te Awa o Waikato (Vision and Strategy for the Waikato Awa) recognises the significance of the Waikato Awa to Waikato-Tainui, with the vision, objectives, and strategies applicable to Waikato Awa tributaries and catchment. The Vision and Strategy (V&S) is acknowledged as the primary, direction-setting document for the Waikato Awa. In order to realise the Vision, 13 objectives (listed A – M) are detailed. These are:

A. The restoration and protection of the health and wellbeing of the Waikato River
B. The restoration and protection of the relationship of Waikato-Tainui with the Waikato River, including their economic, social, cultural, and spiritual relationships.
C. The restoration and protection of the relationship of the Waikato River iwi according to their tikanga and kawa, with the Waikato River, including their economic social, cultural, and spiritual relationships.
D. The restoration and protection of the relationship of the Waikato region's communities with the Waikato River including their economic, social, cultural, and spiritual relationships.
E. The integrated, holistic and coordinated approach to management of the natural, physical, cultural and historic resources of the Waikato River.
F. The adoption of a precautionary approach towards decisions that may result in significant adverse effects on the Waikato River, and in particular those effects that threaten serious or irreversible damage to the Waikato River.
G. The recognition and avoidance of adverse cumulative effects, and potential cumulative effects, of activities undertaken both on the Waikato River and within its catchments on the health and wellbeing of the Waikato River.
H. The recognition that the Waikato River is degraded and should not be required to absorb further degradation as a result of human activities.
I. The protection and enhancement of significant sites, fisheries, flora and fauna.
J. The recognition that the strategic importance of the Waikato River to New Zealand's social, cultural, environmental and economic wellbeing requires the restoration and protection of the health and wellbeing of the Waikato River.
K. The restoration of water quality within the Waikato River so that it is safe for people to swim in and take food from over its entire length.
L. The promotion and improved access to the Waikato River to better enable sporting, recreational, and cultural opportunities.
M. The application to the above of both maatauranga Maaori and latest available scientific methods.

This proposed development will not result in the loss of any natural wetlands or natural/modified watercourses. All aquatic biota will be salvaged during any infilling of artificial watercourses in line with a site-specific Fish Management Plan (FMP) and site works will be done in accordance with a specific Erosion and Sediment Control Plan, to minimise any downstream effects of sediment entering waterways.

To support the objectives outlined above and provide an element of ecological betterment, the wetland area near the southwestern extent of the kahikatea stand will be restored and, where practicable, extended as part of the development (see accompanying EMP).

5.1.2 Tai Tumu Tai Pari Tai Ao (Waikato-Tainui Environmental Plan)

Tai Tumu Tai Pari Tai Ao, the Waikato-Tanui Environmental Plan (WTEP) was developed out of the Whakatupuranga 2050 long-term development approach with the key strategic objective '*to grow our tribal estate and manage natural resources*'.

To align with Tai Tumu Tai Pari Tai Ao, this development will be designed and implemented in a manner that ensures that environmental and cultural effects are protected and enhanced to ensure that the integrity of aquatic and terrestrial ecosystems is not compromised.

5.1.3 Waikato Regional Policy Statement criteria

To be identified as significant indigenous vegetation or significant habitat for indigenous fauna species in the Waikato, an area needs to meet one or more of the WRPS criteria for significant indigenous ecosystems. The remnant kahikatea treeland stand onsite meets criteria 3 and 4 and is considered to be ecologically significant.

5.1.4 National Policy Statement for Freshwater Management and National Environmental Standards for Freshwater

The concept of Te Mana o te Wai is about restoring and preserving the balance between the water, the wider environment, and the community. Te Mana o te Wai encompasses 6 principles relating to the roles of tangata whenua and other New Zealanders in the management of freshwater: Mana whakahaere, Kaitiakitanga, Manaakitanga, Governance, Stewardship and Care and respect.

The protection of wetlands has become part of national policy, with the National Policy Statement for Freshwater Management (NPS-FM) with regulations listed in the National Environmental Standards for Freshwater (NES-F) both of which came into force in September 2020. The Essential Freshwater package introduced policies and regulations to protect 'natural wetlands' with nationally consistent standards, whereby the loss of natural inland wetlands is avoided and their values protected.

Plot 9 was classified as a natural inland wetland and is likely covered under Regulation 53 of the NES-F. Activities which detrimentally impact the wetland are considered non-complying or prohibited depending on the level of activity. In this case, the works will enhance Plot 9 and will not result in adverse impacts to the Plot 9 wetland.

5.1.5 National Policy Statement for Indigenous Biodiversity

The National Policy Statement for Indigenous Biodiversity (NPS-IB) was published in 2023 (MfE, 2023) with the main objective to maintain indigenous biodiversity across Aotearoa New Zealand so that there is at least no overall loss in indigenous biodiversity after the commencement date.

The Waikato District Plan shows no Significant Natural Areas (SNAs) on site. Furthermore, separate the SNA WRC assessment did not identify any SNAs (van der Zwan & Kessels 2018).

Nontheless, in terms of the NPS -IB, the criteria for identifying areas that qualify as significant natural areas (refer to Appendix 1 NPS-IB) is relevant. Applying these criteria, the kahikatea stand on site triggers criterion C-(6)(a), as it provides habitat for an indigenous species that is listed as Threatened or At Risk (declining) in the New Zealand Threat Classification System lists, by providing foraging, commuting and possibly roosting, habitat for long-tailed bats (attributes of rarity and distinctiveness).

Long-tailed bats are also listed as a 'highly mobile species' in the NPS-IB and areas outside of SNAs that support mobile fauna need to be identified and managed to maintain their populations across their natural range. In this regard the large trees onsite provide foraging and commuting habitat and may

provide potential roosting habitat and will need to be managed in line with the requirements in this report.

5.1.6 Fast Track Approvals Act 2024

The Fast Track Approvals Act is a streamlined consenting pathway introduced by the NZ Government to accelerate infrastructure, housing, and development projects of regional or national significance. This proposal has been assessed in accordance with the Act. In relation to section 43 for substantive application, the proposal addresses key ecological issues, including effects on long-tailed bats as well as the kahikatea stand and associated wetland. These are managed through an effects management hierarchy, including retention of the kahikatea stand and natural wetland, restoration planting, pest control, lighting restrictions and establishment of a bat commuting (light) corridor, resulting in maintained or enhanced ecological values.

In relation to section 43 the proposal is consistent with relevant regional and district planning documents as listed in this section (Section 5). Particularly those relating to the protection and enhancement of indigenous biodiversity, through avoidance of effects on high-value habitats such as the kahikatea stand and natural wetland and implementation of restoration measures. potential adverse ecological effects include vegetation clearance, disturbance to bat habitat and behaviour (including lighting effects), and impacts on aquatic habitat and fish. These effects are avoided, remedied, or mitigated through avoidance, enhancement and the implementation of Management Plans.

In relation to Schedule 5, clause 2, the proposal has been assessed against relevant national policy statements and environmental standards.

6 ASSESSMENT OF ECOLOGICAL EFFECTS

6.1 Overview of Potential Adverse Effects

This section provides an overview of the actual and potential ecological effects of developing the site, followed by an assessment of ecological effects following the EcIA methodology outlined in Appendix 6.

In general terms, habitat loss associated with the development of the proposed horse racecourse and associated infrastructure has the potential to create a range of adverse effects on biodiversity values, during enabling works construction (resulting from direct physical disturbance), seasonal construction, and on an ongoing basis. These potential and actual adverse effects on biodiversity values during and after construction may include:

- Effects on terrestrial habitats;
- Effects on freshwater and wetland habitats;
- Effects on fauna due to disturbance and the ongoing land use change; and
- Effects from earthworks, sediment and stormwater.

6.2 Effects on Terrestrial Vegetation

The remnant kahikatea treeland stand has **high** ecological value, as any remnant lowland podocarp forest, even treeland, has ecological value in this highly modified landscape (refer to section 3.1.1). The stand also provides foraging and commuting habitat for long-tailed bats as well as potential roost habitat.

The proposal will not remove the 0.95 ha treeland, and in fact, removal of stock will likely save the stand from gradual degradation due to root damage. It is estimated that without stock removal, the treeland would be largely destroyed over the next ten to twenty years.

All other vegetation is exotic including large hedgerows which are comprised of weedy species, exotic wetlands and exotic trees. Outside of the remnant kahikatea stand, the remainder of the vegetation on the property has Negligible botanical value.

However, the large exotic trees provide commuting and foraging habitat for bats (Section 3.2.2), as well as potential roosting habitat. Any clearance will need to be managed in accordance with the requirements in this report (see section 6.3.1).

The creation of bare earth as a result of construction has the potential for weed colonisation, and this is highly likely given the nearby seed source of the open pastoral areas which contain predominately exotic species. Therefore, any open areas should be managed by an approved erosion and sediment control plan

Principles for the restoration and management of the remnant kahikatea stand are presented in Appendix 8. These principles provide a basis for the comprehensive Ecological Management Plan (EMP) which has been prepared to address the restoration process for the kahikatea stand.

Restoring the kahikatea stand in accordance with a prescribed Ecological Management Plan (EMP) will ensure that any potential adverse effects can be mitigated.

6.3 Effects on Terrestrial Fauna

Development may cause several adverse effects on terrestrial fauna habitats, including habitat loss, habitat fragmentation, changes in microclimates, and increases in noise, and lighting.

In general terms, habitat loss associated with the development and associated infrastructure has the potential to create a range of adverse effects on indigenous fauna values, during enabling works construction (resulting from direct physical disturbance), seasonal construction, and on an ongoing basis. These potential adverse effects on biodiversity values during and after construction may include:

- The creation of habitat edge effects, altering the composition and health of adjacent vegetation (i.e., habitat degradation), which may affect habitat suitability for fauna.
- Direct mortality or injury to species, for example the smaller less mobile species (e.g., lizards) may be harmed during vegetation clearance or earthworks activities. Outside of bird breeding season, bird mortality would be low, however, during breeding season vegetation removal has the potential to result in the destruction of nests, eggs and fledglings. Native fauna (bats, birds and lizards) is protected under the Wildlife Act 1953 and measures will be required to minimise direct harm to native wildlife.
- Habitat fragmentation and isolation, due to the loss and reduction of available habitat types, and by reducing the ability for plants and animals to disperse across the landscape for food, shelter, and breeding purposes, i.e., severing or partially severing access to habitats that would otherwise be suitable; and
- Construction and operations related noise and vibrations or dust effects.

Potential long-term ongoing adverse effects may include:

- Increase in the number of introduced mammalian predators on site, such as rats and cats;
- Ongoing disturbance effects, particularly on habitat margins/edges, through noise, dust and lighting associated with infrastructure.
- Mortality or injury on roads through strike or roadkill for some species; and
- The increased presence of people and introduced species in previously less accessible areas.

These potential effects and measures to avoid, remedy or mitigate any significant adverse effects are discussed in the following sections.

Overall, the proposal is expected to have a minor effect on fauna habitat values, which are already highly degraded and modified. The site is surrounded by roads on four sides, including State Highway 1 to the north, and the fauna currently using the site are therefore likely to be accustomed to a degree of human disturbance. The proposed development also provides an opportunity for an overall biodiversity gain through the creation of open space areas incorporating artificial wetlands and the restoration of native forest and/or shrubland habitat.

Restoring and managing the kahikatea stand (as outlined in Appendix 8 and the EMP) will provide ecological benefits for native wildlife such as birds, bats, and lizards that use the area and would be considered appropriate mitigation. However, all works across the site should be carried out in accordance with an Ecological Management Plan (EMP) to ensure any adverse effects (such as those listed above) are effectively mitigated.

6.3.1 Long-tailed bats - Pekapeka-tou-roa

The bioacoustics survey indicates bat activity at the site ranged from low in areas of pastoral farmland with scattered trees to relatively high within the kahikatea stand. Long-tailed bats have a threat status of Threatened- Nationally Critical and have a **very high** ecological value.

The development of the land including the establishment of a horse racecourse, training facility, harness racing and associated infrastructure may cause several adverse effects on long-tailed bats , including habitat loss, habitat fragmentation, and increases in noise and lighting (Smith et al. 2017).

The effects to long-tailed bats and their habitats have been assessed separately in a memo (Bluewattle Ecology, 2026) which is summarised in this section including Table 7.

Table 7: Summary of potential effects on long-tailed bats and their habitat values and management responses (Source: Bluewattle Ecology, 2026)

Effect pathway	Unmanaged consequence	Ideal management
Removal of confirmed or potential roost trees	Loss of scarce roost resource; direct injury or mortality; reduced roost network resilience.	Avoid; redesign; seasonal and weather-constrained current DOC protocols; supervised felling; replacement habitat; compensation linked to actual loss.
Loss of shelterbelts, tree lines, wet edges and pasture matrix	Reduced foraging area and edge habitat; severed routes; conversion from rural to developed habitat.	Map and retain strategic links; staged clearance; establish dark vegetated corridors before severance.
Track floodlighting	Avoidance, delayed emergence, reduced foraging and corridor use; possible exclusion around key habitat.	Shielding, warm spectrum, kahikatea stand buffer planting.
Public, road, parking, commercial and residential light	Cumulative erosion of dark habitat and permeability across the site.	Low light dark corridors; adaptive controls and audit.
Construction and operational noise	Disturbance or displacement near roosts and along corridors; overlap with emergence and foraging periods.	Unlikely to be significant.
Traffic and headlights	Collision risk, corridor avoidance and repeated light pulses.	Low-speed bat-sensitive zones, dipped headlights, planting screens and route design.
Tall masts and wires/structures	Potential behavioural barrier or collision risk, especially when lit.	Unlikely to be significant.
Increased predators and domestic animals	Higher predation pressure at roosts and restored habitat.	Pest management, predator bands where appropriate, refuse control and domestic animal rules for residential components.
Construction disturbance and accidental discovery	Injury, mortality or abandonment of roosts.	Induction, demarcation, exclusion areas, stop-work and emergency response.
Cumulative landscape change	Loss of resilience and connectivity within the southern Hamilton/Tamahere bat landscape.	Coordinate monitoring and habitat enhancement with wider initiatives; secure off-site compensation if required.

6.3.1.1 Long-tailed Bat Effects Management Recommendations

The following measures are recommended in Bluewattle Ecology (2026) to reduce the scale of these potential adverse effects (also see Table 8):

- Retain, and legally protect the kahikatea stand and create a functionally adequate buffer ecotone around it.
- Set a dark-zone outdoor lighting performance standard set for the RLB areas to create a dark zone, and hence access pathway for bats into the potential habitat areas.
- Avoid potential bat roost-tree removal where practicable; otherwise apply current DOC bat-roost protocols when felling bat roost trees. Incorporate planting cavity bearing trees within the landscape and restoration planting plans.
- If analysis of the two further '26/'27 bioacoustic monitoring rounds suggest regular and relatively high use, determine if there are residual, unmitigated adverse effects on use of key habitat by long-tailed bats. If residual effects are predicted, compensate for residual adverse effects on bats and their habitat using targeted additional long-term predator control and habitat enhancement in high value habitat offsite, but within the home range for the local population (see section 6.3.2 below).

Table 8. Summary of effects management response requirements

Requirement	Timing	Recommended outcome
Bat Management Plan	Submit a final BMP before enabling or construction works	Prepared by a suitably qualified bat ecologist; independently peer reviewed; DOC and council given at least 20 working days to comment; certified before works begin.
Habitat protection	Before works and in perpetuity	Restore and legally protect the kahikatea stand and its ecotone. No built development or artificial lighting infrastructure within this area except approved ecological works.
Corridor and connectivity	Plant before, or in the first suitable season following, relevant works. Implement dark zone lighting standards within the RLBs.	Provide performance standards to achieve a dark zone corridor within the RLB area as outlined in the draft BMP.
Vegetation clearance	Before and during clearance	Avoid removal potential bat roost trees wherever possible. Where removal cannot be avoided, use current DOC tree-felling protocols as detailed in the draft BMP.
Compensation (if required)	Determine if compensation is required following further '26/'27 bioacoustic surveys. In required secure compensation package before relevant habitat impact; fund before construction starts.	If required provide funding for mammalian predator control/habitat enhancement in high-potential bat-roost habitat.
Reporting and review	Annual reporting; formal reviews at years 1, 3, 5 and 10	Report habitat loss, lighting compliance, planting, pest results, bat activity, incidents, expenditure and responses. Council may require BMP amendments or further compensation after review.

6.3.1.2 Residual-effects assessment and response pathway

The Bluewattle Ecology memo outlines potential habitats available for utilisation by bats once the Greenfield Hub is operational, and once these features achieve functional habitat value for bats. Of the 160 ha associated with the development of the site, some 112.7 ha will be potentially available for utilisation by bats. However, as noted above, artificial lighting will restrict utilisation to these areas to an unquantifiable extent.

Lighting controls are recommended in the Bluewattle Ecology (2026) memo, and these measures will likely reduce access deterrence associated with artificial lighting. Due to the nature of the race and training track activities, and lighting associated with other infrastructure on site, there still may remain some residual adverse restrictions for bats to use the full extent of available habitat, even with lighting restrictions.

Residual-effects and compensation analysis is recommended to address possible residual adverse effects on bats and their habitat on the site following analysis of data collected from additional monitoring to be undertaken over the 2026-2027 spring/summer seasons. If required, a rationally derived compensation payment, the quantum of which is determined by suitably experienced and qualified bat ecologists, can then be made to a competent conservation provider for pest control and/or other proven bat habitat enhancement measures in a number of smaller high-potential bat-roost habitats within the home range of this population of bats.

The recommended consenting solution to addressing any residual effects is a consent-backed compensation package, based on the approach used in the SH1 Cambridge-to-Piarere Fast-track decision, but scaled accordingly for this project. The regulatory pathway precedent has been set by several other consents and plan changes in the Waikato basin.

6.3.1.3 Bluewattle Ecology Long-tailed bat effects assessment update conclusion

The project site supports confirmed, relatively high long-tailed-bat activity around the kahikatea stand and a wider functional habitat matrix in a locality with well-established and widespread long-tailed bat utilisation.

The proposed intensity of development and lighting creates residual adverse effects on bats and their use of habitat on the site through physical habitat loss, illumination, fragmentation, disturbance and delayed replacement-habitat function, which will be avoided, remedied, mitigated or compensated (if required) through implementation of the measures recommended in Tables 7 and 8.

6.3.2 Avifauna - Manu

The vegetation onsite, particularly mature indigenous and exotic trees may contain native birds and clearance of this vegetation has the potential to cause injury to or death of native birds, particularly during the breeding season. Native birds within the area should be able to emigrate out of the area, unless unfledged chicks are present in nests. The site supports common indigenous species with **low** ecological values.

To reduce the likelihood of bird mortality, vegetation removal of any mature trees will include checks for nesting birds at the same time as bat pre-felling checks. Provided this mitigation measure is implemented, this will reduce the magnitude of effects to **low**, resulting in a **negligible** overall level of effect.

6.3.3 Lizards - Mokomoko

Lizards can be difficult to detect and may be present onsite, particularly copper skink. Potential direct and indirect effects of development include habitat loss, and food resources loss. Copper skinks have an 'At Risk – Declining' threat status and are therefore habitat for this species is of have **high** ecological value. No indigenous lizards have been found to date, and the RMA Ecology (2026) report assessed the site as having a low likelihood of habitation.

With the following conclusions from RMA Ecology (2026). *Because the likelihood is so low, we conclude that a pre-clearance survey and a Wildlife Act authority are not needed.*

We recommend a Lizard Accidental Discovery Response Protocol as a consent condition instead.

Under the protocol, work stops within 20 m of any find, the Project Ecologist and the Department of Conservation are notified, and relocation, salvage and record-keeping follow as directed. The kahikatea stand will be retained, so there is no risk to any geckos there.

*With the protocol in place, the report assesses residual effects on native lizards as **negligible** (de minimis).*

6.4 Effects on freshwater habitats and biota - Te wai mauri

The artificial watercourses on site are shallow and likely ephemeral. There is minimal overhead canopy cover and riparian vegetative protection, and no fish were recorded during the trapping survey. Shortfin eels were detected during an eDNA survey at the outlet of the site. The watercourses onsite are of **low** ecological value.

However, given that the watercourses do provide habitat for shortfin eels, all activities on site will need to be managed to ensure there is no adverse effect on these environments. Fish recovery will need to take place if watercourses are to be infilled or diverted, so long as water is present within the channel. A Fish Management Plan (FMP) will be designed in accordance the Waikato Regional Council guidelines, mitigating potential adverse effects to any aquatic biota present onsite.

In addition, specific measures will need to be implemented as part of any future development on the land to ensure that contaminants from the proposed development do not enter downstream waterways.

Provided FMP is designed and implemented onsite during development, this mitigation will reduce any potential adverse effects on fish to **very low.**

6.4.1 Sediment and erosion

Activities undertaken as part of the development have the potential to generate sediment, which, if unmitigated, could potentially enter the receiving environment. Erosion control measures must be put in place to ensure there is no adverse effects on downstream receiving environments, namely the Mangaonua Stream and Waikato Awa. Areas of bare earth must be vegetated or covered as soon as possible to reduce the risk of erosion and sedimentation and weed colonisation on bare ground.

It is anticipated that sediment and erosion will be adequately controlled through a sediment and erosion plan which will be designed in accordance the Waikato Regional Council guidelines, mitigating potential adverse effects to the receiving environment. This will reduce the overall effect to the receiving environment to **negligible**.

6.4.2 Stormwater

Intensification of commercial development and roading is likely to alter land surfaces to make them less permeable to water, by both compaction of land surface and increased imperviousness (e.g. roads and new buildings). This can result in increased stormwater runoff and catchment scale erosion and flooding impacts. Stormwater will be managed onsite to protect the receiving environment.

Ensuring the stormwater is treated onsite will be essential to protecting the water quality within the downstream receiving environments, which includes the Waikato Awa. It is anticipated that conveyance, treatment and detention devices will be able to mitigate any potential adverse effects as long as they are fit for purpose and designed and incorporated and following best practice guidelines and regulations. This will reduce the overall effect to the receiving environment to **negligible**.

7 SUMMARY

This EcIA report has been prepared to assess the ecological values and features of the site as well as the potential and actual effects associated with a proposed horse racecourse, training centre, harness racing and associated development at Pencarrow Road, Tamahere.

The site is a highly modified c.160 ha property and is currently comprised of two working dairy farms with associated infrastructure including milking sheds, animal shedding, feed storage, and multiple residential properties.

Fauna ecological values range from **very high** for 'Threatened – Nationally Critical' long-tailed bats, to **low** for common indigenous bird species and shortfin eel.

Across most of the proposed development site, the ecological value of the vegetation and habitats range from **negligible** to **low**. The kahikatea stand is an underrepresented habitat type, has an area of natural wetland and provides habitat for bats and has been assessed as having **high** ecological value. As part of the development this area will be avoided and measures to protect this area will include setbacks and planting to restore and screen artificial lighting and a light corridor. Most of the adverse effects as a result of the development can be mitigated through the restoration and management of the kahikatea stand, with the approach presented in Appendix 8.

The proposed intensity of development and lighting creates residual adverse effects on bats and their use of habitat on the site through physical habitat loss, illumination, fragmentation, disturbance and delayed replacement-habitat function, which will be avoided, remedied, mitigated or compensated (if required) through implementation of the measures recommended in the Bluewattle Ecology (2026) memo and summarised in Table 8.

After proposed measures to avoid, remedy, and mitigate have been undertaken, the magnitude and level of effects are summarised in Table 9.

Potential adverse effects on biodiversity values as a result of the development can be addressed through the following measures:

- The kahikatea stand will be retained and restored. This area is an underrepresented vegetation type and provides a high-value habitat for bats. Most adverse effects can be compensated at this location through restoration and management measures including fencing, planting and pest control. Details have been provided in the EMP prepared for the Project.
- Restoration of the kahikatea stand will include additional wetland creation and restoration, further enhancing the ecological values of the site.
- Long-tailed bats are a very-high-value receptor, and the site forms part of a wider functional habitat matrix. The proposed retention, restoration, roost-tree protocols, dark-corridor controls and monitoring will reduce adverse effects. However, determination of the extent of residual adverse effects on bats, if any, will require finalisation of the compensation determination process. Regardless, it is expected that the residual effects will not be so significant that an appropriately devised compensation package will not be able to address these residual effects on bats and their habitat use on site.
- Impacts to native fish, namely shortfin eel can be minimised by undertaking fish recovery in any wetted watercourse to be disturbed.
- Impacts regarding stormwater and sediment discharges to the receiving environment can be avoided by following best practice guidelines and regulations.
- Areas of bare earth will need to be immediately vegetated or covered to reduce the risk of erosion and sedimentation and weed colonisation on bare ground.

- Implementation of these ecological avoidance, remediation and mitigation measures are detailed in an EMP for the site. Separate draft FMP and BMP's have been prepared. All environmental plans should be independently peer reviewed and certified in accordance with the consent conditions before enabling or construction works commence.

Table 8: Summary of the activity, magnitude of effect, and overall level of effect without and with mitigation.

Activity and effect	**Ecological Value**	**Magnitude of effect**	**Overall level of effect without mitigation**	**Overall level of effect with summary management measures**
Fauna disturbance due to development - bats	Very high	High	Very High	Moderate - Low - See requirements and details in the bat effects memo (Bluewattle Ecology, 2026) and draft BMP.
Fauna disturbance due to vegetation clearance– indigenous birds and lizards	Low	Low	Very low	Negligible –Habitat enhancement of the kahikatea stand will add habitat for native birds and lizards. Undertake checks for nesting birds at the same time as bat pre-felling checks. Retain cover objects such as wood and leave within the kahikatea stand as lizard habitat. A Lizard Accidental Discovery Response Protocol is recommended as a consent condition instead.
Kahikatea stand and associated natural wetland	High	Low	Moderate	Net gain – Avoid impacts to the kahikatea stand and undertake management and restoration (As per the EMP).
Fauna disturbance due to watercourse loss – shortfin eels	Low	Low	Low	Low – Develop and implement a FMP for any instream works, to locate, recover and translocate fish.
Stormwater and Sediment & erosion	Low	Low	Very low	Negligible – Onsite treatment of stormwater and following best practice guidelines and regulations.

8 REFERENCES

Atkinson, I. A. E. (1985). "Derivation of vegetation mapping units for an ecological survey of Tongariro National North Island, New Zealand". New Zealand Journal of Botany, 23(3), 361–378

Bluewattle Ecology. 2026. Waikato Thoroughbred Racing Greenfields Hub Long-tailed Bat Effects Assessment Update.

Davidson-Watts, I. (2019). Long-tailed Bat Trapping and Radio Tracking Baseline Report 2018 and 019 Southern Links, Hamilton. Report prepared for Aecom NZ Ltd.

Dunn, N.R.; Closs, G.P.; Crow, S.K.; David, B.O.; Goodman, J.M.; Griffiths, M.; Hicks, A.S.; Hickford, D.C; Kitson, J.C.; Ling, N.; Waters, J.; Wylie, M.J.; Hitchmough, R.A.; Makan, T. (2025). Conservation Status of New Zealand Freshwater Fishes, 2023. New Zealand Threat Classification Series 46. Published by Department of Conservation, PO Box 10420, The Terrace, Wellington 6143, New Zealand. 11 p.

Leathwick, J. R., Clarkson, B.D, Whaley, P. (1995). Vegetation of the Waikato Region. Client report, Landcare Research, Hamilton, New Zealand.

Ling, N.; O'Brien, L.K.; Miller, R.; Lake, M. 2013: A revised methodology to survey and monitor New Zealand mudfish. Department of Conservation, Wellington (unpublished).

McEwan, M. 1987. Ecological Regions and Districts of New Zealand. New Zealand Biological Resources Centre. Published by Department of Conservation, PO Box 10420, The Terrace, Wellington 6143, New Zealand.

Ministry for the Environment (MfE) (2020a) (Version January 2024): National Policy Statement for Freshwater Management (NPS-FM) 2020, approved by the Governor-General under section 52(2) of the Resource Management Act 1991 on 3 August 2020, published by the Minister for the Environment under section 54 of that Act, 75 p

Ministry for the Environment (MfE) (2020b). Wetland Delineation Protocols. Landcare Research, Hamilton. Report prepared by Landcare Research for Ministry of the Environment.

Ministry for the Environment (MfE) (2023) National Policy Statement for Indigenous Biodiversity (Wellington, 2023).

O'Donnell, C.F.J. (2001). Home range and use of space by Chalinolobus tuberculatus, a temperate rainforest bat from New Zealand. Journal of Zoology 253: 253–264.

O'Donnell, CFJ; Borkin, KM; Christie, JM; Lloyd, B; Parsons, S; and Hitchmough, RA. (2018). Conservation status of New Zealand bats, 2017. New Zealand Threat Classification Series 21. Published by the Department of Conservation, Wellington, NZ. 4 p

O'Donnell, C.F.J.; Borkin, K.M.; Christie, J.E.; Davidson-Watts, I.; Dennis, G.; Pryde, M.; Michel, P. (2022). Conservation Status of Bats in Aotearoa New Zealand, 2022: New Zealand Threat Classification Series 41. Published by Publishing Team, Department of Conservation, PO Box 10420, The Terrace, Wellington 6143, New Zealand. 18 p.

Robertson, H.A.; Baird, K.A.; Elliott, G.P.; Hitchmough, R.A.; McArthur, N.J.; Makan, T.D.; Miskelly, C.M.; O'Donnell, C.F.J.; Sagar, P.M.; Scofield, R.P.; Taylor, G.A.; Michel, P. (2021). Conservation status of birds in Aotearoa New Zealand, 2021 . New Zealand Threat Classification Series 36. Department of Conservation, Wellington. 43 p.

RMA Ecology, 2026. Pencarrow FTAA: Lizard assessment. Prepared by RMA Ecology.

Roper-Lindsay, J., Fuller S.A., Hooson, S., Sanders, M.D., Ussher, G.T. (2018). Ecological impact assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition.

Sedgeley, J. A., & O'Donnell, C. F. J. (1999). Roost selection by the long-tailed bat, Chalinolobus tuberculatus, in temperate New Zealand rainforest and its implications for the conservation of bats in managed forests. Biological Conservation, 88(2), 261–276.

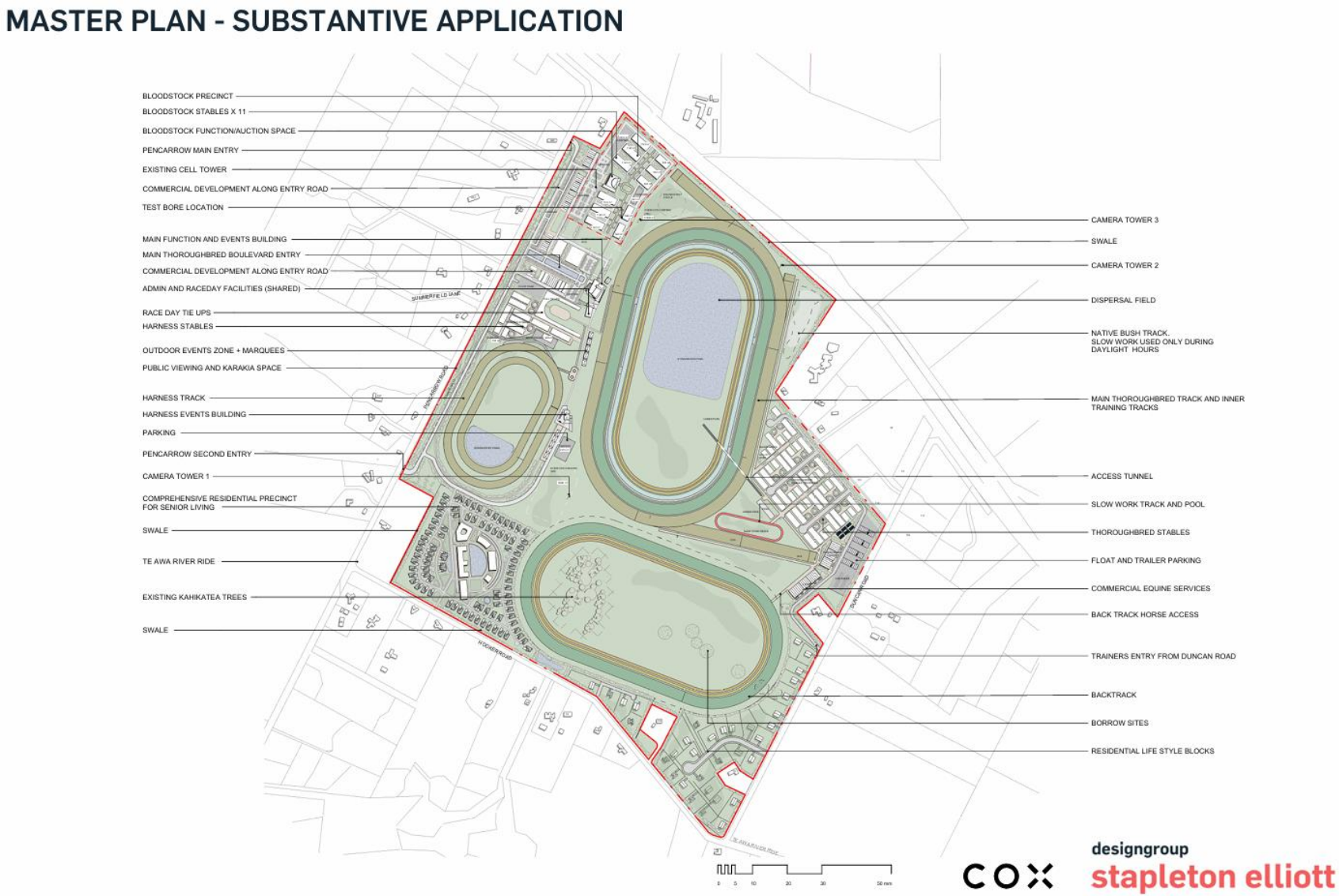
Singers, N.J.D.; Rogers, G.M. (2014). A Classification of New Zealand's Terrestrial Ecosystems. Science for Conservation 325. Published by Publishing Team, Department of Conservation, PO Box 10420, The Terrace, Wellington 6143, New Zealand. 87 p.

Waikato Regional Council. (2016). The Waikato Regional Policy Statement - Te Tauākī Kaupapahere o te Rohe o Waikato. Waikato Regional Council, Hamilton. Document # 3647993

Wildland Consultants Ltd. (2023). Updated guidelines for determining areas of significant indigenous vegetation and habitats of indigenous fauna in the Waikato region. Waikato Regional Council Technical Report 2023/03.

van der Zwan, W.; Kessels, G.H.A. 2018: Significant natural areas of the Waikato District: terrestrial and wetland ecosystems. Waikato Regional Council Technical Report 2017/36. Kessels Ecology Contract Report to Waikato Regional Council, Hamilton, 134 p.

Appendix 1: Proposed Site Master Plan



Appendix 2: Stakeholder feedback and applicant response

Waikato Regional Council and Department of Conservation feedback on the WTR fast track Project. Table highlights comments and how they have been addressed in this ECiA. Note: Only ecology comments have been described here and for other comments, refer to those speciality reports.

Waikato Regional Council		
Feedback commentary	**Applicant response**	**References**
Te Ture Whaimana o Te Awa o Waikato - the Vision and Strategy for the Waikato River is incorporated into the WRPS and is relevant to this referral application. Given the site's location within the Waikato River catchment, any substantive application must address in further detail how the proposal will give effect to Te Ture Whaimana.	Te Ture Whaimana o Te Awa o Waikato is specifically addressed in this ECiA. The Vision and Strategy (V&S) is acknowledged as the primary, direction-setting document for the Waikato Awa which is achieved through 13 objectives. This proposed development will not result in the loss of any natural wetlands or natural/modified watercourses. All aquatic biota will be salvaged during any infilling of artificial watercourses in line with a site-specific Fish Management Plan (FMP) and site works will be done in accordance with a specific Erosion and Sediment Control Plan, to minimise any downstream effects of sediment entering waterways. To ensure that the objectives listed in the V&S area realised, and to ensure there is an element of betterment to the Project. The wetland area is near the southwestern extent of the kahikatea stand and will be restored and extended as part of this development.	Refer to Section 5.1.1.
Freshwater - The fish survey methods (trapping and eDNA) outlined in the Ecological Impact Assessment (EIA) are considered appropriate, and the conclusion that the ecological value of these watercourses is 'low' is supported. As noted in the assessment, any works associated with the watercourses will require a Fish Management Plan to capture and relocate any fish.	Yes, the applicant with the need for a Fish Management Plan (FMP) which has been documented in this ECiA as a requirement to mitigate against any adverse effects on aquatic biota during site development. The FMP will be submitted alongside the application to support this.	Refer to Section 6.4 for requirements for FMP and accompanying FMP will be submitted alongside the substantive application.
Freshwater - Based on the Stormwater Modelling Report, it is expected that some or all of the existing watercourses will be infilled, resulting in a net loss of the waterway network. While these	The ecological function of the artificial watercourses on at the proposed site has been explained in section 3.4 and following supported by Table 6 (Section 4.1). These sections indicate that the	Refer to Section 3.4, 4.1 (Table 6)

watercourses are artificial and considered to have low ecological value, they nevertheless provide important ecological functions, including habitat value and connectivity to downstream environments (e.g. catchment contribution and fish foraging area). Further assessment of the ecological function would be beneficial to determine how the proposal aligns with the NPS-FM.	watercourses on site are ephemeral and therefore only flow for part of the year. While they are connected to downstream freshwater environments, the availability of this upstream habitat is seasonal (during times of flowing water) and is of low ecological value. There is a lack of riparian cover and instream habitat, and these watercourses are very shallow. These factors along with no fish captured during the fish survey, and only shortfin eel being detected in eDNA samples (a tolerant species to degraded conditions) highlight the low value habitat present on site. In terms of ecological function as a result of hydrology. There will still be water exiting the site through sub-surface drains and treatment swales, so hydrology will be maintained.	
Freshwater - The on-site watercourses discharge into downstream systems of higher fisheries value, including the Mangaone Stream and the Waikato River. Accordingly, careful management is required to protect the ecological integrity of these receiving environments. The implementation of best practice measures for stormwater management, contaminant control, and hydrological management should be undertaken as part of site development to avoid adverse effects on these downstream water bodies.	The applicant agrees with the commentary. A site-specific erosion and sediment control plan has been listed as a measure to mitigate against any adverse effects of site development on the downstream receiving environments, and a stormwater plan additionally will be required to support this. Works will also be in line with Waikato Regional Council Best Practice Guidelines for working in and around waterways.	Refer to Section 6.4 for these listed mitigation measures.
Wetland - Provided the hydrological connectivity can be maintained, and works are kept outside the kahikatea stand and proposed restoration measures are implemented, there should be an overall positive effect on the natural inland wetland. Mitigation measures should include complete fencing of the kahikatea stand, ongoing weed and pest control, and any necessary sediment and erosion controls for works undertaken near waterways that may drain into the wetland. Proposed planting should ensure that only wetland or wet-tolerant species are used (rather than more dry-adapted species) within the existing inland wetland, to maintain its ecological character. WRC also supports the recommendation to cease maintenance of watercourses	The applicant agrees with the commentary and these mitigation measures to ensure that there are no adverse effects on the wetland, or the existing kahikatea stand have been detailed in an Ecological Management Plan (EMP) for the site, which will be submitted as part of the substantive application. This EMP details fencing, planting, animal and weed control, hydrological management and associated monitoring.	Refer to Section 4.1 (Table 6) and Section 6.2 for requirements for EMP and accompanying EMP will be submitted alongside the substantive application.

immediately adjacent to the kahikatea remnant, and to consider revegetating these areas with native species, as this would improve water retention and benefit the wetland within the stand. The substantive application would need to identify if the cessation of maintenance of watercourses is to occur and how this will be managed.		
Bats - The application will need to consider if light from the tracks and public lighting will influence bat activity. It appears the kahikatea stand is relatively close to the main track where there is a proposal to install 200 LED floodlights powered by diesel generators at 1000-2000 lux. The noise impact on bats has not been considered as part of the EIA. This will need to be considered. Noise will be generated from day/night racecourse events (PA system, crowd noise), residential/commercial facilities, vehicles and diesel generators. In addition, the 18m and 24m high masts will need to be considered in terms of bat activity. WRC supports the preparation of a Bat Management Plan (BMP). The BMP should include what represents suitable replacement roosting habitat, if this will be a short- or long-term solution, and how the replacement habitat will be monitored to ensure success and suitability. It should also provide details on 'light' and 'dark' corridors for bat activity. The corridors should follow similar lighting controls as those proposed for the kahikatea block. To ensure consistency, suitable bat corridors should also be featured in the Urban Design Assessment Report.	The applicant agrees with the commentary and these mitigation measures to ensure that there are no adverse effects on the long-tailed bats. An additional longtailed bat assessment report has been prepared (Bluewattle Ecology, 2026). These measures have also been detailed in a Bat Management Plan (BMP) for the site, which will be submitted as part of the substantive application. This BMP details placement roosting habitat and associated monitoring, details on light and dark corridors and site lighting.	Refer to Section 3.2.1 and 3.2.2, 4.1 (Table 6) and Section 6.3 for requirements for effects to bats and accompanying BMP will be submitted alongside the substantive application.
Lizards - The EIA concluded that provided any adverse effects of the development on lizards and their habitats are considered and avoided, remedied or mitigated at the time of works, the overall effect on lizards is low. To ensure that any adverse effects are	As per the RMA Ecology (2026) report the site is at least 98 % of the site is intensively managed pasture with no lizard habitat. Hedgerows, buildings, road margins and most drain margins are also assessed as having nil likelihood of lizards. There are only two	

considered, avoided, remedied or mitigated, a Lizard Management Plan should be prepared. This was not proposed in the EIA. As suggested in the EIA, pre-clearance surveys and salvage should be undertaken for all areas that provide suitable habitat. Wildlife Act Authorisation and relocation sites should be detailed in the Lizard Management Plan.	locations where lizards could possibly be present, and both rate as very low likelihood: • The kahikatea stand. This could support arboreal geckos, but it is small, isolated by 800–1,000 m from other treeland, and has had no pest control. • Parts of the main stream/drain margins. Copper skinks could occur only where the margins carry wide, rank grass. This is about 5 % of the drain margin length. Because the likelihood is so low, we conclude that a pre-clearance survey and a Wildlife Act authority are not needed. A Lizard Accidental Discovery Response Protocol is recommended as a consent condition instead.	
Pest plants and animals - WRC recommends that a pest management plan is prepared and included within the substantive application.	Yes, a pest management plan details measures for pest animals and plants is incorporated into the EMP/BMP for the site. A pest animal control contractor will produce and implement the pest animal plan.	Refer to Section 7 and associated table for requirements for EMP and accompanying EMP will be submitted alongside the substantive application.
Monitoring: A monitoring programme is recommended to track the effectiveness of the mitigation measures and included within the substantive application.	Yes, a monitoring programme have been detailed in the Ecological Management Plan or Bat Management Plan to assess effectiveness of implemented measures over time.	Refer to accompanying EMP and BMP.
Department of Conservation		
Feedback commentary	**Applicant response**	**References**
Bats - With regard to bats, a bat survey has found bat activity throughout the Project site. Bat activity was higher in the kahikatea stand than at other sites, and the kahikatea wetland is likely the most important area within the site for bats. However, DOC records that this does not mean that the rest of the site is not important, as it represents a dark area where bats can commute and forage. This Project would effectively remove or compromise much of the existing 160 ha bat habitat. Given this, if the Project is referred the potential substantive application should include appropriate	Yes, an additional Long-tailed bat effects assessment update memo has been prepared by Bluewattle Ecology (2026) to assess the entire 160 ha Project area. That memo and a site-specific BMP detail the measure required to ensure that adverse effects are appropriately compensated due to the development. This BMP details placement roosting habitat and associated monitoring, details on light and dark corridors and site lighting.	Refer to Section 3.2.1 and 3.2.2, 4.1 (Table 6) and Section 6.3 for the summary of the Bluewattle Ecology (2026) memo. A BMP has also been prepared for the site.

mitigation for bats, including extending and building on the lighting strategies proposed within the referral application.		
Bats - Long-tailed bats are common within the Hamilton Ecological District, and likely to visit the Project site. Artificial lights at the Project site could interrupt and negatively affect the behavioural patterns of these Threatened – Nationally Critical – species if it is not adequately mitigated.	The applicant agrees that the site development may impact on the resident and commuting long-tailed bats at this site. As above a Long-tailed bat effects assessment update memo has been prepared by Bluewattle Ecology (2026) as well as a site-specific BMP.	Refer to Section 3.2.1 and 3.2.2, 4.1 (Table 6) and Section 6.3. As well as the Bluewattle Ecology (2026) memo and BMP.
Environmental effects - Due to the scale of development proposed for the Project site, DOC considers the Project may have significant adverse effects on any ecological values that are present. However, based on our knowledge of the existing environment and species expected to occur on the site, our understanding of the Project, and our experience of the kinds of design measures and conditions that could be implemented, DOC considers that once more detailed information is available, it would be possible to achieve a project with the imposition of conditions (that are appropriate, enforceable, include best management practice, and apply the relevant ecological management plans, as and where required), that does not have significant adverse effects on the environment.	The applicant has noted within the EcIA where adverse effects may be imposed on ecological values and fauna present. These include the kahikatea stand and associated natural wetland, long-tailed bats and associated habitats, lizards, avifauna, aquatic biota (namely shortfin eel), erosion and sediment and stormwater. Based on these effects, this EcIA details ways to minimise the impact and additional report/memo have been prepared to address any adverse impacts on bats and lizards. Additionally, site specific plans include a FMP, EMP and BMP. All of which will be submitted alongside the substantive application. In addition, a site-specific erosion and sediment control plan has been listed as a measure to mitigate against any adverse effects of site development on the downstream receiving environments, and a stormwater plan additionally will be required to support this. Works will also be in line with Waikato Regional Council Best Practice Guidelines for working in and around waterways.	Refer to Section 6 for these listed mitigation measures and the accompanying lizard report (RMA Ecology, 2026) and bat report (Bluewattle Ecology, 2026) and management plans submitted with the substantive application.
Strategic planning - The Proposal is not inconsistent with the relevant statutory planning provisions. However, consideration should be given to: • The relevant provisions in Te Ture Whaimana with respect to streams which are tributaries of the Waikato River;	Te Ture Whaimana o Te Awa o Waikato is specifically addressed in this ECiA. The Vision and Strategy (V&S) is acknowledged as the primary, direction-setting document for the Waikato Awa which is achieved through 13 objectives. This proposed development will not result in the loss of any natural wetlands or natural/modified watercourses. All aquatic biota will be salvaged during any infilling of artificial watercourses in line with a site-specific Fish Management Plan (FMP) and site works will be done in accordance	Refer to Section 5.1.1 and associated management plans.

• Maintaining and restoring the ecological integrity of relevant ecosystems and habitat types; • Conserving any threatened and at-risk species to ensure their persistence; • Protecting freshwater fish habitat, fish passage and the maintenance of habitat connectivity and water quality of any waterway.	with a specific Erosion and Sediment Control Plan, to minimise any downstream effects of sediment entering waterways. To ensure that the objectives listed in the V&S area realised, and to ensure there is an element of betterment to the Project. The wetland area is near the southwestern extent of the kahikatea stand and will be restored and extended as part of this development which further supports conserving threatened species (long-tailed bats) and habitats (Natural wetland, high value ecosystem types of the remnant stand). See EMP.	
Lizards - The applicant has determined a Wildlife Act approval is required to handle, capture and relocate salvaged lizards, if discovered onsite, including any accidental killing. Assessments should be undertaken to confirm lizard presence and mitigation needs and relocation in preparing the potential substantive application. It is unclear whether the kahikatea stand is intended to be utilised as a relocation site, or what predator management will occur there. Further, the referral application notes that further specialist reporting will determine if any other approvals will be sought as part of the Wildlife Act approval. DOC agrees that any further approvals should be identified ahead of lodging the potential substantive application.	The EcIA notes that native fauna is protected under the Wildlife Act 1953 and that measures are required to minimize direct harm to native wildlife. A qualified herpetologist has been engaged to assess native lizard values across at the site. As per the RMA Ecology (2026) report the site is at least 98 % of the site is intensively managed pasture with no lizard habitat. Hedgerows, buildings, road margins and most drain margins are also assessed as having nil likelihood of lizards. There are only two locations where lizards could possibly be present, and both rate as very low likelihood: • The kahikatea stand. This could support arboreal geckos, but it is small, isolated by 800–1,000 m from other treeland, and has had no pest control. • Parts of the main stream/drain margins. Copper skinks could occur only where the margins carry wide, rank grass. This is about 5 % of the drain margin length. Because the likelihood is so low, we conclude that a pre-clearance survey and a Wildlife Act authority are not needed. A Lizard Accidental Discovery Response Protocol is recommended as a consent condition instead. In addition, a pest management plan details measures for pest animals and plants are incorporated into the EMP/BMP.	Refer to Section 7 and associated table for requirements for EMP and accompanying EMP will be submitted alongside the substantive application.

Fish passage - There is the potential for At-Risk Declining and Threatened, Nationally Vulnerable fish species being present on the Project Site. Any existing or new fish passage barriers, such as perched culvert pipes or crossings/fords etc. between the wetland habitat and the property boundary should be made fish friendly and passable at all times.	Site surveys and eDNA results have determined that only shortfin eels are present onsite. Based on the proposed site development, infilling of the network of artificial watercourses throughout the site is required. Therefore, no fish passage will be present into the site from downstream watercourses. Based on this development, there is a need for a Fish Management Plan (FMP) which has been documented in this EcIA as a requirement to mitigate against any adverse effects on aquatic biota during site development. The FMP will be submitted alongside the application to support this.	Refer to Section 6.4 for requirements for FMP. The FMP has been prepared and will be submitted alongside the substantive application.
Fish - DOC recommends consideration is given to whether a complex freshwater fisheries activity approval is required, given that waterways may be diverted and culverts may be implemented as part of the Project. Details of the potential approvals required were provided to the applicant as part of the preliminary consultation process.	As described above the network of artificial watercourses will be infilled on site and undertaken in line with the FMP. The FMP details permitting requirements. A MPI special permit is required to take and possess fish and aquatic life and relocate it to a suitable habitat when it is necessary or required to mitigate for any potential adverse effects. No other permit is required as fish will not be transferred between different catchments.	Refer to Section 6.4 for requirements for FMP. The FMP has been prepared and will be submitted alongside the substantive application.

Appendix 3: Watercourse Classification memo and email agreement from Waikato Regional Council

Ecology New Zealand Limited
800 Heaphy Terrace,
Claudelands,
Hamilton
Email: info@ecologynz.nz

MEMORANDUM

Attention: Sam Simpson – Operations, General Manager

Date: 17 October 2025

From: Dylan Smith – Senior Freshwater Ecologist

Project: 25171.1.001: 636 Pencarrow Road Watercourse Classification Memorandum

1. INTRODUCTION

The memo[1] by Ecology New Zealand Limited (ENZL) was requested by the BCD Group Limited (the Client) to provide an assessment and classification on a watercourse that runs through 636 Pencarrow Road, Tamahere, Waikato ('the site'; Figure 1). This memorandum aims to provide classification to a watercourse on site where the client is currently undertaking due diligence pre-engagement scoping to potentially pipe or divert the existing feature as part of prospective development within the property (Figure 1).

This memo aims to provide insight into current legal definitions and frameworks used to classify 'modified natural watercourses' and 'artificial watercourses', and the historical land use of the site. Correct designation of the watercourse will allow for an accurate regulatory framework to be applied for any future impacts/earthworks potentially required to further the development of the proposed racecourse.

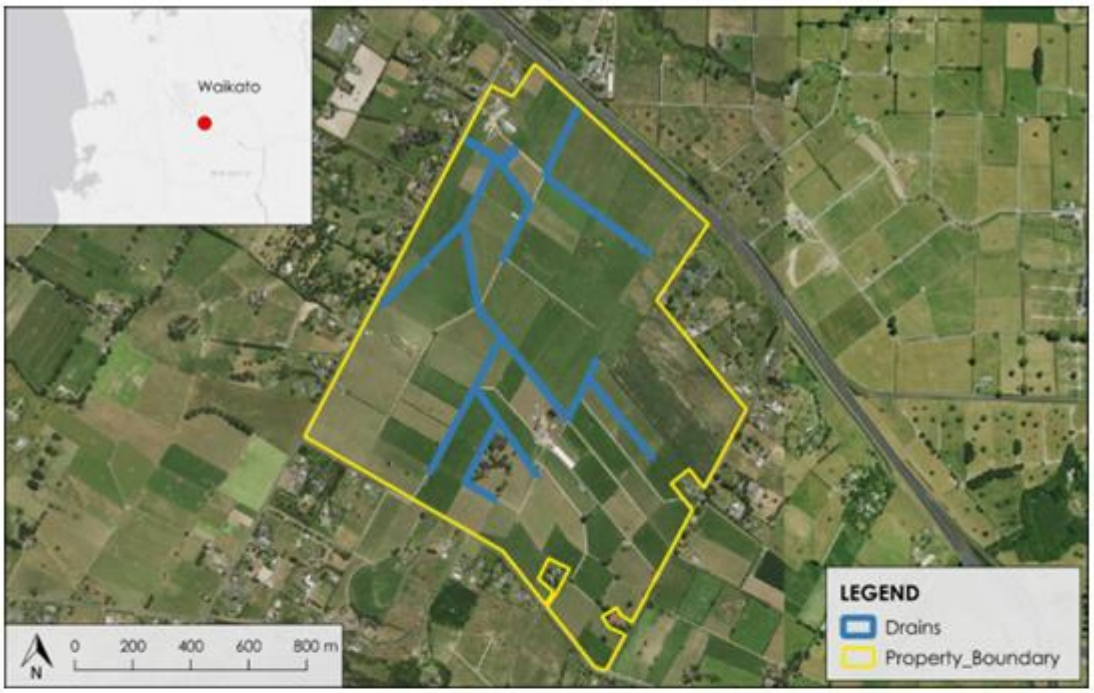


Figure 1: The watercourse (blue) within the proposed development area adjacent to Marychurch Road, Matangi.

2. LEGAL FRAMEWORK CURRENTLY APPLICABLE TO THE USE OF WATERCOURSE CLASSIFICATIONS

The National Policy Statement–Freshwater Management (NPS-FM), National Environmental Standards-Freshwater (NES-F), and the Waikato Regional Council Regional Policy Statement for Freshwater include provisions for the management of permanent and intermittent rivers. To determine if a waterway meets the definition of a 'river' under the Resource Management Act 1991 (RMA), a two-stage assessment can be undertaken. The first stage is defining whether the waterway is natural, modified, or artificial. If the waterway is considered modified or natural, then it can be assessed to determine whether its flow is ephemeral, intermittent, or permanent.

2.1. Rivers/Modified Watercourses

The Resource Management Act 1991 (RMA) defines "river" broadly to include "a continually or intermittently flowing body of fresh water; and includes a stream and modified watercourse; but does not include any artificial watercourse." This means that even if a natural watercourse has been altered, it's still generally considered a "river" under the RMA, unless it's entirely artificial.

The NPS-FM further defines a River as 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).

2.2. Artificial Watercourses

National Policy Statement for Freshwater (NPS-FM)

A drain refers to any artificial watercourse designed, constructed, or used for the drainage of surface or subsurface water, but excludes artificial watercourses used for the conveyance of water for electricity generation, irrigation, or water supply purposes.

Waikato Regional Council (WRC) – Waikato Regional Plan[2]

The following definitions have been extracted from the Glossary of Terms section of the WRP and are applicable to the classification of this watercourse:

- **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**."

Greater Wellington Regional Council (GWRC) – Watercourse Categorisation Guidance Document[3]

- **Highly modified river or stream:** "A river or stream that has been modified and channeled for the purpose of land drainage of surface or sub-surface water and has the following characteristics: a. It has been channeled into a single flow, and b. The channel has been straightened, and c. The channel is mechanically formed with straight or steeply angled banks, and d. It exhibits these characteristics for at least its entire length through the property in which the activity is being carried out.
- **Drain:** "Any artificial watercourse designed, constructed, or used for the drainage of surface or subsurface water, but excludes artificial watercourses used for the conveyance of water for electricity generation, irrigation, or water supply purposes."

This means that a "drain" is fundamentally understood as an **artificial watercourse created for the purpose of land drainage[4].**

Horizons Regional Council (HRC) – One Plan[5]

Artificial watercourse means a continually or intermittently flowing body of fresh water that does not meet the definition of river in S2 of the RMA. For the purposes of this Plan, it includes an irrigation canal, water supply race, canal for the supply of water for hydroelectricity power generation, and farm drainage canal, but excludes a non-natural lake.

Otago Regional Council [6]

[2] Waikato Regional Council: Waikato Regional Plan; Modeule 1, G-2: https://www.waikatoregion.govt.nz/council/policy-and-plans/regional-plan/

[3] Greater Wellington Regional Council. 2021. How to determine whether a watercourse is a river, ephemeral watercourse, highly modified river or stream, or artificial watercourse.

[4] https://www.waikatoregion.govt.nz/services/integrated-catchment-management/land-drainage/

[5] Horizons Regional Council. (2024). One Plan, RPS – LF – Land and Freshwater https://www.horizons.govt.nz/HRC/media/Media/One%20Plan/5-Part-2-RPS-LF-Land-and-freshwater_3.pdf?ext=.pdf

[6] Otago Regional Council. (2022). Practice note: What is 'water' and what is an 'artificial watercourse?' https://www.orc.govt.nz/media/13061/practice-note-what-is-water-and-what-is-an-artificial-watercourse.pdf

The following factors derived from case law must be considered when distinguishing between a river as described in the RMA and an artificial watercourse:

a. Whether the water is fresh water, as defined in S2 of the RMA (i.e. not water in a pipe, tank, or cistern). If the water is not fresh, then the watercourse does not meet the definition of a river and will not be a modified or artificial watercourse.
b. To be a river (including a modified watercourse), the water must be permanently or intermittently flowing.
c. If modified, whether there was a natural watercourse prior to modification.
d. Whether the bed is artificial or comprised of natural bed materials. Note: A diversion of a river through an artificial channel can remain part of the river.
e. Whether the source of the flow is natural or not.
f. The path of the watercourse – a meandering watercourse suggests a modified watercourse; however, a channelised path can also be a modified watercourse.

Bay of Plenty Regional Council[7]

Modified watercourse – a watercourse that meets any of the following criteria:

a. Is a river or stream that has been channelled or diverted.
b. Is a Land Drainage Canal (as defined in this regional plan) constructed through a wetland or swamp, that generally follows the path of a historic natural watercourse or reasonably defined natural drainage channel.
c. Is a watercourse that has a natural headwater of either a channel or spring, and generally follows the path of a historic natural watercourse or reasonably defined natural drainage channel.

Broadly speaking, it is nationally and regionally recognised that an artificial watercourse must not have originated from a natural source, must not have replaced a natural watercourse, meander, be designed for drainage and have a historic context. Additionally, it must not fall into the criteria of a River, as defined in the RMA.

3. SITE LOCATION, DESCRIPTION AND CONTEXT

Historical

The site is situated within a highly modified rural farmland area that has been subject to extensive modification in the past. The area under investigation has been historically drained for over a century and intensively farmed for agricultural purposes. Using Retrolens[8]A review of historic imagery shows that the watercourse on site has been in its present state since the earliest records available. As shown in Figure 2-3, there are natural flow paths visible within the wider catchment adjacent to it. However, the watercourse under investigation still shows characteristics considered to be indicative of a drain dating back to 1946 (Figure 3).

It appears that the gully system northwest of the site has always had its furthest extent outside of the site and never naturally occurred within the site. The gully network (red area) is connected to the site via a series of drainage channels (Red arrow - Figure 2) with existing drain networks observed from the earliest time period on record (1946; Figure 3) that have been developed over time in very flat rural areas with limited natural drainage outlets to make

[7] Bay of Plenty Regional Council. (2008). Bay of Plenty regional water and land plan. https://www.boprc.govt.nz/media/31241/Plan-100301-Operative-RWLP-Definitions.pdf

[8] https://retrolens.co.nz/

the land productive and prevent flooding. There is evidence of this happening between aerials where the drain network on-site has extended between 1946 and 1953 (Figures 2 and 3).

There is no evidence to suggest that the watercourse was a natural water body before construction, nor that it originated from a natural watercourse that became modified at a later date. Additionally, it has straightened channels dating back to 1946 and appears to have been maintained from this period to the present for the purpose of removing excess water from the land.

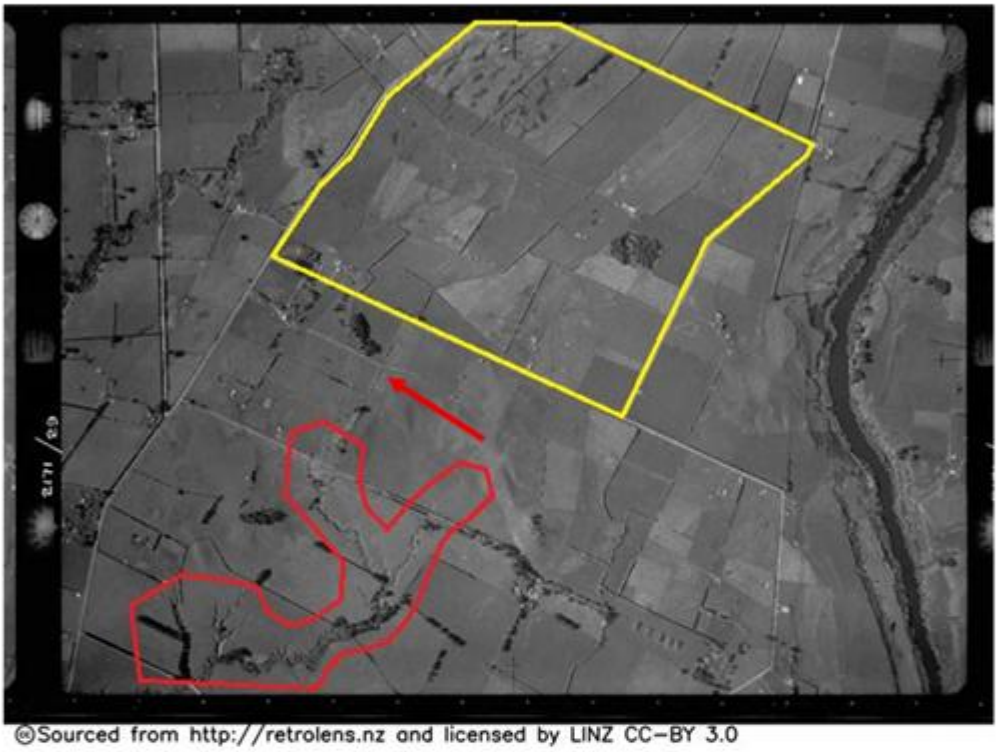


Figure 2: Clearer aerial imagery of the site and the downstream gully system the site is connected. Dated 1953, available through Retrolens.

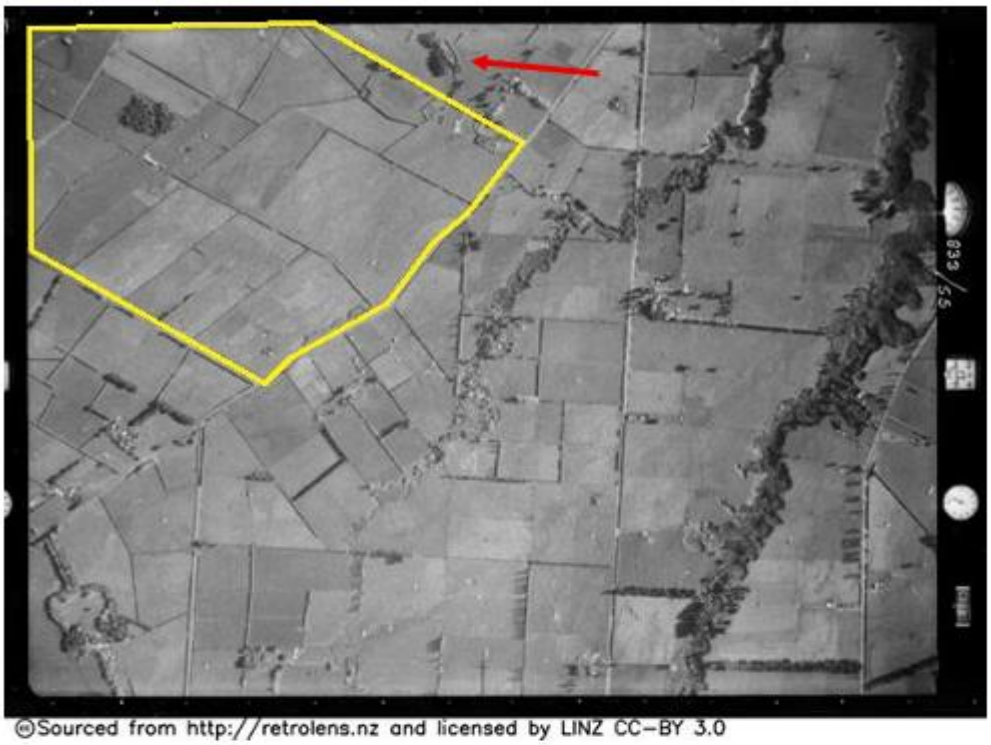


Figure 3: Earliest aerial imagery available through Retrolens (1946)of the site and exit drainage network running through 636 Pencarrow Road and neighbouring 605/613 Pencarrow Road.

Present

A site visit was undertaken on the 26th of September, 2025, to assess the channel to assist with the classification and provide some modern-day context to the historical desktop assessment.

Evidence of rooted terrestrial vegetation could be seen throughout the watercourse, even during winter when the channel experiences peak flow. This is indicative of usage for the purpose of drainage, as rooted terrestrial vegetation does not typically set in intermittent or permanent watercourses (Figure 4; Figure 5).

Additionally, no evidence of meandering or other natural processes could be observed on-site, despite the fact that the channel has been active for at least 80 years. There was evidence of substrate sorting processes, and limited amounts of woody debris were present immediately upstream/downstream of culverts, likely a byproduct of significant flow events moving large quantities of water off the road and into the channel. Additionally, there were some sparse sections of riparian vegetation contained in small patches inside the fenced areas. Native species included Wheki (Dicksonia squarrosa) and swamp kiokio (*Parablechnum minus)*

ENZL also undertook a review of the Waikato Regional Council's drainage network GIS mapping. It was identified that the site is not currently managed by WRC within its "scheme drains" land drainage areas (Figure 6). These are maintained by the council on behalf of ratepayers. A further review of the Water Classification Portal in WRC's platform found that the watercourse was classified as an unnamed river (ID: 6820488). It is unclear how this watercourse

was given the classification, as information about it cannot be found online at the time of writing; therefore, we cannot verify the accuracy of this information in any meaningful detail.

The watercourse appears to adhere to the classification of a drain outlined by GWRC:

> **Drain:** "Any artificial watercourse designed, constructed, or used for the drainage of surface or subsurface water, but excludes artificial watercourses used for the conveyance of water for electricity generation, irrigation, or water supply purposes."

Therefore, we conclude that the watercourse should be classified as an **artificial watercourse** created for purposes of land drainage.



Figure 4: Evidence of rooted terrestrial vegetation within the watercourse.



Figure 5: Upstream-facing view of the watercourse on-site taken from the edge of the roadside.

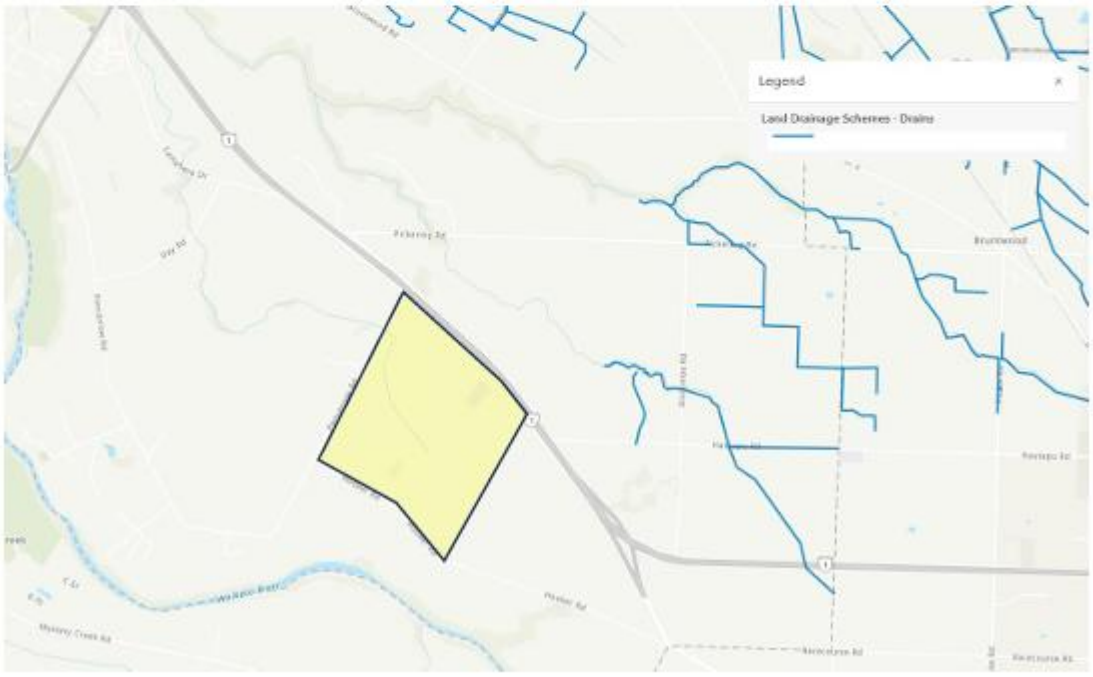


Figure 6: Figure retrieved from the Waikato Regional Maps Drainage GIS viewer[9]. The yellow polygon represents the site location.

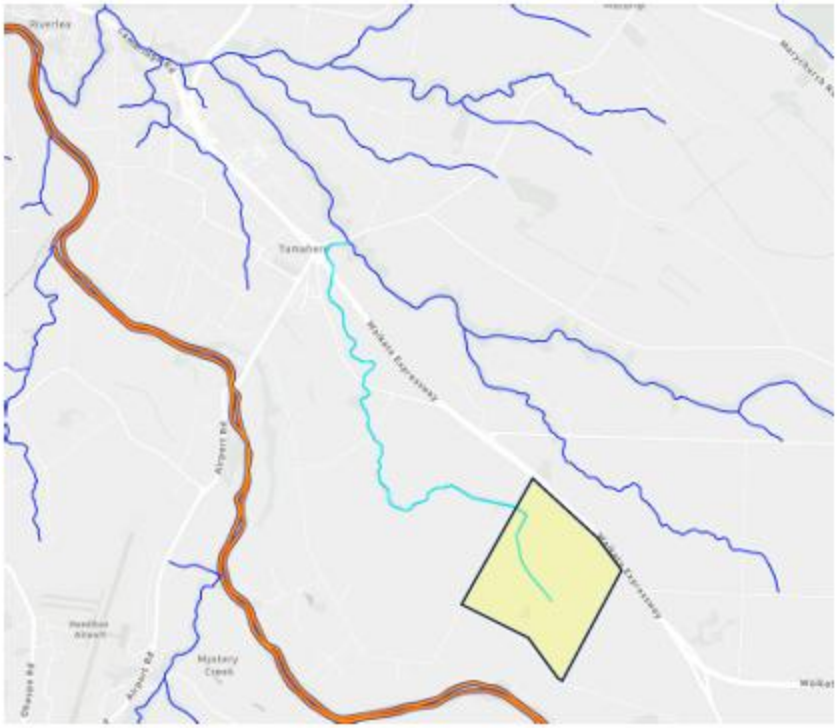


Figure 7: Water Classification Portal – Waikato Regional Council digital information: (Unnamed River): 6820488. *The yellow polygon represents the site location.*

4. CONCLUSION

Given the evidence from both historical and present-day information, we classify the watercourse on site as an artificial farm drain. There is no historical evidence to support that this watercourse was ever a natural system based upon historical imagery, and the current ecological features within the watercourse appear consistent with what would be expected to be present within a drainage system. It is our professional opinion that the watercourse located on 636 Pencarrow Road is a drain and therefore classified as an artificial watercourse accordingly.

[9] https://waikatomaps.waikatoregion.govt.nz/Viewer/?map=15b6ef59ffba4d9b9128c70da260bef3#

APPENDIX A

Report Limitations

This Report/Document has been provided by Ecology New Zealand Limited (ENZL) subject to the following limitations:

i) This Report/Document has been prepared for the particular purpose outlined in ENZL's proposal and no responsibility is accepted for the use of this Report/Document, in whole or in part, in other contexts or for any other purpose.

ii) The scope and the period of ENZL's services are as described in ENZL's proposal and are subject to restrictions and limitations. ENZL did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Report/Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by ENZL in regards to it.

iii) Conditions may exist which were undetectable given the limited nature of the enquiry ENZL was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Report/Document. Accordingly, if information in addition to that contained in this report is sought, additional studies and actions may be required.

iv) The passage of time affects the information and assessment provided in this Report/Document. ENZL's opinions are based upon information that existed at the time of the production of the Report/Document. The Services provided allowed ENZL to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.

v) Any assessments, designs and advice made in this Report/Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Report/Document.

vi) Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by ENZL for incomplete or inaccurate data supplied by others.

vii) The Client acknowledges that ENZL may have retained sub-consultants affiliated with ENZL to provide Services for the benefit of ENZL. ENZL will be fully responsible to the Client for the Services and work done by all of its sub-consultants and subcontractors. The Client agrees that it will only assert claims against and seek to recover losses, damages or other liabilities from ENZL and not ENZL's affiliated companies. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any legal recourse, and waives any expense, loss, claim, demand, or cause of action, against ENZL's affiliated companies, and their employees, officers and directors.

viii) This Report/Document is provided for sole use by the Client and is confidential to it. No responsibility whatsoever for the contents of this Report/Document will be accepted to any person other than the Client. Any use which a third party makes of this Report/Document, or any reliance on or decisions to be made based on it, is the responsibility of such third parties. ENZL accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this Report/Document.

ix) Where lengths or other measurements have not been provided by a surveyor, ENZL has used basic GIS mapping and measurement systems to estimate these numbers. These should not be taken as surveyor-level accuracy for the purposes of decision making.

APP147909 Waikato Thoroughbreds Pencarrow Road Site - water body classification

CH Ceri Hills <[redacted]
To Josh Caddigan
Cc Sam Simpson; Sharon Flintoff; info@ecologynz.nz; Brian Richmond

Hi Josh

Thanks for the updated and clarified memo. In regards to this assessment for the Pencarrow Road site, we will classify the watercourse as an 'artificial watercourse' under the Waikato Regional Plan (WRP). Therefore, please consider the relevant rules in the Waikato Regional Plan (WRP) and policies within the Waikato Regional Policy Statement (WRPS) as part of your ongoing assessment."

Kind Regards
Ceri

Ceri Hills | CONSENTS OFFICER | Resource Consents - Team 1, Resource Use
WAIKATO REGIONAL COUNCIL | Te Kaunihera ā Rohe o Waikato
[redacted]
F: facebook.com/waikatoregion
Private Bag 3038, Waikato Mail Centre, Hamilton, 3240

From: Josh Caddigan [redacted]>
Sent: Friday, 17 October 2025 4:06 pm
To: Ceri Hills <[redacted]>; Brian Richmond <[redacted]>
Cc: Sam Simpson <[redacted]>; Sharon Flintoff <[redacted]>; info@ecologynz.nz
Subject: RE: APP147909 Waikato Thoroughbreds Pencarrow Road Site - water body classification

CAUTION: This email originated from outside of Waikato Regional Council. Do not follow guidance, click links, or open attachments unless you recognise the sender and know the content is safe.

Hi Ceri,

Please see the drain classification memo updated as per your comments below.

Look forward to receiving WRC's response.

Ngaa Mihi,

Josh Caddigan
Senior Planner
Email: [redacted]
Mobile: [redacted] | **Website:** bcdgroup.nz
Ph: 0508 BCD GROUP (0508 223 47687)
Level 1, 220 Tristram Street, Hamilton, 3204
PO Box 9421, Waikato Mail Centre, Hamilton



This e-mail message and any attached files may hold confidential information.
If you are not the intended recipient - any use, disclosure or copying of this email is unauthorised.
If you have received this e-mail in error, please notify the sender immediately by reply email or call BCD Group on 07 839 9107

From: Ceri Hills <[redacted]>
Sent: Tuesday, 14 October 2025 3:03 pm
To: Josh Caddigan <[redacted]>; Brian Richmond <[redacted]>
Cc: Sam Simpson <[redacted]>; Sharon Flintoff <[redacted]z>; info@ecologynz.nz
Subject: APP147909 Waikato Thoroughbreds Pencarrow Road Site - water body classification

Hi Josh,
Thanks for this water body classification report from Ecology NZ.
We note a few points from this report that will need to be amended prior to WRC response to agree with the classification.

The Ecology NZ report refers to WRP glossary of terms on page 3 – including a "drain". WRP does not include any such definition – this is the Greater Wellington definition. This is also referred to on page 6 … "the watercourse appears to adhere to the classification of a drain outlined by WRC:".

As there is no 'drain' definition in the WRP glossary of terms, the water body is better referred to as an "artificial watercourse" under the WRP. This is the same approach we advised in Brian's email for Church Road – 16 July 2025.
We are comfortable that on an amended Ecology NZ Memo to use WRP glossary of terms (artificial watercourse) we should be in a position to agree to the classification,

Thanks
Ceri

Ceri Hills | CONSENTS OFFICER | Resource Consents - Team 1, Resource Use
WAIKATO REGIONAL COUNCIL | Te Kaunihera ā Rohe o Waikato
P: [redacted]
F: facebook.com/waikatoregion
Private Bag 3038, Waikato Mail Centre, Hamilton, 3240

From: Josh Caddigan <[redacted]>
Sent: Friday, 10 October 2025 10:19 am
To: Ceri Hills <[redacted]z>; Brian Richmond <[redacted]>
Cc: Sam Simpson <[redacted]>; Sharon Flintoff <[redacted]>
Subject: APP147909 Waikato Thoroughbreds Pencarrow Road Site water body classifciation

CAUTION: This email originated from outside of Waikato Regional Council. Do not follow guidance, click links, or open attachments unless you recognise the sender and know the content is safe.

Hi Ceri / Brian,

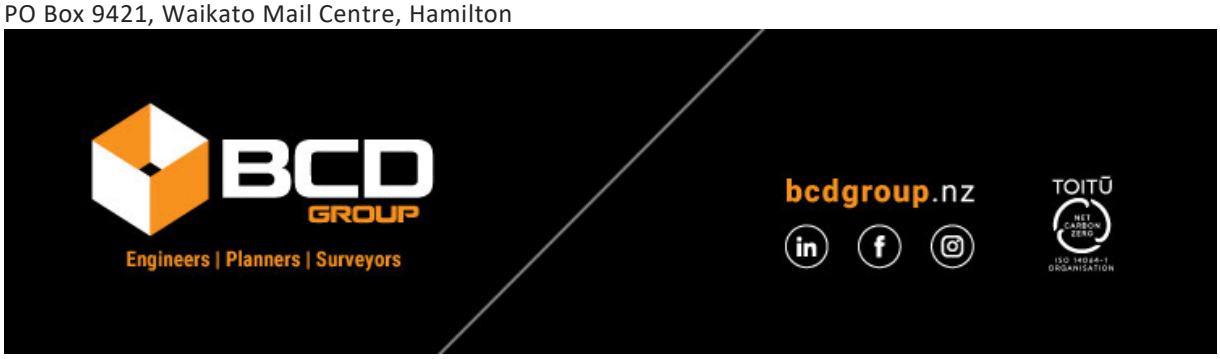
Thanks for your time this morning,

Please find attached the drain classification memo for Pencarrow Road.

We will be in touch next week regarding the Regional Plan assessment.

Ngaa Mihi,

Josh Caddigan
Senior Planner
Email: [redacted] | **Website:** bcdgroup.nz
Ph: 0508 BCD GROUP (0508 223 47687)
Level 1, 220 Tristram Street, Hamilton, 3204
PO Box 9421, Waikato Mail Centre, Hamilton



This e-mail message and any attached files may hold confidential information.
If you are not the intended recipient - any use, disclosure or copying of this email is unauthorised.
If you have received this e-mail in error, please notify the sender immediately by reply email or call BCD Group on 07 839 9107

From: Ceri Hills <[redacted]>
Sent: Wednesday, 8 October 2025 10:54 am
To: Brian Richmond <[redacted]>; Josh Caddigan <[redacted]>
Cc: Sam Simpson [redacted]; Sharon Flintoff <[redacted]>
Subject: RE: Waikato Thoroughbreds Pencarrow Road Site [Filed 08 Oct 2025 10:57]

Hi Josh
Thanks for you patience for this one. Brian and I are able to meet with you online regarding this site and consider any questions you may have. We both appear to have time on Friday morning between 9-11.30am if that would work for you?

We note this site is different from Church Road in that it is not within a WRC manged drainage scheme.

Let me know
Thanks
Ceri

Ceri Hills | CONSENTS OFFICER | Resource Consents - Team 1, Resource Use
WAIKATO REGIONAL COUNCIL | Te Kaunihera ā Rohe o Waikato
[redacted]
F: facebook.com/waikatoregion
Private Bag 3038, Waikato Mail Centre, Hamilton, 3240

From: Brian Richmond <[redacted]>
Sent: Friday, 3 October 2025 1:29 pm
To: Josh Caddigan [redacted]>
Cc: Ceri Hills <[redacted]>; Sam Simpson <[redacted]>; Sharon Flintoff [redacted]>
Subject: RE: Waikato Thoroughbreds Pencarrow Road Site

Hi Josh,

Thanks for the information provided below.

We would be happy to meet on this one. However, there are a few staff away at the moment, so once they are back next week I can let you know some dates that we could meet.

Thanks
Brian

Brian Richmond | PROJECT MANAGER - DEVELOPMENT | Resource Consents - Team 1, Resource Use
WAIKATO REGIONAL COUNCIL | Te Kaunihera ā Rohe o Waikato
[redacted]
F: facebook.com/waikatoregion
Private Bag 3038, Waikato Mail Centre, Hamilton, 3240

From: Josh Caddigan <[redacted]>
Sent: Wednesday, 1 October 2025 12:57 pm
To: Brian Richmond [redacted]>
Cc: Ceri Hills <[redacted]>; Sam Simpson [redacted]>; Sharon Flintoff <[redacted]>
Subject: Waikato Thoroughbreds Pencarrow Road Site

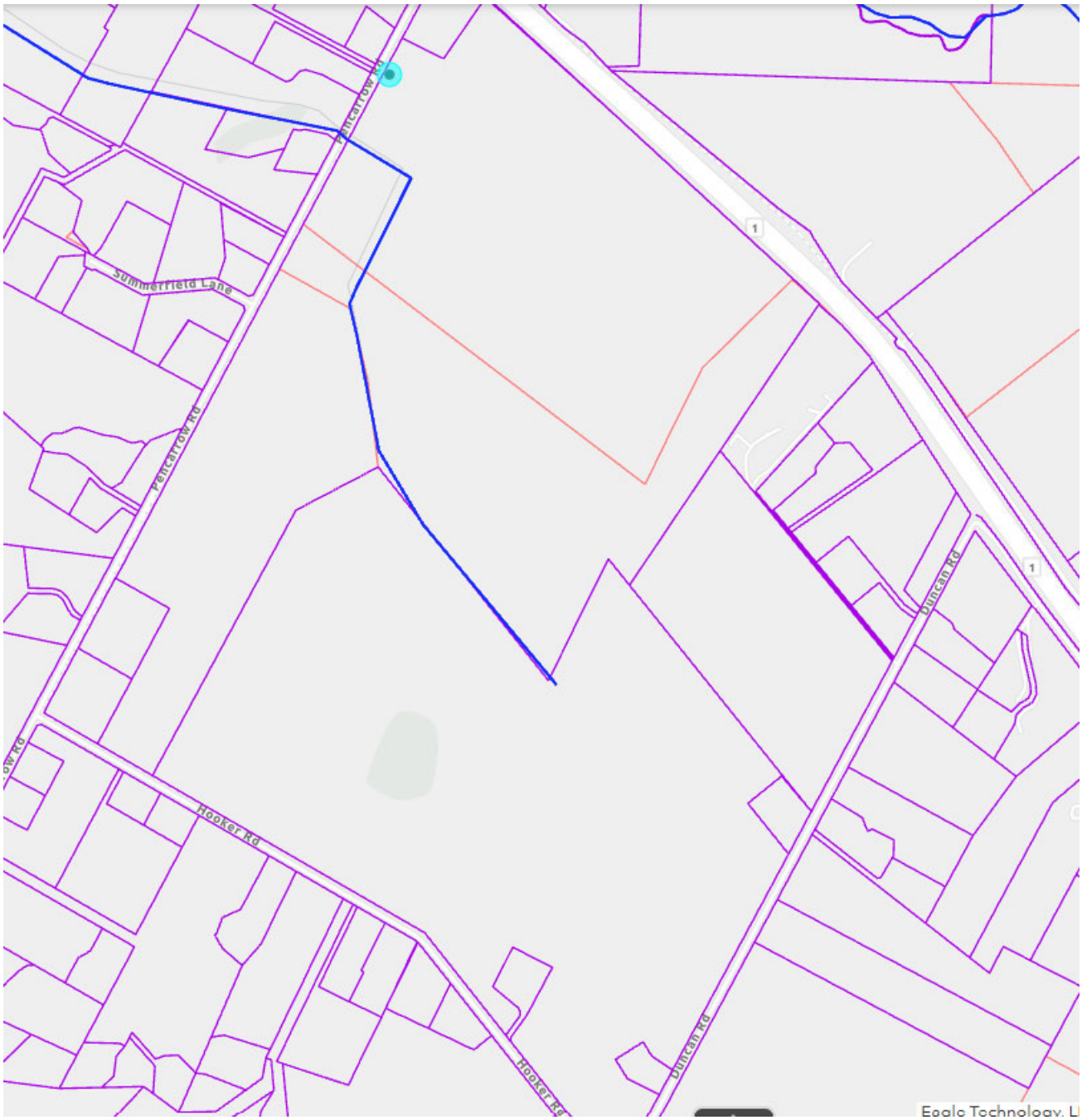
CAUTION: This email originated from outside of Waikato Regional Council. Do not follow guidance, click links, or open attachments unless you recognise the sender and know the content is safe.

Hi Brian,

Hope you've had a good week,

We are now working on due diligence for another property (636 Pencarrow Road, Tamahere)

The site has stream / river identified on WRC maps within the site that we believe is a farm drain within our property.



Our key concerns to discuss would be:

1. Existing Regional Council Drainage

- Classification of this drain
- Due to future spatial planning of the site we would need to investigate either piping and building over these drains, or re-routing the drain to suit the proposed

layout – we would like to discuss WRC's appetite for this to occur if the drain is classified as an artificial watercourse.

Can we please arrange a meeting at your earliest convenience to discuss the above?

Ngaa Mihi,

Josh Caddigan
Senior Planner
Email: [redacted]
[redacted] | **Website:** bcdgroup.nz
Ph: 0508 BCD GROUP (0508 223 47687)
Level 1, 220 Tristram Street, Hamilton, 3204
PO Box 9421, Waikato Mail Centre, Hamilton



This e-mail message and any attached files may hold confidential information.
If you are not the intended recipient - any use, disclosure or copying of this email is unauthorised.
If you have received this e-mail in error, please notify the sender immediately by reply email or call BCD Group on 07 839 9107

Appendix 4: Historic and retrolens imagery




16/02/1995

10/01/2008



30/01/2013




30/04/2018
Rapu Ki Rua Institute


28/02/2025
Rapu Ki Rua Institute

Appendix 5: Weather during the bat surveys

Date	Temperature at dusk (20:00 to 00:00)	Maximum nightly temperature	Minimum nightly temperature	Daily rainfall (mm)
2025-11-13	13.3	14.8	13.1	18.6mm
2025-11-14	12.4	14.2	11.6	0.4mm
2025-11-15	10.5	14.8	9.5	5.6mm
2025-11-16	12	16.3	4.7	0.0mm
2025-11-17	14.3	16.9	6.6	0.0mm
2025-11-18	16.5	18	12.2	15.6mm
2025-11-19	16.8	17.9	15.3	35.6mm
2025-11-20	14.6	18.1	13.8	0.0mm
2025-11-21	14.6	18.3	12.1	0.0mm
2025-11-22	14.8	21.3	9.4	1.6mm
2025-11-23	13.6	17.5	12.1	0.2mm
2025-11-24	13.6	16.9	9.9	0.0mm
2025-11-25	15.2	17.8	10.8	0.0mm
2025-11-26	16.5	18.9	12.2	17.6mm
2025-11-27	17.5	19.7	14.5	0.6mm
2025-11-28	15.7	19	14.9	0.4mm
2025-11-29	14.2	21.8	9.4	0.2mm
2025-11-30	17.2	17.8	7.9	37.2mm
2025-12-01	13.5	21.1	12.1	0.4mm
2025-12-02	16.8	22.3	10.1	4.2mm
2025-12-03		19.6	15.8	

Appendix 6: EcIA Guideline Tables

Step one: Assign ecological value

Appendix I Table 1: Assigning ecological value (Roper-Lindsay et al. 2018).

Description	Value
Feature rates Very Low for at least three assessment attributes and Low to Moderate for the remaining attribute(s).	Negligible
Feature rates Very Low to Low for most assessment attributes and moderate for one. **Limited ecological value other than providing habitat for introduced or tolerant indigenous species.**	Low
Feature rates High for one assessment attribute and Low to Moderate for the remainder, OR The Project area rates Moderate for at least two attributes and Very Low to Low for the rest. **Likely to be important at the level of the Ecological District.**	Moderate
Feature rates High for at least two assessment attributes and Low to Moderate for the remainder, OR The Project area rates High for one attribute and Moderate for the rest. Likely to be regionally important.	High
Feature rates High for at least three assessment attributes. **Likely to be nationally important.**	Very High

Appendix I Table 2: Assigning ecological value at a species level for terrestrial and freshwater species (Roper-Lindsay et al. 2018).

Threat Class	Threat Sub-class	Value
Exotic: Introduced and Naturalised	-	Negligible
Indigenous: Common/not threatened	-	Low
Indigenous: Locally uncommon or distinctive species	-	Moderate
Indigenous: At Risk	1. Naturally uncommon 2. Relict 3. Recovering	Moderate
	4. Declining	High
Indigenous: Threatened	1. Nationally Critical 2. Nationally Endangered 3. Nationally Vulnerable	Very High

Step two: Assessing magnitude of effects

Appendix I Table 3: Assessment and criteria for describing the magnitude of effects (Roper-Lindsay et al. 2018).

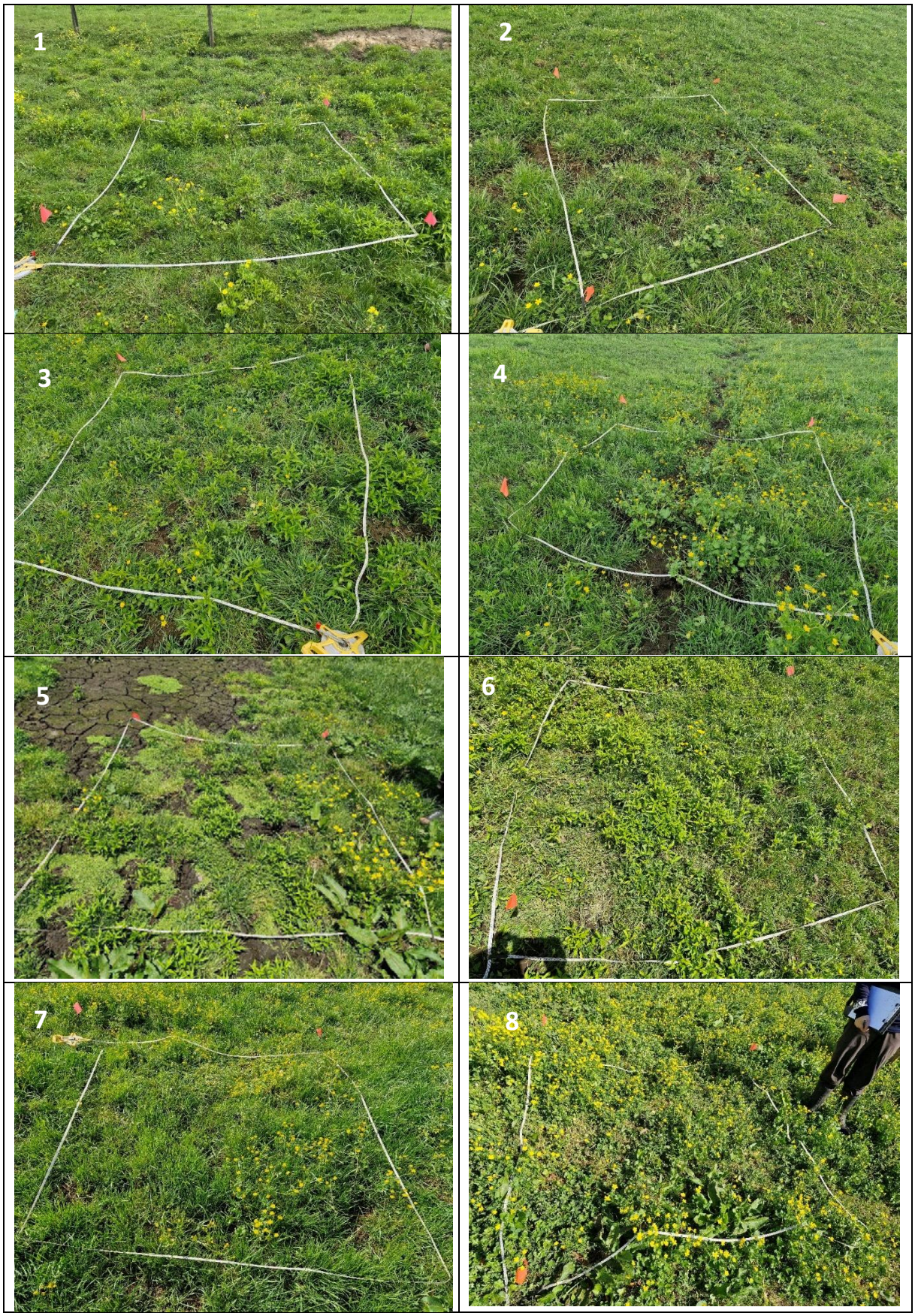
Description	
Very slight change from existing conditions. Change barely distinguishable, approximating "no change"; and/or having negligible effect on the known population or range of the feature.	Negligible
Minor shift away from existing conditions. Change arising from the loss/alteration will be discernible,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

Step three: Assessment of the level of effects

Appendix I Table 4: Matrix for determining the overall level of the described ecological impacts (Roper-Lindsay et al. 2018).

Effect Level		Ecological Value				
		Negligible	**Low**	**Moderate**	**High**	**Very High**
Magnitude of impact	**Positive**	Net Gain	Net Gain	Net Gain	Net Gain	Net Gain
	Negligible	Very Low	Very Low	Very Low	Very	Low
	Low	Very Low	Very Low	Low	Low	Moderate
	Moderate	Very Low	Low	Moderate	High	High
	High	Very Low	Low	Moderate	Very	Very High
	Very High	Low	Moderate	High	Very High	Very High

Appendix 7: Vegetation plot photos



9	

Appendix 8: Restoration and Management of the remnant kahikatea stand principles

This restoration plan has been prepared for the restoration of the remnant kahikatea stand at the subject property. This remnant is located in the Hamilton Basin which is one of the most heavily degraded management zones in the Waikato District, with only small, scattered indigenous forest remnants remaining. These small remnants stand out as vestiges of what once was an expansive and biodiverse wetland and forest ecosystem complex. In terms of restoration and management, permanent stock exclusion and fence upgrades are required as the first step in the restoration process. Provided only cattle are present on the property a 5-wire fence with 2 electric wires is sufficient and will need to be subject to regular monitoring and maintenance. If gates are installed (to remove cattle that accidently enter the remnant) these should be padlocked closed.

Pest animal and plant control is required. Weed pressure was low to moderate throughout most of the site, with current grazing levels keeping weeds at a minimum aside from unpalatable and grazing-tolerant species such as barberry.

A guide to the restoration and management of Kahikatea Forest Fragments has been prepared by Waikato Regional Council, which provides helpful advice on how these areas may be restored[16].

The objective of the restoration is to mitigate any adverse impacts of the proposed development on resident flora and fauna. In the future this area will be largely self-sustaining habitats where animal and plant pests are largely controlled to zero density and indigenous flora, and fauna dominate the forest ecosystem.

Animal pest control

A mammalian predator and herbivore pest management programme should be developed to control herbivores (possums, hares) that will damage revegetation plantings and predators (rats, feral cats and mustelids).

Pest plant control

Pest plant control was low in the kahikatea due a history of grazing. The occasional inkweed, barberry and small blackberry plant were present, and these require control. Ongoing control will be required once stock are excluded and will be particularly important as the plantings are establishing.

Control methods for most of these weed species can be found on the Waikato Regional Council Biosecurity plant pest factsheet series[17] and further information on control of other species can be found on the Weedbusters website[18].

Hydrology

Drains have been dug around the perimeter of the kahikatea stand. These drains are relatively shallow and ephemeral but, along with landscape-scale drainage, will likely alter the natural hydrology of the remnant. Reinstatement of the hydrology to this area would be a difficult and complex issue as any

[16] Forest-Fragment-factsheet-6.pdf

[17] https://www.waikatoregion.govt.nz/services/publications/biosecurity-factsheets/

[18] https://www.weedbusters.org.nz

alteration to the present hydrology would have to ensure that flooding of the nearby road and adjacent productive grazing land did not occur.

It is recommended that these drains immediately bordering the remnant are no longer maintained or dug out. If the remnants require additional water retention it may be sufficient to partially block the drains for example with the use of native plants e.g., *Carex* grasses within the drains to allow increased water retention.

Planting

The area to be restored should include all of the mature trees in the area. If the entire area/paddock that the remnant is located within (within the fenced boundary) then c.2.65 ha of area will be restored. This will equate to c.9,200 plants spaced at a density of one plant every 1.5 m. A recommended plant list for kahikatea forest remnants is provided overleaf and has been taken from the WRC forest fragment factsheet 6[16].

The use of early successional species is particularly useful to buffer the remnant from edge effects such as prevailing winds and weed intrusion. On the damp/drier areas early successional plants such as manuka, karamu, and flax will provide good ground cover and grow quickly. As the plantings mature other species, particularly large canopy trees, can be planted in the restoration area.

- Well-drained drier areas can be planted predominantly with kanuka, with species such as totara, mapou, mahoe and karamu placed among it.
- Damper areas can have manuka, kahikatea, cabbage tree, karamu, and pukatea.
- Rare plants which could be planted (if able to be sourced) include: *Syzygium maire*, *Microsorum novae-zelandiae*, *Mida salicifolia Pimelea tomentosa, Pseudopanax laetus* and *Raukaua edgerleyi.*

SCIENTIFIC NAME	COMMON NAME	PLANT TYPE	DRAINAGE *Plants listed in order from wetter sites to drier sites*
'Nurse' plants - full sun in exposed sites			
Carex virgata	Purei	Sedge	Poor
Carex secta	Purei	Sedge	Poor
Coprosma propinqua	Swamp coprosma	Shrub	Poor
Coprosma tenuicaulis	Swamp coprosma	Shrub	Moderate/poor
Austroderia fulvida	Toetoe	Sedge	Moderate
Carpodetus serratus	Putaputawētā	Tree	Moderate
Coprosma rigida		Shrub	Good/moderate/poor
Cordyline australis	Cabbage tree/tī	Tree	Good/moderate/poor
Leptospermum scoparium	Mānuka	Tree	Good/moderate/poor
Phormium tenax	Flax/ harakeke		Good/moderate/poor
Dacrycarpus dacrydioides	Kahikatea	Tree	Good/moderate/poor
Coprosma robusta	Karamū	Shrub	Good/moderate
Myrsine australis	Māpou	Tree	Good/moderate
Podocarpus tōtara	Tōtara	Tree	Good
Kunzea ericoides	Kānuka	Tree	Good
Sophora microphylla	Kōwhai	Tree	Good

Planting in sheltered sites or canopy gaps			
Syzygium maire	Swamp maire	Tree	Poor
Astelia grandis	Swamp lily	Flax-like herb	Moderate/poor
Coprosma tenuicaulis	Swamp coprosma	Shrub	Moderate/poor
Gahnia xanthocarpa	Giant sedge	Sedge	Moderate/poor
Laurelia novae-zelandiae	Pukatea	Tree	Moderate/poor
Melicope simplex	Poataniwha	Tree	Moderate/poor
Streblus heterophyllus	Tūrepo	Tree	Moderate/poor
Carex dissita	Purei	Sedge	Moderate
Pennantia corymbosa	Kaikōmako	Tree	Moderate
Dacrycarpus dacrydioides	Kahikatea	Tree	Good/moderate/poor
Alectryon excelsus	Tītoki	Tree	Good/moderate
Coprosma rhamnoides		Shrub	Good/moderate
Coprosma areolata	Thin-leaved coprosma	Shrub	Good/moderate
Coprosma rotundifolia	Round-leaved coprosma	Shrub	Good/moderate
Dacrydium cupressinum	Rimu	Tree	Good/moderate
Eleocarpus hookerianus	Pōkākā	Tree	Good/moderate
Hedycarya arobrea	Pigeonwood	Tree	Good/moderate
Melicytus micranthus	Small-leaved māhoe	Shrub	Good/moderate
Melicytus ramiflorus	Māhoe	Tree	Good/moderate
Nestegis cunninghamii	Black maire	Tree	Good/moderate
Prumnopitys taxifolia	Matai	Tree	Good/moderate
Sophora microphylla	Kōwhai	Tree	Good

Later planting under nurse plants in shaded areas			
Astelia grandis	Swamp lily	Flax-like herb	Moderate/poor
Schefflera digitata	Patē	Shrub	Good/moderate
Coprosma grandifolia	Raurēkau, kanono	Shrub	Good/moderate
Hedycarya arobrea	Pigeonwood	Tree	Good/moderate
Melicytus ramiflorus	Māhoe	Tree	Good/moderate
Alectryon excelsus	Tītoki	Tree	Good/moderate
Geniostoma rupestre	Hangehange	Shrub	Good
Beilschmiedia tawa	Tawa	Tree	Good

Note: ferns are widely dispersed and will likely turn up on their own

Planting technique

Planting should ideally be done in autumn when there is sufficient soil moisture and soil temperatures are still high enough to promote root growth. Planting can be done right through winter until around September.

Plants should be bought from a reputable grower, should be from a local seed source (ideally from the Hamilton Ecological Districts or neighbouring districts), and should be healthy and robust. Plants grown from natural populations in neighbouring districts are preferred to non-eco-sourced plants.

In the open restoration areas, plants are to be planted at a density of one plant every 1.5 m (approximately 5,000/ha) in groups of three or more. Large canopy forming trees (planted in the initial restoration phase) should be spaced approximately 3-4 m apart. Smaller trees and shrubs can be scattered throughout. Supplementary canopy enhancement species, planted after the early successional species have gained canopy closure, should be spaced approximately 10-15 m apart (approximately 115/ha to 50/ha). Spot-spraying with a glyphosate herbicide should be carried out to control weed and grass growth 28 to 14 days prior to planting. Spots should be approximately 0.3 x 0.3 m in area and spaced according to the required planting density (e.g. 1.5 m centre to centre).

In areas where soil has been compacted as the result of previous land uses, the soil can be loosened to a depth of 0.5 m using a crowbar or trenching spade. After planting, the soil level against the stem should be the same as before planting. Staking is recommended so that plants are more easily located.

The plant is to be secured in the ground by filling the space surrounding the roots with soil and lightly compressing it. Soil compression will fill any voids that might be present around the roots avoiding damage caused by water accumulation. Initial watering after planting is required.

Optimal plant stock will be used in the planting which has the following attributes:

- Healthy, vigorous, and free from obvious signs of disease and pests;
- Planter bag or pot size RRTT, PB3 - PB5;
- Of at least average size for the specified pot/planter bag size;
- Well-developed root system with high amount of new root growth; and
- Not root bound.

Planting maintenance

Planted areas should be regularly maintained to keep them weed-free and plants should be released at least three times in the first year after planting and one or two times in the subsequent four years. This involves clearing competing vegetation from around each plant, which gives them the best chance of survival and maximises growth rates. Releasing can be done with a non-residual herbicide such as glyphosate, with a brush-cutter, or manually. It is normal to expect a mortality rate of at least 10%. Additional plants should be planted in the spaces where other plants died.