

ecoLogical Solutions

Environmental Consultants



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Brymer Farms Development Ecological Impact Assessment

Submitted to:
Pragma Homes



Quality Assurance

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Qualifications, Experience and Code of Conduct

The qualifications and experience of the authors and technical director/reviewer of this report are summarised below. We confirm that we have read the Code of Conduct for Expert Witnesses Contained in the Environment Court of New Zealand Practice Note 2023 and we agree to comply with it.

We acknowledge that, as an expert, we have an overriding duty to assist the decision maker impartially on matters within our area of expertise. In preparing this report, we have exercised our independent professional judgement, and the opinions we express are our own. We understand that our duty as an expert is not to advocate for the interests of the applicant or any other party.

We confirm that the issues addressed in this report are within our area of expertise, except where we state that we are relying on the evidence or advice of another person. We have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this report.

Rebecca Bodley – Senior Ecologist

Rebecca Bodley is a terrestrial and freshwater ecologist with 14+ years' experience delivering on a wide range of ecology projects from small scale land development to large scale infrastructure, public and private land management and landscape scale restoration. She has extensive experience in planning, managing and implementing both terrestrial and freshwater impact assessments, ecological surveys, ecosystem restoration, mitigation strategies and residual effects management through offset and compensation design. Becky managed the ecology component for plan change applications and consenting for housing projects including most recently Warkworth Ridge (Plan Change 40) and the Rotokauri Greenway Project, located in Waikato which was granted consent under the COVID-19 Recovery (Fast-track Consenting) Act 2020 in July 2024.

Signed:  Date: 20 August 2026

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Phil Taylor has 19 years of consulting experience as a freshwater ecologist. Throughout his career, he has worked on a diverse range of projects, including effects assessments, fish passage design, fish habitat design, conservation mapping, instream flow assessments, and research and development projects both in New Zealand and overseas. Phil holds an MSc from Victoria University and is a Certified Environmental Practitioner – Ecology Specialist.

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Richard is the founder and managing director of Ecological Solutions and has over 27 years of ecology consulting experience. Throughout the past 27 years, Richard has led or supported assessments of the ecological effects of small- and large-scale land development, hydro schemes, primary industry, forestry and mining throughout New Zealand.

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Executive Summary

Ecological Solutions Limited were engaged to undertake terrestrial and freshwater ecological surveys and prepare an ecological impact assessment (EclA) for the 'Brymer Farms Project', which encompasses 81-hectares of rural land, on the western side of Hamilton City, located between Brymer Road and Whatawhata Road (584 Whatawhata Rd).

Overall, the value of terrestrial ecological features on the Site ranged from 'negligible' due to the predominance of exotic pasture and intensive farming, to 'very high' due to the presence of long-tailed bats (*Chalinolobus tuberculatus*) which have a Conservation status of Threatened-Nationally Critical. Freshwater ecological features of the Site ranged from 'negligible' to due to the artificial watercourses (farm drains) to 'moderate' due to the presence of highly modified wetlands. According to the Waikato Regional Policy Statement (WRPS) ecological significance criteria, the wetlands within the Site can be considered significant.

The application of effects management measures to manage effects on indigenous fauna is outlined in either proposed consent conditions (birds) or specific management plans (appended to this report) including a lizard management plan (LMP), bat management plan (BMP) and a fish management plan (FMP).

The terrestrial ecological impacts (at the scale of the Site) attributable to the Project after application of the effects management measures, ranged from positive to low levels of effect, in accordance with the EclAG. Therefore, no offset/ compensation measures were necessary.

The freshwater ecological impacts (at the scale of the Site) attributable to the Project after application of the effects management measures, ranged from 'positive' to 'moderate' levels of effect (wetland loss), in accordance with the EclAG. The residual level of effect of the loss and modification (culverting) of modified ephemeral and perennial watercourses was 'low'; however, while the EclA guidelines suggest that 'low' levels of effect should not normally be of concern, the NPS-FM (2020) is clear in its intent that the loss of river extent and values should be avoided, and that where this cannot occur the effects management hierarchy should be applied.

Residual effects on wetlands and streams within the Site is intended to be addressed via compensation, including creation and restoration of wetland and stream features within the Site. The details of this are set out in the landscape plan prepared by B&A. The overall resulting outcome for streams and wetlands is expected to be net positive.

1.0 Introduction

1.1 Background

Brymer Farms Limited are applying under the Fast Track Approvals Act 2024 (FTAA) for consent to undertake a residential development called Brymer Farms ('the Project'). The Project area encompasses 81-hectares of rural land, on the western side of Hamilton City, located between Brymer Road and Whatawhata Road (584 Whatawhata Rd) ('the Site') as shown in Figure 1.

This Ecological Impact Assessment (EclA) is part of a suite of technical assessments prepared to inform the Assessment of Effects on the Environment (AEE) and to accompany the application. This EclA describes the Site, identifies the ecological values, and evaluates these values against the potential ecological effects arising from the Project. Ecological effects are considered in relation to the effects management hierarchy with recommendations for minimisation and remediation provided here. Where appropriate, offsetting/compensation has been proposed for the outstanding residual adverse effects.

1.2 Project Description

The Brymer Farms Limited development is a comprehensively planned, multi-staged residential development providing for the urbanisation and subdivision of the Site. The Project is the subject of a Notice of Decision by the Minister, dated 4 September 2025, to refer the Project. It seeks the land use, environmental, subdivision and associated infrastructure consents required to enable the development to be delivered progressively and in a coordinated manner.

The Project will provide approximately 1,043 residential units, including approximately 248 apartment units, across a range of housing typologies and densities. Housing will comprise a mix of terraced, duplex and detached dwellings, conventional and compact residential lots, irregular lots, and eight larger rural-residential lots. This range of typologies is intended to provide housing choice while enabling the development pattern to respond appropriately to the physical characteristics, environmental features and constraints of the site.

The master plan (Figure 2) also provides for two mixed-use commercial sites, identified as C1 and C2, which will form a neighbourhood scale commercial component within the development. C1 will provide approximately 910 m² of ground-floor commercial gross floor area (GFA), with 24 two-bedroom apartments above. C2 will provide approximately 1,274 m² of ground-floor commercial GFA, with 16 two-bedroom apartments above. Both sites will incorporate basement car parking, dedicated vehicle access, servicing areas and landscaping. Collectively, C1 and C2 will provide approximately 2,184 m² of commercial GFA and 40 apartments, supporting the day-to-day needs of residents and contributing to a mixed-use neighbourhood environment.

The development will be supported by the necessary transport and three-waters infrastructure. Water supply and wastewater servicing will connect to the IAWAI reticulated networks, with internal reticulation and associated infrastructure established progressively as development is staged. This may include pump stations, storage, reservoirs and mains, where required. Stormwater will be managed through an integrated stormwater management system, with discharge ultimately occurring to the receiving environment within the Waikato District. The stormwater system will incorporate appropriate treatment, attenuation and conveyance measures and will integrate, where appropriate, with proposed wetlands, watercourses, stormwater reserves and other water-sensitive design features throughout the development.

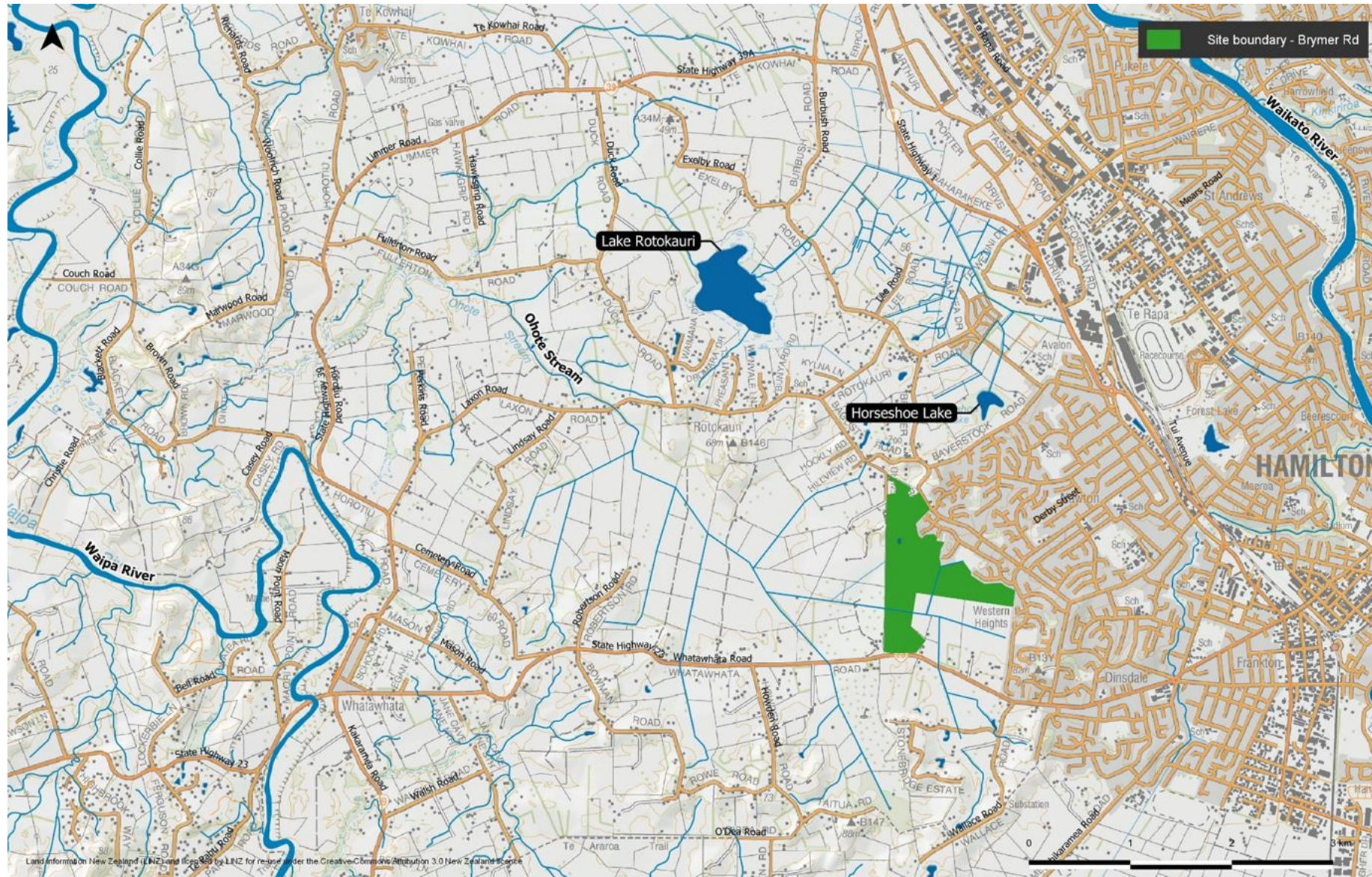


Figure 1: Location of the Brymer Development.

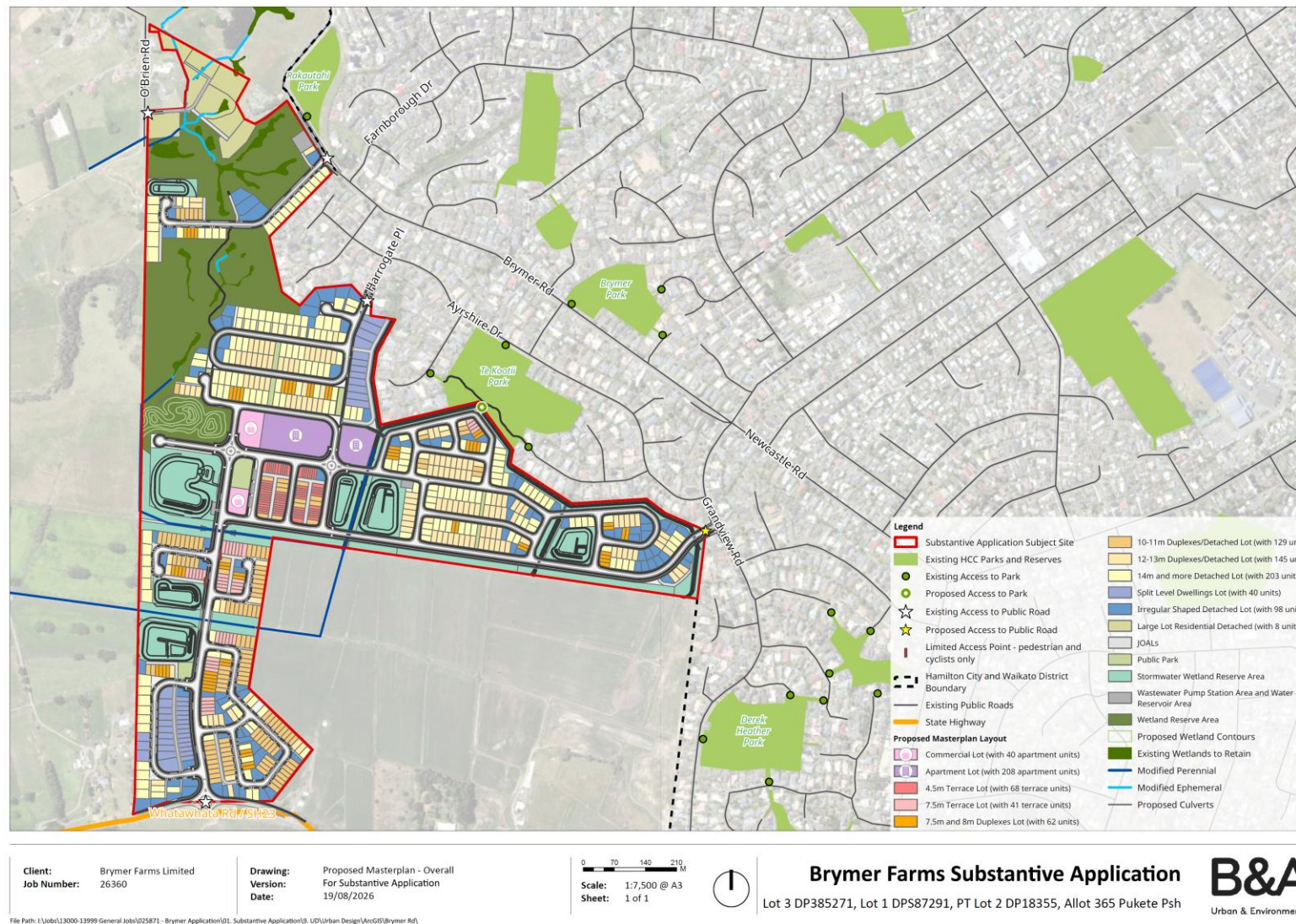


Figure 2: Proposed masterplan.

Implementation of the Project will require staged development related earthworks to establish suitable building platforms, a well-connected road network, infrastructure corridors, reserves and other components of the master plan. These works will include site formation, cut and fill, retaining, erosion and sediment control, and other enabling works required to facilitate the staged subdivision and development of the site. The proposal will also require the undergrounding of existing power lines within the Applicant's site.

A significant component of the Project is the provision and enhancement of open space and ecological values. The development will provide an integrated network of public and recreational open spaces, pedestrian connections, wetlands, watercourses, stormwater reserves, landscaped areas and retained vegetation. Environmental and ecological mitigation and offsetting will also be provided where required to address effects arising from the development and to support the protection, restoration and enhancement of ecological values across the site and wider receiving environment. Where appropriate, these measures will be integrated with the development's open-space and stormwater networks.

The overall open-space and movement network will connect with the surrounding urban environment and existing reserves, including Rakautahi Park, Brymer Glen Reserve, Brymer Park and Te Kootii Park. These connections will provide links between residential neighbourhoods, commercial and community areas, recreational spaces and the wider transport network.

Overall, Brymer is a large scale, comprehensively planned urban development that will enable approximately 1,048 residential units, including approximately 248 apartments, together with approximately 2,184 m² of commercial GFA. The Project encompasses the subdivision and development of the land and the associated development related earthworks, transport and access infrastructure, water supply and wastewater connections to the IAWAI reticulated networks, stormwater management and discharge, ecological mitigation and offsetting, landscaping, open space, recreation, and other supporting infrastructure necessary to establish the new community.

The Project will be implemented through a multi-staged consenting and development framework, enabling subdivision, land use and infrastructure works to proceed progressively while ensuring that each stage is appropriately serviced and integrated with the wider development and surrounding environment.

The development will be subject to a comprehensive suite of proposed conditions of consent, including a design guide, developed with input from the Applicant's relevant technical and environmental specialists. These conditions will provide the framework for managing the construction, staging, servicing and operation of the development, including earthworks, transport, three-waters infrastructure, stormwater discharges, ecological effects and offsetting, landscaping and open space, and other potential environmental effects associated with the Project.

Collectively, the master plan, supporting technical assessments and proposed conditions of consent provide an integrated framework for the staged delivery and management of Brymer, including measures to avoid, remedy or mitigate adverse environmental effects and, where appropriate, provide environmental compensation.

1.3 Scope of this Report

This assessment of terrestrial and freshwater ecological effects includes:

- The methodology used to inform this assessment.
- A description of habitat, fauna, flora and ecological character of the Site.

- An assessment of the key ecological values in the Site.
- A description of the proposed Project activities, and the effects of these activities on ecological values at the appropriate scale (i.e., within the Site, and/ or Zone of Influence or population level).
- An outline of recommended measures to avoid, minimise, remedy or mitigate adverse ecological effects.
- An ecological compensation package for residual adverse effects, that have a more than 'moderate' overall level of effect after steps to avoid, remedy, and mitigate adverse effects have been undertaken.

2.0 Ecological Setting

The Site lies within the Hamilton Ecological District (c. 159,376 ha) which is one of the most modified districts in New Zealand (Leathwick et al. 1995). Within the Hamilton Ecological District only 1.6% of the original indigenous vegetation remains (Leathwick et al. 1995). Land use in the Site and its immediate surroundings was predominantly maize cropping and livestock grazing. Prior to drainage and clearance for farming, the vegetation was predominantly bogs, shrubland and fernland with small areas of swamp forest dominated by kahikatea (*Dacrycarpus dacrydioides*) (McEwen 1987).

Only a few small remnants of the former indigenous forest cover remain, perhaps less than 20 ha in total of high-quality indigenous habitat (Clarkson and McQueen 2004).

A variety of flora and fauna of conservation interest are present within the ecological district. Plant species of conservation interest (de Lange et al. 2024) have been recorded within the district in wetland, peatland and forest remnants and include:

- Water milfoil (*Myriophyllum robustum*, 'At Risk – Declining').
- Giant wire rush (*Sporadanthus ferrugineus*, 'At Risk – Relict').
- The orchid (*Bulbophyllum tuberculatum*, 'At Risk – Naturally Uncommon').

The Site is located in the upper reaches of the south eastern branch of the Ohote Stream Catchment. The Ohote Stream is a tributary of the Waipa River and is the major stream system within the Rotokauri Integrated Catchment Management Plan (ICMP) (Hamilton City Council 2019). However, the Site itself, falls just outside the ICMP Area.

Fish species of conservation interest according to (Dunn et al. 2025) present within Ohote stream catchment include:

- Inanga (*Galaxias maculatus*, 'Threatened – Nationally Vulnerable').
- Longfin eel (*Anguilla dieffenbachii*, 'At Risk – Declining').
- Giant kōkopu (*Galaxias argenteus*, 'At Risk – Declining').
- Banded kōkopu (*Galaxias fasciatus*, 'At Risk – Naturally Uncommon').
- Black mudfish (*Neochanna diversus*, 'At Risk – Declining').
- Common smelt (*Retropinna retropinna*, 'At Risk – Declining').

Peat lakes and surrounding wetlands provide habitat for bird species of conservation interest according to (Roberston et al. 2021) such as:

- Australasian bittern (*Botaurus poiciloptilus*, 'Threatened – Nationally Critical').

- Grey duck (*Anas superciliosa*, 'Threatened – Nationally Vulnerable').
- Brown teal (*Anas chlorotis*, 'Threatened – Nationally Increasing').
- Banded rail (*Gallirallus philippensis*, 'At Risk – Declining').
- Spotless crane (*Zapornia tabuensis*, 'At Risk – Declining').

The New Zealand long-tailed bat (*Chalinolobus tuberculatus*, 'Threatened – Nationally Critical') (O'Donnell et al. 2023) are present throughout the Waikato region, and is known to utilise bush fragments and open habitat throughout the Hamilton District.

3.0 Methodology

3.1 Desktop Review

A desktop review of existing literature and databases for the Site was undertaken. This included a review of the following databases and documents.

- Waikato Regional Council (WRC) plans, policies and maps to determine if any significant freshwater or terrestrial features have been identified within the Site or the surrounding area.
- Waikato Regional Council Significant Natural Areas report for the Waikato District (van der Zwan and Kessels 2017).
- Database records held in the New Zealand Freshwater Fish Database, herpetofauna records (Department of Conservation database), bat records (Department of Conservation database) and bird records (New Zealand eBird database).
- Current and historical aerial images from Google Earth, LINZ and Retrolens to assist with identifying historical stream alignments and potential wetland habitat.
- Topographic maps.
- Other ecological reports and records compiled for the Site or local vicinity.

3.2 Terrestrial Ecology

3.2.1 Vegetation and Habitat for Fauna

The vegetation survey within the Site, was carried out in conjunction with the wetland assessment during the months of April, September and November 2025. Areas of vegetation and habitat were identified, mapped, described, and photographed during the surveys.

Factors used to assess the likelihood of occupancy for key fauna of interest included:

- Size and connectivity of habitat to other sites.
- Current and previous land use.
- Structure and intactness of vegetation.
- Depth of leaf litter and humus layers.
- Provision of microhabitats for foraging, shelter, and breeding.

Specific fauna surveys were also undertaken for birds, lizards and bats (refer to methods

described in sections 3.2.2, 3.2.3 and 3.2.4 respectively).

3.2.2 Birds

Bird species seen and heard during site surveys were recorded. No formal bird counts were undertaken.

3.2.3 Lizards

Lizard habitat was manually searched on 13 November 2025. The manual search involved walking slowly and systematically through potential habitats whilst visually scanning the surroundings for basking or foraging lizards. This included investigating vegetation, the ground, and lifting potential refuges such as rocks, loose vegetation and debris briefly to visualise beneath them for lizards. Searches were undertaken for a total of 1.5 person-hours, which was considered adequate time to search the small amount of potential habitat within the Site.

3.2.4 Bats

Bats within the Site were surveyed in conjunction with Paddy Stewart from Soundcounts Limited. A bioacoustic survey was undertaken within the Site to assist in determining the presence of long-tailed bats. Twenty AR4 Automatic Bat Monitors (ABMs) were deployed for 29 consecutive nights from 15 October to 13 November 2025 at the locations shown in Figure 3.

ABMs were set in trees with a diameter at breast height exceeding 15 cm, or on waratahs nearby to habitats potentially used by bats (such as waterways for feeding). Tree species or placement method are described for each ABM in section 5.3.2. ABMs were set to record from an hour prior to official sunset until an hour past official sunrise to ensure roost emergence and return flight behaviour was captured.

All acoustic data from the ABMs was analysed using BatSearch3.23 software developed by the Department of Conservation in accordance with the protocols described by Lloyd (2019). All potential echolocations identified via the automated software processing were verified by Paddy Stewart (Soundcounts) who holds competency 3.1 under the Department of Conservation Bat Roost Protocols (2024).

Nightly weather conditions during the survey periods, including air temperature (°C) and precipitation (mm), was provided by EnviroNZ from their weather monitoring station (-37.808425, 175.258896), to confirm the suitability of particular nights for bat emergence (i.e. valid survey nights). A valid survey night was defined using the specifications outlined in the Bat Roost Protocols (Department of Conservation 2024).



Figure 3: Location of Automatic Bat Monitors.

3.3 Wetland Identification and Delineation

Wetlands are defined in the Resource Management Act (RMA) as *“Permanently or intermittently wet areas, shallow water, and land water margins that support a natural ecosystem of plants and animals that are adapted to wet conditions”*.

The wetland assessment was completed in April, September and November 2025.

All areas determined to meet the RMA definition of a wetland were defined and delineated in accordance with the National Policy Statement for Freshwater Management (2020) (NPS-FM 2020) guidelines and MfE Wetland Delineation Protocols (2020) that were current at the time the field work was undertaken.

The NPS-FM (2020) defines natural wetlands meaning 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.

3.4 Freshwater Ecology

3.4.1 Survey Sampling Sites

The freshwater ecological assessment was completed in September and December 2025. Stream Ecological Valuation (SEV) surveys and water physico-chemical parameters were measured along five representative reaches. Environmental DNA (eDNA) was collected from water samples at seven points (sub-catchments) and mudfish trap surveys were undertaken along 15 representative sections of drains and modified watercourses where suitable habitat characteristics were identified. The sampling sites outlined above are shown on Figure 4.

3.4.2 Watercourse Classification

Watercourses were classified in accordance with the definitions outlined in the Waikato Regional Plan (i.e., artificial, farm drainage canal, modified, ephemeral or perennial). The Waikato Regional Plan definitions are set out in Table 1.



Table 1: Watercourse definitions in the Waikato Regional Plan.

Watercourse classification	Description
Artificial	A watercourse that contains no natural portions from its confluence with a river or stream to its headwaters and includes irrigation canals, water supply races, canals for the supply of water for electricity power generation and farm drainage canals.
Farm Drainage Canal	An artificial watercourse on a farm that contains no natural portions from its confluence with a river or stream to its headwaters, and includes a farm drain or a farm canal.
Modified Watercourse	An artificial or modified channel that may or may not be on the original watercourse alignment and which has a natural channel at its headwaters.
Ephemeral	Streams that flow continuously for at least three months between March and September but do not flow all year.
Perennial	Streams that flow year-round assuming average rainfall.

3.4.3 Water Physicochemistry

Water physicochemical parameters including temperature, dissolved oxygen, conductivity, and pH were measured in four watercourses (W1, D5, D8, D9), using a calibrated hand held YSI meter.

3.4.4 Fish Fauna

Environmental DNA (eDNA) samples were collected from three locations (summarised in Table 2, and shown on Figure 4) during the September 2025 survey, and an additional four locations in December 2025 to provide an indication of the fish species present. Samples were sent to Wilderlab¹ for basic multispecies analysis.

Table 2: Summary of eDNA Site samples.

eDNA sample	Watercourse	Collection date
Sample 1	W1	Sept 25
Sample 2	W3	Sept 25
Sample 3	W2	Sept 25
Sample 4	D9 – lower reach	Dec 25
Sample 5 (1-2)	D7	Dec 25
Sample 5 (3-4)	D9 – upper reach	Dec 25
Sample 5 (5-6)	D4	Dec 25

A survey targeting black mudfish was undertaken at the Site in the locations shown on Figure 4 using best practice survey methods for black mudfish (Ling et al. 2013). Traps were set overnight and cleared early the following morning. The number of traps set in each sample reach is presented in Table 3. The trapping survey involved setting 119 gee-minnow traps and covered 1,808 m of potential habitat within the Site.

¹ <https://www.wilderlab.co.nz/>

Table 3: Summary fish trapping effort.

Watercourse	Watercourse length trapped (m)	No. of gee-minnow traps
W1	263	12
W2	317	20
W2a	108	5
D2	230	15
D3	220	10
D10	218	10
ND1	161	10
ND1a	39	5
ND1b	21	5
ND1c	43	7
ND2	113	10
ND3	75	10
Total	1,808 m	119

3.4.5 Stream Ecological Valuation

Stream Ecological Valuation (SEV) surveys were carried out across five sites (Table 4) following the method in Storey et al. (2011). SEV results provide an indication of the ecological function and values of the modified watercourses within the Site. SEV scores calculated for habitat, biological and physical parameters range between 0 (poor) and 1 (excellent).

Table 4: Summary of SEV Site survey.

SEV site	Watercourse
SEV 1	W1 – upper reach
SEV 2	W2a
SEV 3	W2 – upper reach
SEV 4	W2 – lower reach
SEV 5	W1 – lower reach

3.5 Assessment of Ecological Values

Ecological values were assigned following the approach outlined in the Environment Institute of Australia and New Zealand's (EIANZ) Ecological Impact Assessment Guidelines (EclAG) (Roper-Lindsay et al. 2018). The EclAG outline a standardised approach for defining ecological values.

The approach involves assessing four matters including representativeness, rarity/distinctiveness, diversity/pattern and ecological context with consideration of the attributes outlined in Table 7 of the EclAG. The overall ecological values within the Site and vicinity were assigned based on the four matters outlined above and using the scoring system outlined in Table 6 of the EclAG.

3.6 Assessment of Ecological Effects

The level of effects was assessed using the method recommended by the EclAG (Roper-Lindsay et al. 2018). This method involves assigning ecological values as above and determining the magnitude of effects based on criteria outlined in Table 5 below and

assigning the overall level of effect using the matrix in Table 6 below. The magnitude of the effects was considered at the Site level (unless otherwise indicated).

Table 5: Criteria for describing magnitude of effect.

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

Table 6: Criteria for describing level of effect.

Magnitude of effect	Ecological value				
	<i>Very high</i>	<i>High</i>	<i>Moderate</i>	<i>Low</i>	<i>Negligible</i>
Very high	Very high	Very high	High	Moderate	Low
High	Very high	Very high	Moderate	Low	Very low
Moderate	High	High	Moderate	Low	Very low
Low	Moderate	Low	Low	Very low	Very low
Negligible	Low	Very low	Very low	Very low	Very low
Positive	Net gain	Net gain	Net gain	Net gain	Net gain

3.7 Assessment of Ecological Significance

Habitats and indigenous biodiversity within the Site were assessed against the significance criteria outlined in the operative Waikato Regional Policy Statement (WRPS) in Appendix 5 for determining significance of indigenous biodiversity (WRC 2016). Under the WRPS, areas of significant indigenous biodiversity are to be identified using a suite of 11 criteria. An area that meets one or more of the criteria is deemed to be significant. Habitat and indigenous biodiversity within the Site was also assessed against the criteria for Significant Natural Areas in the National Policy Statement for Indigenous Biodiversity 2023 (NPS-IB) (as set out in Appendix 1 of the NPS-IB).

4.0 Terrestrial Vegetation

4.1 Introduction

The majority of the Site (south and eastern flats) comprised maize cropland, while both grazed and rough pasture occurred in the northern part of the Site in the steeper hill area. Exotic trees were found scattered across the Site as well as singular native trees and a small indigenous stand of mature kānuka treeland. Further descriptions of vegetation are provided in the following sections.

No areas within the Site are identified as Significant Natural Areas (SNAs) in the Waikato Regional Plan and no plant species of conservation concern or botanical interest were identified during the Site survey. The location of vegetation types and features is shown in Figure 6 and a list of plant species recorded at the Site is provided in Appendix A.

4.2 Native Vegetation

4.2.1 Kānuka Treeland

An area of approximately 1.52 ha of mature kānuka (*Kunzea robusta*) treeland was located on the Sites western boundary (Figure 5). The canopy consisted of tall kānuka with occasional māhoe (*Melicytus ramiflorus*) and kōhūhū (*Pittosporum tenuifolium*) within an otherwise depleted and sparse understorey. A single kāmahi (*Pterophylla racemosa*) was also observed within the treeland. Exotic pest plants such as blackwood (*Acacia melanoxylon*), barberry (*Berberis glaucocarpa*), woolly nightshade (*Solanum mauritianum*), and gorse (*Ulex europaeus*) occurred occasionally within the treeland interior and margins. The groundcover layer included native meadow rice grass (*Microlaena stipoides*), alongside mixed exotic grasses, such as browntop (*Agrostis capillaris*) and sweet vernal (*Anthoxanthum odoratum*), and at the time grazed by stock.

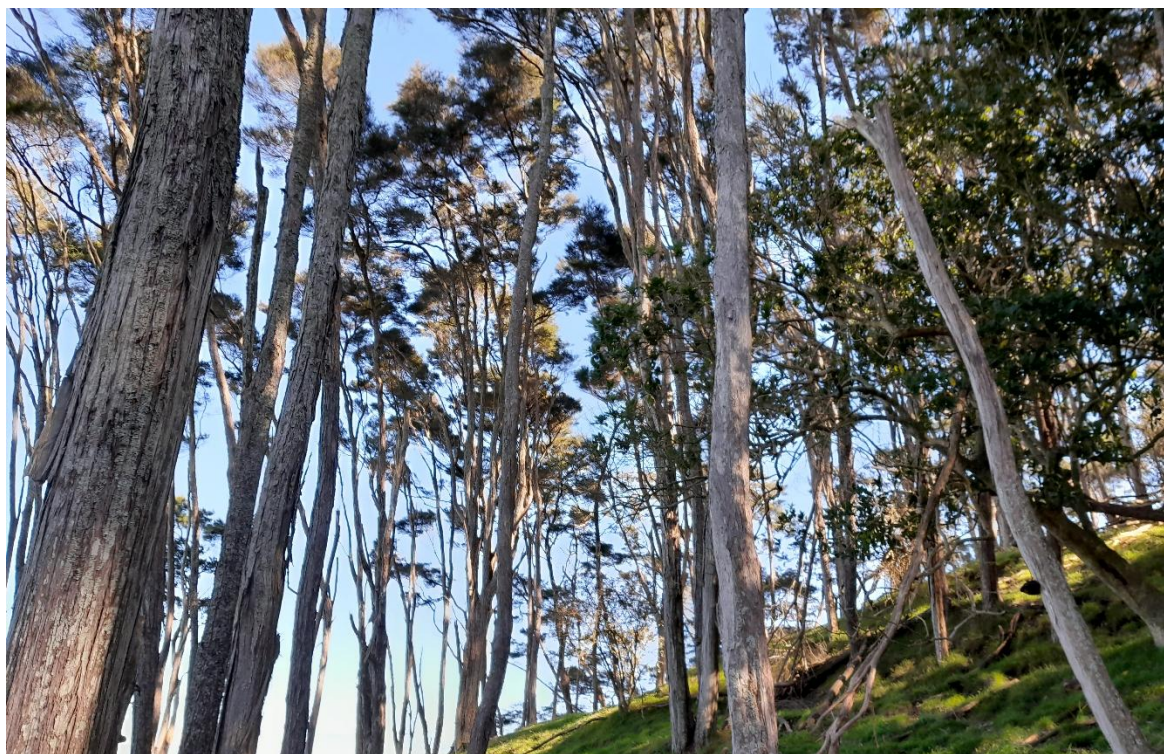


Figure 5: Kānuka treeland.



Figure 6: Location of vegetation types within the Site.

4.2.2 Isolated Native Trees

Singular and isolated native podocarps were limited across the Site and included two tōtara (*Podocarpus totara*) trees and one kahikatea (*Dacrycarpus dacrydioides*) (Figure 6)

4.3 Exotic Trees, Shrubs and Hedgerows

Singular and small stands of exotic trees were found scattered across the Site (Figure 6), and featured several large pine (*Pinus radiata*) (Figure 7), blackwood (*Acacia melanoxylon*) and pin oak (*Quercus palustris*). Scattered gorse was frequently found on gully hillsides alongside shrubs hawthorn (*Crataegus monogyna*) and barberry. A small grove of black locust (*Robinia pseudoacacia*) was located on the north-eastern boundary (Figure 8). Occasional eucalypts (*Eucalyptus* spp.) and poplar (*Poplar x canadensis*) were also observed.



Figure 7: Mature pine tree within the Site.



Figure 8: Grove of deciduous black locust within the Site.

4.4 Pasture

Pasture typically comprised cocksfoot (*Dactylis glomerata*), Yorkshire fog (*Holcus lanatus*), perennial rye (*Lolium perenne*) and white clover (*Trifolium repens*). Rotational cropping of maize (*Zea mays*) covered the lower flats of the Site.

4.5 Ecological Values

A summary of the ecological values from a botanical perspective of vegetation within the Site is provided in Table 7 and Table 8. The ecological value of vegetation cover as it relates to habitat for indigenous fauna is outlined separately in Section 5.0.

Vegetation within the Site comprised mainly pasture, crops and exotic trees and shrubs. Grazed exotic pasture offers no botanical value and therefore was considered to have 'negligible' ecological value in accordance with the EclAG.

Exotic trees and shrubs within the Site do not reflect indigenous vegetation that would have formerly been present, nor are the occasional native species present rare or distinctive. On that basis exotic trees were considered to have 'low' ecological value in accordance with the EclAG (Table 7).

The kānuka treeland was isolated and characterised by a lack of understory development and ingress of exotic species. This remnant treeland was not representative of a natural kānuka treeland ecosystem. As a result, the ecological value of the kānuka treeland was considered to be 'low' in accordance with the EclAG.

Table 7: Ecological values of the Site with respect to exotic trees and shrubs and isolated native trees (excluding the kānuka treeland).

Criteria for assessment	Description for the Site	Rating
Representativeness	Vegetation does not represent any native ecosystem type.	Low
Rarity/distinctiveness	Vegetation is neither rare nor distinctive and is primarily exotic.	Low
Diversity and pattern	Vegetation has a low level of diversity and pattern.	Low
Ecological context	Botanically, the vegetation does not provide a source of native seed to the local surrounds, instead is mostly a source of weeds. Vegetation does on occasion provide some ecosystem services such as shading to some wetlands, small lateral drains and modified watercourses.	Low
Overall value		Low

Table 8: Ecological values of the Site with respect to the kānuka treeland.

Criteria for assessment	Description for the Site	Rating
Representativeness	Vegetation is not representative of an intact native ecosystem type.	Low
Rarity/distinctiveness	Vegetation is neither rare nor distinctive and comprises an exotic component. The species of kānuka (<i>Kunzea robusta</i>) present is considered 'Not Threatened' (de Lange et al. 2024), despite the threat of myrtle rust (<i>Austropuccinia psidii</i>) on myrtaceous species.	Low
Diversity and pattern	Vegetation is characterised by a homogenous structure induced from prolonged animal damage resulting in a low level of diversity and pattern.	Low
Ecological context	Vegetation provides a source of native seed; however, this is limited in terms of species. The kānuka treeland provides a stepping stone of native habitat for species such as birds in an otherwise rural (pasture dominated landscape).	Moderate
Overall value		Low

5.0 Terrestrial Fauna

5.1 Birds and Bird Habitat

5.1.1 Database Records

A search of the eBird database² within 10 km of the Site revealed seven 'Threatened' species and 16 'At Risk' species (Robertson et. al. 2021), as shown in Table 9. Many of these are waterbirds associated with the nearby Hamilton Lake and the Waikato River, and are not of relevance to the Site. One 'Threatened' species and one 'At Risk' species were reported in 2021 on the Site's border: New Zealand falcon (*Falco novaeseelandiae*) and royal spoonbill (*Platalea regia*). Given there are no more recent records of either of these birds, it is likely they are only occasional visitors to the Site. A full list of bird species identified on eBird is provided in Appendix B.

Table 9: eBird records of species of conservation interest according to Robertson et. al. (2021) within 10 km of the Site.

Scientific Name	Common name	Threat Category	Threat Status
<i>Ardea alba</i>	Great Egret	Threatened	Nationally Critical
<i>Botaurus poiciloptilus</i>	Australasian Bittern	Threatened	Nationally Critical
<i>Falco novaeseelandiae</i>	New Zealand Falcon	Threatened	Nationally Increasing
<i>Poliiocephalus rufpectus</i>	New Zealand Grebe	Threatened	Nationally Increasing
<i>Anas superciliosa</i>	Pacific Black Duck	Threatened	Nationally Vulnerable
<i>Hydroprogne caspia</i>	Caspian Tern	Threatened	Nationally Vulnerable
<i>Urodynamis taitensis</i>	Long-tailed Koel	Threatened	Nationally Vulnerable
<i>Anthus novaeseelandiae</i>	New Zealand Pipit	At Risk	Declining
<i>Chroicocephalus novaehollandiae</i>	Silver Gull	At Risk	Declining
<i>Cyanoramphus auriceps</i>	Yellow-crowned Parakeet	At Risk	Declining
<i>Haematopus finschi</i>	South Island Oystercatcher	At Risk	Declining
<i>Petroica longipes</i>	North Island Robin	At Risk	Declining
<i>Poodytes punctatus</i>	New Zealand Fernbird	At Risk	Declining
<i>Sterna striata</i>	White-fronted Tern	At Risk	Declining
<i>Zapornia pusilla</i>	Baillon's Crake	At Risk	Declining
<i>Zapornia tabuensis</i>	Spotless Crake	At Risk	Declining
<i>Fulica atra</i>	Eurasian Coot	At Risk	Naturally Uncommon
<i>Phalacrocorax sulcirostris</i>	Little Black Cormorant	At Risk	Naturally Uncommon
<i>Platalea regia</i>	Royal Spoonbill	At Risk	Naturally Uncommon
<i>Nestor meridionalis</i>	New Zealand Kaka	At Risk	Recovering
<i>Phalacrocorax varius</i>	Pied Cormorant	At Risk	Recovering
<i>Phalacrocorax carbo</i>	Great Cormorant	At Risk	Relict
<i>Pterodroma cookii</i>	Cook's Petrel	At Risk	Relict

² eBird records accessed 26 June 2026.

5.1.2 Survey Results

Habitat for birds within the Site was generally poor and limited to isolated individual trees or small stands of exotic trees and shrubs which were exposed to the elements, unvegetated drains and grazed pasture. The only exception to this was the area of Kānuka treeland which may provide nesting habitat for common native species and a stepping stone for birds in the local landscape.

Fauna (including birds) within the Site were likely to be affected by mammalian predators such as mustelids (*Mustela* spp.), possums (*Trichosurus vulpecula*), mice (*Mus musculus*) and rats (*Rattus* spp.) which are typically present in rural Waikato environments where predator control is absent. The latter three species were detected in similar rural habitat to the north of the Site by RMA Ecology (2023) during a lizard survey within the Rotokauri Greenway footprint.

Eight bird species were seen or heard during site surveys (Table 10). All of the species encountered were common species typical of urban and rural environments.

Table 10: Birds encountered during the Site surveys.

Common name	Scientific name	NZ status	Conservation status (Robertson et al. 2021)
Common myna	<i>Acridotheres tristis</i>	Introduced	-
Eurasian blackbird	<i>Turdus merula</i>	Introduced	-
European starling	<i>Sturnus vulgaris</i>	Introduced	-
Fantail/pīwakawaka	<i>Rhipidura fuliginosa</i>	Native	Not Threatened
Pūkeko	<i>Porphyrio melanotus</i>	Native	Not Threatened
Ring-necked pheasant	<i>Phasianus colchicus</i>	Introduced	-
Spur-winged plover	<i>Vanellus miles</i>	Native	Not Threatened
Welcome swallow	<i>Hirundo neoxena</i>	Native	Not Threatened

5.1.3 Ecological Values

Only common native and exotic bird species were noted within the Site during field surveys. The Site provides habitat for native and exotic birds common to rural Waikato. The ecological value of the Site for birds and bird habitat was considered to be 'low' as summarised in Table 11.

Table 11: Ecological values of the Site with respect to birds and bird habitat.

Criteria for assessment	Description for the Site	Rating
Representativeness	The habitat for birds within the Site is typical of rural/ peri urban habitats utilised by common native and introduced birds within the Waikato Region. The habitats (with exception of the Kānuka treeland) are not representative of indigenous habitats or the previously occurring habitats, which would have had extensive wetlands present (peat flats).	Low
Rarity/ distinctiveness	No rare, 'At Risk', or 'Threatened' avian species were observed within the Site during the survey. Records of species of conservation interest near to the Site are generally associated with specific habitats such as open water bodies and the Waikato River. Some species of conservation interest could use the Site; however, their occupancy is likely to be rare and infrequent.	Low
Diversity and pattern	The avifauna present during site surveys comprised common species and lacked the diversity present in intact ecosystems.	Low
Ecological context	Habitat for birds in the Site includes areas suitable for foraging, roosting, and breeding activities for common native and exotic species. With the majority of the surrounding Hamilton district cleared for agriculture, these habitats are important for the survival of native birds that utilise them. They can also provide important stepping stone functions between remnants of native forest.	Moderate
Overall value		Low

5.2 Lizards and Lizard Habitat

5.2.1 Local Records and Surveys

The Department of Conservation database does not hold any records of native lizards within the Site. The most common record within 12 km³ was of copper skink (*Oligosoma aeneum*), with 180 observations. Other native species recorded in the DOC database are Pacific gecko (*Dactylocnemis pacificus*) and goldstripe gecko (*Woodworthia chrysosiretica*). Pacific gecko that are both terrestrial and arboreal favouring mature lowland forests, mānuka and kānuka scrubland, and other areas of dense vegetation. Goldstripe gecko are primarily found in the Taranaki region and are semi-arboreal in nature favouring forests, scrub, and flaxlands.

A total of 75 Artificial Cover Objects (ACOs) were installed by Ecology NZ (February 2021) across the proposed Minor Arterial designation footprint which is situated approximately 3.5 km to the north of the Site within a similar rural landscape. ACOs were left for over three months, after which they were checked independently on three occasions (when not damaged or lost). One adult copper skink and two unidentified skinks were documented during ACO checks. Unidentified skinks were presumed to be either copper skink or exotic rainbow skink (*Lampropholis delicata*) due to their size, shape, and the known and expected diversity of lizards in the landscape. The level of occupancy was considered low given the survey was conducted during the optimal survey season (February 2021).

Ecological Solutions surveyed lizards for the Rotokauri Greenway Project located approximately 1-4 km to the north of the Site within a similar rural landscape. A total of 110 ACOS were left for six weeks to bed in, after which they were checked for occupancy on nine occasions from December 2022 – March 2023. Manual habitat searches totalling five hours were also undertaken. Four copper skinks were identified (one through the manual search

³ Distance to existing lizard records not precise. 12 km equals smallest reporting distance in accordance with Ecological Solutions GIS data sharing agreement with the Department of Conservation.

process, and three via the ACOs). Ecological Solutions concluded copper skinks were likely to be absent, or present in extremely low densities across the Rotokauri Greenway Site.

5.2.2 Survey Results

Most of the Site comprised grazed pasture (or crops) which was generally unsuitable for lizards. However small pockets of isolated habitat that could support native skinks did occur. Potential habitat for native skinks (as shown in Figure 10) included:

- Low growing shrubs, rank grass, ornamental gardens, and miscellaneous debris around buildings, as well as areas in or under the buildings themselves (mapped as Buildings and Surrounds, Figure 10)
- A large pile of concrete near the centre of the Site.
- Isolated areas of woody debris.
- The kānuka treeland, which contained occasional woody debris and grazed grass, noting that this vegetation had a sparse/ absent sub-canopy and understory and minimal ground cover.

There was no habitat onsite considered suitable for supporting native gecko. The kānuka treeland had a very sparse canopy, and would not allow for gecko to move between trees (Figure 5). This vegetation also had low habitat complexity and would not provide alternative cover (e.g., understory, groundcover, rocks, logs, dense shrubs, rank grass) and would likely be subject to mammalian predators.

Two unidentified skinks, presumed to be either copper skink, ornate skink, or exotic rainbow skink due to their size, shape and the known and expected diversity of lizards in the landscape, were identified during the search of lizard habitat (Figure 10). These skinks were observed within grazed pasture under isolated logs, as shown in Figure 9.

There was no habitat within the Site suitable for native frogs.



Figure 9: Isolated log in pasture where an unidentified skink was observed.

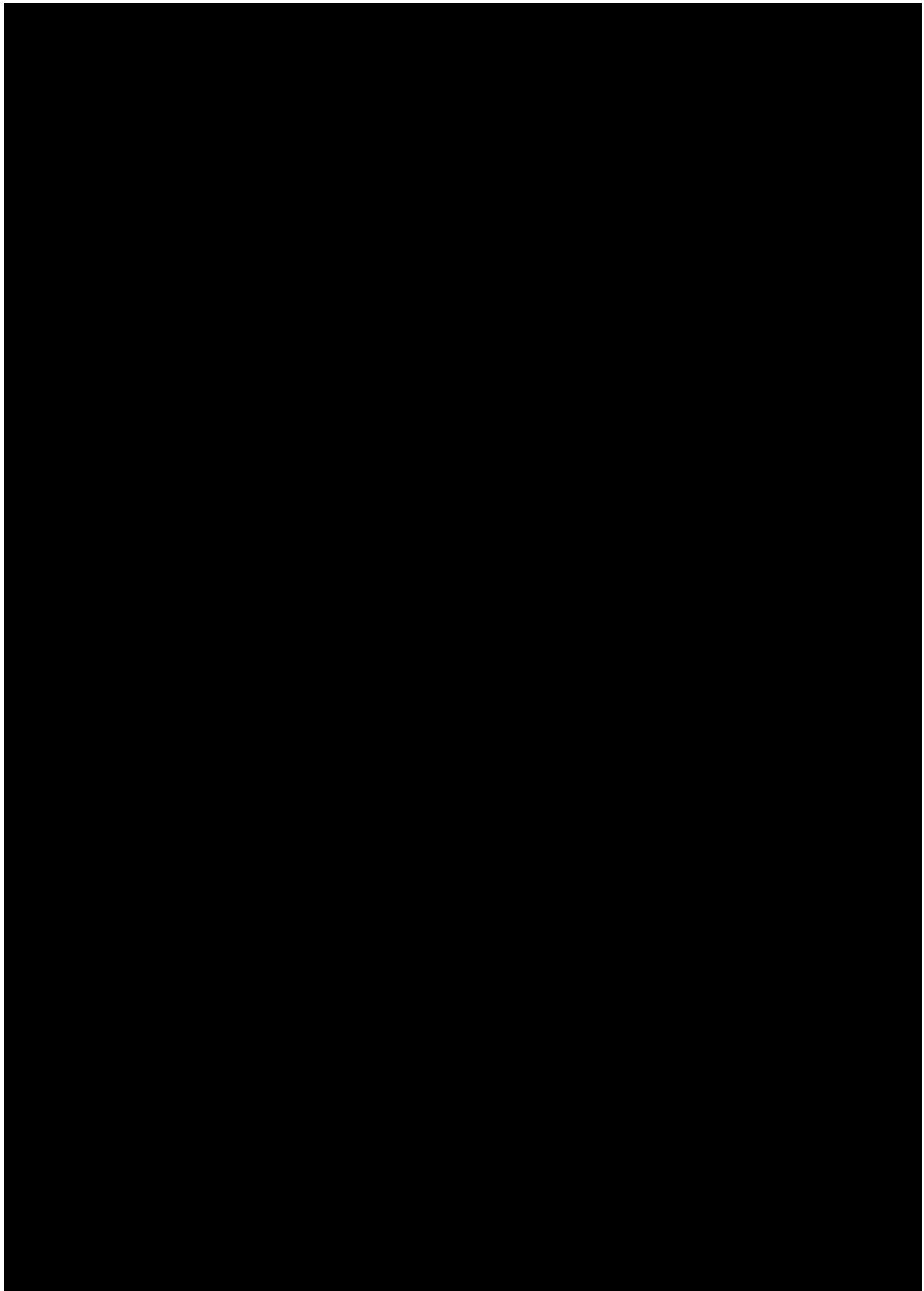


Figure 10: Potential lizard habitat within the Site.

5.2.3 Ecological Values

Overall, the Site constitutes 'low' to 'moderate' quality habitat for ground dwelling skinks (Table 12). There was no habitat considered suitable for supporting arboreal gecko. Given the likely presence of predators and the isolated, degraded and fragmented nature of the habitat present, the distance from the nearest source population, and ongoing farming practices, the persistence and/or recolonisation of most lizard species that may have originally inhabited the Site will have been impeded.

Based on locally conducted surveys in similar rural landscapes copper skink are the only likely native skink expected to be present, (in very low densities). Copper skinks are frequently encountered within novel ecosystems within the Waikato District including within farmland and in urban areas and residential gardens.

Copper skinks are considered 'At Risk – Declining' (Hitchmough et al. 2026) and have 'high' ecological value (as a species) in the EclAG framework.

Table 12: Ecological values of the Site with respect to lizards and lizard habitat.

Criteria for assessment	Description for the Site	Rating
Representativeness	The habitat value for lizards within the Site (excluding grazed pasture, which is not considered habitat), while lacking diversity and complexity, is representative of habitat for terrestrial skinks within rural Waikato.	Low
Rarity/ distinctiveness	Copper skink are potentially present within the Site in low density. Both are considered 'At Risk – Declining' according to Hitchmough et al. (2026). According to the EclAG, species with this threat status are considered to have 'high' ecological values	High
Diversity and pattern	Habitat for ground dwelling skinks is relatively scarce across the Site, however there is some diversity of habitat present (i.e., coarse woody debris and tree stumps, scrambling weed rows and hedges with rank grass and artificial materials). It appears unlikely that all of this habitat is currently occupied. Habitats are predominantly not indigenous.	Low
Ecological context	Copper skink and ornate skink are of conservation concern, so any habitat, particularly across grazed farmland, that can support individuals is important in an ecological context. The existing habitats are small and widely dispersed.	Moderate
Overall value		Moderate

5.3 Bats and Bat Habitat

5.3.1 Previous Surveys and Records

Department of Conservation Database

DOC have 1,372 records of bat surveys within 10 km of the Site on their database as at February 2025. 752 of these records, are positive detections of long-tailed bat as shown on Figure 11. Most bat detections were concentrated in southeastern Hamilton around Glenview and Riverlea and the Waikato River, with scattered records to the north, south and west of the Site. No bats have been detected in the Site, despite a survey being

undertaken within the kānuka treeland in 2020 (Waikato Regional Council/ Waikato University). The nearest records of long-tailed bats on the DOC database occurs 500 m to the northeast of the Site in a small fragment of vegetation surrounded by residential housing. These records were from Project Echo in 2020. Bats have also been detected in the Waiwhakareke Heritage Park (approximately 700 m to the North of the Site) in 2019 and 2020 (Project Echo).

Local Studies

Soundcounts Ltd, Titoki Landcare Ltd and Ecological Solutions (Ecological Solutions 2023) installed between 20 and 34 ABMS during each of three surveys conducted between November 2022 and June 2023 to inform the Rotokauri Greenway Project (1-4 km north of the Site). Four passes were detected during the study and these were considered to be commuting calls.

Ecology NZ (2021) installed 10 ABMs in suitable habitat within the proposed Minor Arterial designation area over the period between 5 February and 26 February 2021. One single long-tailed bat pass was detected during the survey, and this was considered a commuting call.

Two bat surveys were undertaken as part of the Rotokauri North project in 2018–2019. The Rotokauri North project is located 3.6 km northwest of the Site and contained similar habitats. The first survey used 12 ABMs and spanned 28 nights from December 2018 to January 2019 and the second used 11 ABMs over 15 nights during March 2019. No long-tailed bat passes were detected in either of these surveys (Tonkin and Taylor 2020).

Ecological Solutions commissioned Ecology NZ to undertake a bioacoustic survey for long-tailed bats at 256 Brymer Road, which is north of Lake Waiwhakareke approximately 800m north of the Site for an unrelated residential development project in 2020. This survey took place between April 30 and 18 May 2020 and used 15 ABMs which recorded for, on average, 18 valid survey nights (a total of 90 survey nights). During this survey four potential bat passes and one confirmed bat pass were recorded.

All the above surveys resulted in relatively low levels of bat activity in comparison to south-east Hamilton.

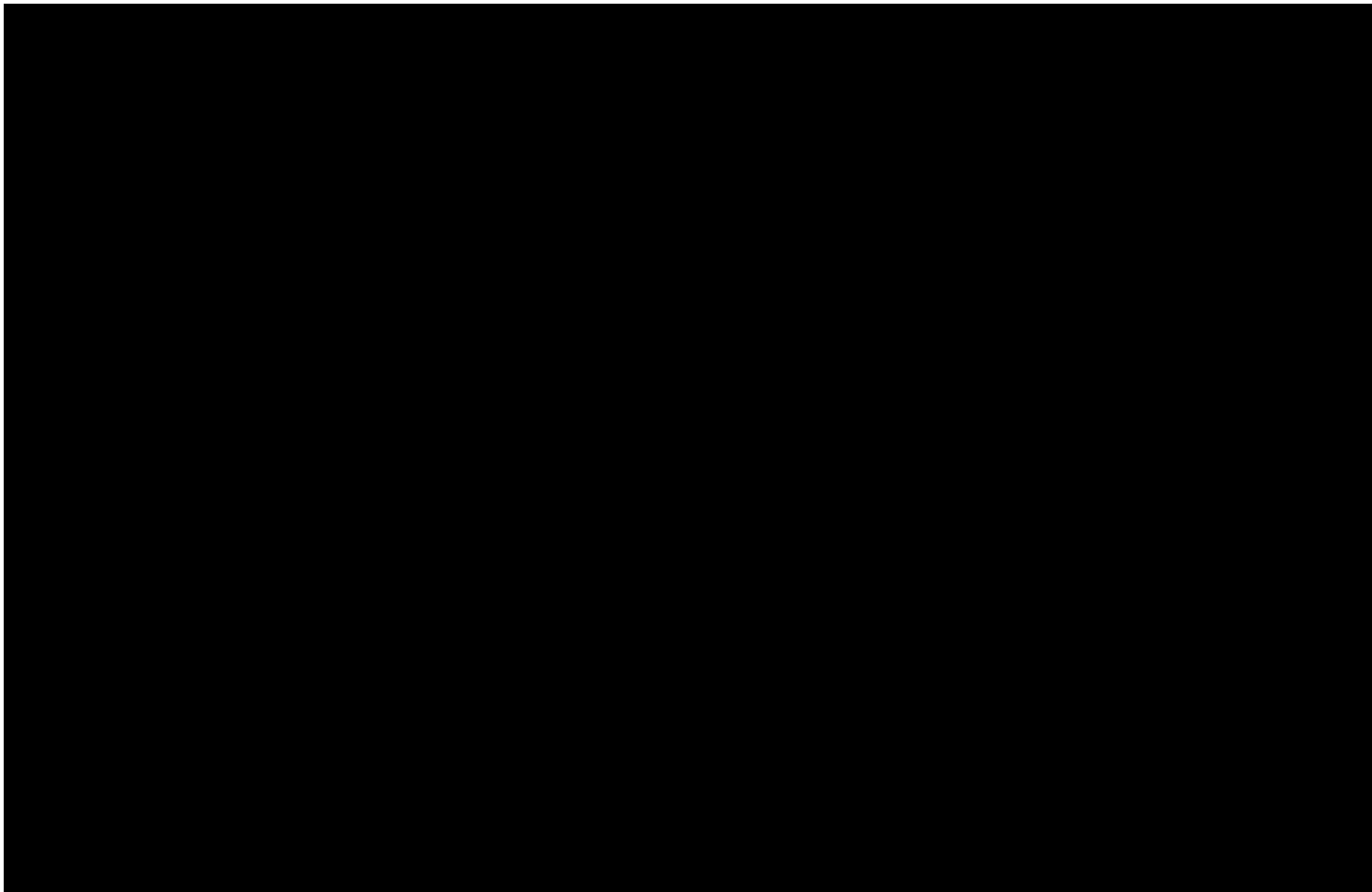


Figure 11: Department of Conservation Bat Records within 10 km of the Site.

5.3.2 Site Survey

Habitat for long tailed bats within the Site included a range of trees ≥ 15 cm DBH with Potential Roost Features (PRFs), scattered about hill slopes and on either side of the open grassland flats. The flats were bisected by a network of drains, and there are several wetlands on site, that could provide foraging opportunity for any bats active across the landscape.

Tree species observed included a small stand of black locust (0.21 ha) which contained PRFs such as hollows, cavities, and knot holes. A small area of blackwood (0.18 ha), an area of eucalypts and poplar (0.37 ha) and the native kānuka treeland (1.52 ha).

At least thirteen stand-alone native and exotic trees were also present, with several old growth pine with broken or dead branches/stems were scattered across developed grassland slopes.

During the onsite ABM survey two long-tailed bat passes were detected on two different ABMs (ABM70 and ABM84) on 7 November 2025 just prior to midnight (Table 13, Figure 12). Both ABMs were located adjacent to Wetland E (one on a waratah and one within a pine tree). The passes were considered most likely to be commuting calls. The low level of activity recorded in this survey was expected based on the results of other local surveys in close proximity to the Site (Section 5.3.1) for this reason, no additional surveys were warranted. There were a total of 24 valid survey nights (DOC 2024) during the survey, though two ABMs had fewer nights due to early failures of their batteries.

Table 13: Bat Passes per valid survey night.

ABM Number	No. of Bat Passes	No. of Valid Survey Nights	Bat Passes per valid Survey Night
57	0	24	0
59	0	19	0
61	0	24	0
67	0	24	0
70	<u>1</u>	24	0.042
71	0	24	0
74	0	24	0
76	0	24	0
80	0	24	0
83	0	20	0
84	<u>1</u>	24	0.042
86	0	24	0
88	0	24	0
89	0	24	0
92	0	24	0
93	0	24	0
101	0	24	0
103	0	24	0
109	0	24	0
110	0	24	0

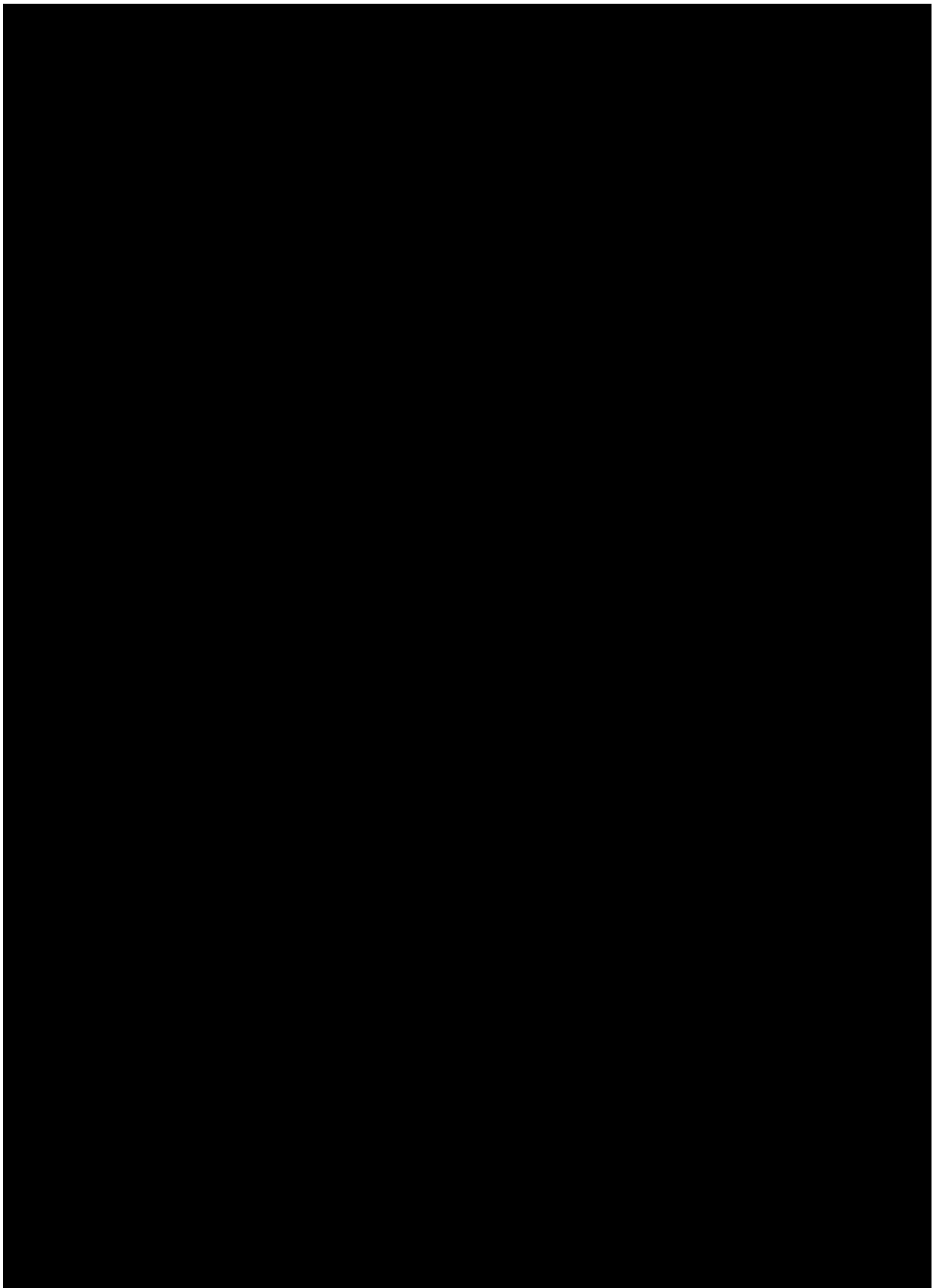


Figure 12: Bat detections on Site during October–November 2025 ABM survey.

5.3.3 Ecological Values

Long-tailed bats are considered 'Threatened – Nationally Critical' (O'Donnell et al. 2023). According to EclA guidelines, species with this threat status are considered to have 'very high' ecological value. Habitat within the Site (farmland, crops and exotic specimen trees) are characteristic of the rural Hamilton and Waikato Region. Bat activity has been found to be high within similar habitats south-east of Hamilton; however, surveys completed locally suggest that bat activity is likely to be low in the north-western parts of Hamilton (Ecology NZ 2021).

The bioacoustics data presented in this report is consistent with low activity and is consistent with data collected in local studies to the north of the Site during the 2022–2023 survey period for the Rotokauri Greenway Project (Ecological Solutions 2023), a single commuting pass identified in 2020 relating to the proposed Minor Arterial designation footprint (Ecology NZ 2021) and no bat passes at Rotokauri North in 2018–2019 (Tonkin and Taylor 2020).

Since only low bat activity has been recorded within the Site and the local landscape, and all records have been commuting passes, it seems likely that potential roosting habitat within the Site (while present) is not currently used by local bats. Therefore, these trees are currently unlikely to be of 'high' value to local bat populations. Furthermore, bats have large home ranges, and the occasional detection of bats in an area does not necessarily indicate the area is core habitat⁴.

Overall, ecological values within the Site with regard to bats and bat habitat are considered to be 'moderate' as summarised in Table 14.

⁴ Core habitat discussed herein, refers to areas of habitat essential for the long-term survival of a species in a given area.

Table 14: Ecological values of the Site with respect to bats and bat habitat.

Criteria for assessment	Description for the Site	Rating
Representativeness	The habitat value for bats within the Site is representative of rural/ peri urban habitat utilised by bats within the Waikato Region. However, it is not representative of indigenous habitat	Low
Rarity/ distinctiveness	Long-tailed bats have been detected twice within the Site (likely one commuting pass captured on multiple machines). Long-tailed bats are considered 'Threatened (Nationally critical)' according to O'Donnell et al. (2023). According to EclA guidelines, species with this threat status are considered to have 'very high' ecological values.	Very high
Diversity and pattern	The Site provides habitats suitable for commuting, foraging and roosting activities. However, all the habitat is low quality with (e.g., open and exposed roost features, low value wetland habitat). It is also limited in extent (c. 2.3 ha of mature trees, plus at least 13 standalone trees not included in this estimate). Approximately 78 ha of grazed pasture within the Site with low growing shrubs, heavily degraded wetlands (c. 2.4ha) and drains which lack vegetation (with the exception of weeds and small shrubs) and supports a low abundance and diversity of aquatic insects which would support bat feeding.	Low
Ecological context	The habitat onsite provides a stepping stones between fragments of habitat within the rural landscape to the south and east, to larger areas of habitat in the north (i.e., Lake Rotokauri and Lake Waiwhakareke).	Moderate
Overall value		Moderate

6.0 Wetlands

6.1 Description

The geology of the Site includes mostly Hamilton Ash on hillslopes and ridges, with Walton subgroup in the gully systems and large areas of peat and Piako subgroup on the flats. The peat area appears to have formerly been a large bog wetland complex which was mostly drained sometime prior to 1943 and no wetlands are now present in the peat area.

The Site contained 15 'natural inland wetlands' and a small fragment of a wetland from the neighbouring property at the time of the Site survey (average size 1,063 m², collectively covering 1.7 ha) as defined by the NPS-FM (2020). Wetlands are mapped in Figure 13, with examples shown in Figure 14 and Figure 15. Normal farm management alters the environment regularly (e.g., grazing, sowing, cropping, tilling, drain maintenance) and may change the extent and values of wetlands within the Site. Wetland plot data is presented in Appendix C.

The wetlands were located in shallow gullies upon low permeability Walton Subgroup soils, with Hamilton Ash geology forming the surrounding hillslopes and ridgelines (CMW Geosciences, unpublished draft geology map, dated 29/10/25). These wetlands were considered most likely to be supported by a combination of groundwater discharges from the Walton Subgroup sediments and/ or seepage/ spring fed as well as fed by rainwater and runoff. The hydrology for the wetlands appeared to be enduring, based on the visible changes in vegetation pattern in their respective locations in aerial imagery dating back to 1943 (i.e. Retrolens and Google Earth). Groundwater discharge appears to be important in supporting the wetlands during summer months when rainfall and runoff inputs will be lower.



Figure 13: Natural inland wetlands within the Site.



Figure 14: Wetland H.



Figure 15: Section of Wetland E.

Wetlands were generally riverine marsh systems damaged from historic and active farming. Exotic species dominated wetland plant communities which consisted of hydrophytic grass species such as glaucous sweet grass (*Glyceria declinata*), Mercer grass (*Paspalum distichum*) and Yorkshire fog. Other commonly occurring herbaceous and/or rush species within these grassland communities included creeping buttercup (*Ranunculus repens*), lotus (*Lotus pedunculatus*) and soft rush (*Juncus effusus*).

6.2 Ecological Values

The wetlands identified within the Site were considered to have ‘moderate’ ecological values, due to the rarity of wetlands as a habitat type, rather than a reflection of their current condition, which was poor. A summary of the ecological values with regard to wetlands is provided in Table 15.

Table 15: Ecological values of the Site with respect to wetlands.

Criteria for assessment	Description for the Site	Rating
Representativeness	Wetlands were severely degraded via drainage and current or historic grazing and did not reflect former vegetation types.	Very low
Rarity/ distinctiveness	Wetland habitats are a threatened habitat type within the Hamilton ED with <1% historical cover remaining (Leathwick et al 1995).	High
Diversity and pattern	Wetlands were highly modified habitats with very low species diversity (predominantly introduced species). Fauna present within wetlands included common species such as pūkeko and perhaps (although unlikely) shortfin eel.	Low
Ecological context	Wetlands were not buffered and provided poor habitat for native bird species in the wider landscape. The wetlands did however, form part of stream/wetland gully systems and had enduring hydrology and restoration potential.	Moderate
Overall value		Moderate

7.0 Terrestrial and Wetland Ecological Significance

7.1 Terrestrial Vegetation and Habitat

No terrestrial vegetation within the Site was considered to meet the WRPS significance criteria, nor the criteria for Significant Natural Areas in the National Policy Statement for Indigenous Biodiversity 2023 (NPS-IB).

Long-tailed bats, which are considered ‘Threatened - Nationally Critical’ (O'Donnell et al. 2023), were detected within the Site. The two detections within the Site and the rare detections in local surveys were all commuting calls, suggesting that, bats may pass through the area, but are not necessarily recognising or using it as roosting or foraging habitat (despite suitable habitat being present). Long-tailed bats are highly mobile fauna, and the fact that they pass through the Site is not considered to trigger criteria 3 of the WRPS significance criteria.

Copper skinks are considered ‘At Risk – Declining’ (Hitchmough et al. 2026) and are likely to be present within the Site; however, this species is not especially rare within the region,

nor would the protection of the habitat within the Site be important for the persistence of the species either locally or nationally.

7.2 Wetlands

According to the criteria in the WRP, all wetlands within the Site would be considered significant because they meet Criterion 4 “*It is indigenous vegetation or habitat type that is under-represented (20% or less of its known or likely original extent remaining) in an Ecological District, or Ecological Region, or nationally*”.

Although the vegetation within wetlands was not indigenous, wetlands are a threatened and under-represented habitat type within the Hamilton ED with <1% historical cover remaining (Leathwick et al. 1995).

In general terms, these wetlands would be considered to have a low level of significance, only triggering this one criterion within the WRP, and being dominated primarily by exotic species. The wetlands present were considered to have enduring hydrology and good restoration potential.

8.0 Freshwater Environment

8.1 Stream Classifications

8.1.1 Artificial Drains

Most watercourses within the Site were classified as artificial drains that have been dug through a flat area of peat (historically wetland) and have no natural portions. The length of artificial drain within the Site was 9,198 m (Figure 16 and Table 16). Approximately 4,959 m of artificial drains were constructed since 2022 based on a review of aerial imagery. All other artificial drains were constructed before 1943.

8.1.2 Modified Watercourses

Modified ephemeral and perennial watercourses made up 1,429 m of the drainage network within the Site (Figure 16 and Table 16). Modified watercourses originated in natural headwater gullies where natural inland wetlands occur (i.e., north-central area of Site).

Ephemeral modified watercourses (total length = 690 m) typically occurred below natural inland wetlands in gullies in the northern portion of the site and transition into perennial modified watercourses (total length = 739 m) on the flats.

Although stream channels are unlikely to have naturally formed on the flat topography where Watercourses W1 and W2 are shown (i.e., historically wetland), these sections of modified watercourse have natural portions in their headwaters, so all downstream sections were classified as modified watercourse (consistent with the WRC definition) despite being highly channelised with straight alignments and having the physical appearance of drains.

Watercourse W2 flows out of the southern boundary of the central portion of the Site, re-enters the Site, and flows for 415 m before exiting the western boundary of the Site. Approximately 240 m of Watercourse W1 drains outside the Site along the western boundary.



Figure 16: Watercourse classifications within the Site.

8.1.3 Piped or culverted watercourses

There was 279 m of piped sections (i.e., mostly culverts) on artificial drains and modified watercourses within the Site (Figure 16 and Table 16).

Table 16: Watercourse classifications within the Site.

Type	Length (m)	Notes
Artificial drains	9,198	Includes old drains (present since 1943, labelled D1–D16) and recently dug terminal drains (partially labelled ND1–ND3) (see Figure 16).
Modified watercourses (Perennial)	739 m	W1, W2, W3
Modified watercourses (Ephemeral)	690 m	W1a, W2a, W3a, W3b, W3c.

8.2 Water Physicochemistry

Water physicochemistry was measured at four locations on 26 September 2025 between 10:30 a.m. and 4:20 p.m. (Table 17). Water temperatures were moderate, dissolved oxygen high, conductivity moderate-low and pH near-neutral. Water physicochemistry would not have limited aquatic biota at sampled sites at the time of the survey.

Table 17: Water physico-chemistry in modified and artificial watercourses.

Watercourse	Time	Temperature (°C)	Conductivity (µS/cm)	pH	DO (%)	DO (g/m ³)
W1 (modified)	10:30 a.m.	16.7	133	7.0	109	10.5
D5 (artificial)	2:20 p.m.	17.3	129	7.0	100	9.6
D8 (artificial)	12:45 p.m.	16.5	135	6.9	110	10.7
W7 (modified)	4:20 p.m.	18.2	207	6.2	114	10.7

8.3 Aquatic Habitat

8.3.1 Artificial Drains

Artificial drains provided poor quality habitat for aquatic fauna due to the lack of aquatic habitat diversity (e.g., channelised, uniform run/pool, depths, widths), low channel gradient, lack of vegetated riparian margins, poor channel shade and water short nature in some drains (i.e., ephemeral). Habitat in artificial drains is shown in Figure 17 and Figure 18.



Figure 17: Habitat in Drain 2 (D2).



Figure 18: Habitat in Drain 6 (D6).

8.3.2 Modified Watercourses

Modified watercourses were channelised with straight alignments and provided generally similar habitat to artificial drains. Modified ephemeral watercourses had narrow channels, shallow water depths, were stagnant in places and provided very-poor quality aquatic habitat. Modified perennial watercourses were fed by upstream catchments and artificial drains on flat areas so conveyed more water. Modified perennial watercourses were deeply incised, wide, had moderate-deep water depths, sluggish flow in uniform runs, lacked riparian vegetation, poorly shaded, high macrophyte cover and provided aquatic habitat of poor quality. Typical habitat in modified watercourses is shown in Figure 19.



Figure 19: Modified Watercourse.

8.4 Fish Fauna

8.4.1 New Zealand Freshwater Fish Database and Existing Data

The New Zealand Freshwater Fish Database (NZFFD) holds records for eight native fish species and five introduced species within the wider Ohote Stream catchment that includes Lake Rotokauri and Lake Waiwhakareke.

Native fish species include longfin eel (*Anguilla dieffenbachii*), shortfin eel (*Anguilla australis*), giant kōkopu (*Galaxias argenteus*), banded kōkopu (*Galaxias fasciatus*), īnanga (*Galaxias maculatus*), common bully (*Gobiomorphus cotidianus*), black mudfish (*Neochanna diversus*) and common smelt (*Retropinna retropinna*). Introduced species include rudd (*Scardinius erythrophthalmus*), koi carp (*Cyprinus carpio*), goldfish (*Carassius auratus*), gambausia (*Gambusia affinis*) and brown bullhead catfish (*Ameiurus nebulosus*).

Native fish species in the wider Ohote Stream catchment of conservation interest include īnanga with a 'Naturally Vulnerable' status, longfin eel, giant kōkopu, black mudfish and common smelt with an 'At Risk – Declining' status, and banded kōkopu with a 'Naturally Uncommon' status (Dunn et al. 2025). Koi carp, brown bullhead catfish, wild goldfish and gambausia are listed in the Waikato Regional Pest Management Plan 2014–2024 (Waikato Regional Council 2014) as pest fish species.

8.4.2 Fish Habitat and Survey Results

Aquatic habitat in artificial drains and modified watercourses provided very-poor quality habitat for native fish (e.g., uniform, poor cover/shelter). No native fish were captured during the trapping survey. A single koi carp was observed in Drain D9. eDNA samples collected at seven locations (n=6) indicated the presence of longfin eel, shortfin eel, rudd, goldfish and gambausia (Table 18 and Appendix D). Results of the trapping survey and eDNA sampling indicate the fish fauna within the Site is likely to be limited by poor water quality, poor habitat conditions and possibly downstream barriers to migration restricting access.

Table 18: Fish species detections from the Site.

Common name	Scientific name	Threat status	Watercourse						
			Site 1	Site 2	Site 3	Site 4	Site 5 (1-2)	Site 5 (3-4)	Site 5 (5-6)
Longfin eel	<i>Anguilla dieffenbachii</i>	At Risk – Declining	-	-	-	51 ± 63	9 ± 12	3,738 ± 389	3 ± 4
Shortfin eel	<i>Anguilla australis</i>	Not Threatened	2,047 ± 2,094	516 ± 545	335 ± 99	4,324 ± 970	3,016 ± 1,767	1,783 ± 1,216	780 ± 99
Rudd	<i>Scardinius erythrophthalmus</i>	Introduced and naturalised	-	-	-	98 ± 64	-	-	-
Gambusia	<i>Gambusia affinis</i> *	Introduced and naturalised	1,564 ± 1,593	-	138 ± 99	3,879 ± 4,094	-	-	-
Goldfish	<i>Carassius auratus</i>	Introduced and naturalised	-	-	-	524 ± 269	-	-	-

Note: *Listed as a pest species in the Waikato Regional Pest Management Plan 2014–2024 (Waikato Regional Council 2014). Values are mean DNA reads ± 1 Standard Deviation.

8.5 Stream Ecological Valuation

Stream Ecological Valuation (SEV) surveys were carried out at six locations on modified watercourses (Figure 4). SEV scores ranged between 0.186 and 0.196 out of a maximum of 1.0 at sites W1 and W2, respectively (Table 19 and Appendix E). All SEV scores for modified watercourses were very-low and indicated poor ecological function and value.

Low scores were given to 'floodplain effectiveness' and 'fish spawning habitat' functions due to the channelised and incised nature of the channels and lack of effective floodplain. Low scores were given to 'water temperature control', 'organic matter input', 'instream particle retention' and 'riparian vegetation intact' functions due to the general lack of vegetated riparian margins. Low scores were given to 'habitat for aquatic fauna' function due to the uniform habitat conditions and unshaded upstream catchment.

Table 19: Stream Ecological Valuation (SEV) data for modified watercourses.

Function	SEV1 - W1 (upper)	SEV2 - W2a	SEV3 - W2 (upper)	SEV4 - W2 (lower)	SEV5 - W1 (lower)
Natural flow regime	0.10	0.29	0.10	0.12	0.10
Floodplain effectiveness	0.24	0.52	0.20	0.20	0.20
Connectivity for natural species migrations	0.40	0.02	0.50	0.40	0.40
Natural connectivity to groundwater	0.10	0.01	0.10	0.08	0.08
<i>Mean</i>	<i>0.20</i>	<i>0.30</i>	<i>0.20</i>	<i>0.20</i>	<i>0.20</i>
Water temperature control	0.02	0.12	0.00	0.00	0.00
Dissolved oxygen levels maintained	0.40	0.34	0.34	0.40	0.40
Organic matter input	0.40	0.34	0.34	0.40	0.40
Instream particle retention	0.10	0.30	0.20	0.30	0.20
Decontamination of pollutants	0.00	0.00	0.00	0.00	0.00
<i>Mean</i>	<i>0.05</i>	<i>0.15</i>	<i>0.10</i>	<i>0.15</i>	<i>0.10</i>
Fish spawning habitat	0.05	0.05	0.05	0.05	0.05
Habitat for aquatic fauna	0.25	0.25	0.24	0.31	0.35
<i>Mean</i>	<i>0.16</i>	<i>0.13</i>	<i>0.14</i>	<i>0.12</i>	<i>0.13</i>
Riparian vegetation intact	0.01	0.00	0.07	0.01	0.01
<i>Mean</i>	<i>0.00</i>	<i>0.00</i>	<i>0.02</i>	<i>0.00</i>	<i>0.00</i>
Overall SEV score	0.186	0.193	0.195	0.196	0.192

8.6 Freshwater Ecological Values

8.6.1 Artificial Drains

All artificial drains within the Site were assessed as having 'negligible' ecological value (refer to Table 20) as they were man-made and not representative of natural ecosystems, are not rare or distinctive habitat or support threatened freshwater species and do not provide an important migratory pathway for native fish or contribute to ecological networks/linkages.

Table 20: Ecological values of artificial drains within the Site.

Criteria	Description for the Site	Rating
Representativeness	Artificial drains within the Site are man-made with straight channels that provide uniform aquatic habitat, lack riparian vegetation, are poorly shaded and are not representative of natural environments	Very low
Rarity/ distinctiveness	Artificial drains are man-made so are not rare or distinctive environments and do not support aquatic species of conservation concern.	Very low
Diversity and pattern	Artificial drains have very low habitat diversity or complexity and known to support a very limited native fish fauna (shortfin eel)	Very low
Ecological context	Are man-made features, do not provide a migratory pathway for native diadromous fish and do not positively contribute to ecological networks or linkages within the catchment.	Low
Overall value		Negligible

8.6.2 Modified Watercourses

Modified watercourses within the Site were assessed as having 'low' ecological value (Table 21). Modified watercourse within the Site have been highly modified through channelisation and straightening resulting in uniform aquatic habitat that is not representative of a natural freshwater environment, are not rare or distinctive habitats but may support 'At Risk – Declining' longfin eel. Modified watercourses within the Site do not provide an important migratory pathway for diadromous native fish as there is limited or no aquatic habitat capable of supporting fish in upstream headwater wetlands.

Table 21: Ecological values of the modified watercourses within the Site.

Criteria	Description for the Site	Rating
Representativeness	Modified watercourses within the Site have been channelised and straightened and were most likely constructed to drain wetlands and/or to connect upstream catchments originating in natural hillslopes through the historical wetlands to the downstream catchment. Modified natural watercourses have limited habitat heterogeneity and are not representative of natural environments as they have artificial drain characteristics.	Low
Rarity/ distinctiveness	Modified watercourses within the Site do not contain habitat for indigenous species of conservation interest and are not rare freshwater ecosystems.	Low
Diversity and pattern	Modified watercourses within the Site have straight aligned channels that provide uniform habitat for aquatic fauna. Modified watercourses lack vegetated riparian margins.	Low
Ecological context	Modified watercourses were construct of a former peat bog and link small headwater wetland/stream catchments on hillslopes with the downstream catchment. Modified watercourses do not provide an important migratory pathway for native diadromous fish upstream.	Moderate
Overall value		Low

Modified watercourses and artificial watercourses within the Site do not meet any of the eleven criteria listed in the WRPS for assessing significance so are not significant.

9.0 Detailed Description of Activities

9.1 Earthworks

The earthworks extent (approx. 70 ha) is shown in Figure 20. Earthworks will include the excavation of services, formation of building platforms, paved and landscaped areas. Erosion and sediment controls will be designed in accordance with Waikato Regional TR2009/02. The detailed earthworks strategy, cut and fill volumes, staging and sediment controls will be set out in a Construction Management Plan (CMP).

The earthworks planned for the Site takes into consideration, the outcomes and recommendations within the Geotechnical Investigation undertaken for the project by CMW Geosciences (2026). Significant peat deposits have been identified and mapped in the low-lying areas of the Site, which presents a risk of differential settlement. CMW recommend staged preloading of the peat areas during construction.

According to the Project Infrastructure Report (Maven Associates 2026), “*excess cut material generated from the wider earthworks will be placed over the peat deposits in a controlled manner to induce consolidation and settlement. The preloading will be undertaken in stages and monitored allow the peat to settle within the tolerances and settlement envelope specified by the Geotechnical Engineer. Preloading will only be reduced or removed once settlement rates have stabilised and the required ground performance criteria have been achieved, thereby minimising the risk of post-construction settlement.*”

The earthworks extent does result in the loss of four wetlands (Wetlands K, L, M and N) and 133 m of modified ephemeral watercourse (watercourse W2a). It also encroaches in some locations within a 10 m setback of watercourses and wetlands to facilitate the construction of a well-functioning urban environment (e.g., roading etc.).

Some modified perennial streams (e.g., W2) will be recontoured and earth worked (during the compaction of peat) and then reinstated as a stream channel.

9.2 Stormwater

The stormwater for the Site is summarised in the Project Infrastructure Report (Maven Associates 2026) and set out in detail within the Stormwater Management Plan (SMP), Appendix A of Maven Associates 2026. To summarise, stormwater management will be achieved through the use of several devices including

- Modified drains/ channels with landscaping.
- Roadside raingardens and artificial wetlands.
- High flow bypasses.
- Treatment wetlands with forebays (eight treatment wetlands).
- On lot retention through soakage.
- Protection of existing bush features.
- Planting of riparian and wetland areas.



Figure 20: Earthworks extent based on shapefiles released by Maven and Associates, 3 August 2026.

9.3 Wastewater

Wastewater discharge from the developed Site will be to the IAWAI network. The initial interim solution for Stages 1–5 (approximately 333 houses), is to pump wastewater to the Grandview Road Waste Water Pump Station (WWPS), and upgrade it with additional emergency storage.

During Stage 6, a wastewater rising main will be constructed through to the western interceptor. The plan is to run this up Grandview Road, connecting to a manhole 70m past the manhole connection for the development. Wastewater will then be switched from the Grandview Road WWPS, to the new wastewater rising main to the western interceptor. The rising main to Grandview Road WWPS will then be decommissioned. Refer to Maven Drawing no SK02-2 and SK02-3.

9.4 Staging

The Project will be staged as shown in Figure 21. Stage 1 (sub-stage a) is when the effects of stream and wetland loss (Wetlands K, L, M and N and 133 m of watercourse W2a) will be realised. Stage 1 (sub-stage b) includes the creation of >0.75 ha of wetland habitat.

Ecological Solutions understands that Stage 1 will include the restoration of existing wetlands C, G, F, H, J and I (totalling 1.06 ha) while the restoration of wetlands O3 (within the Site), A, B and C (totalling 0.1373 ha) will occur in Stage 4 (sub-stage b).

Stream creation will occur in Stage 2 (sub-stage a), while stream restoration will occur in both Stage 1 and Stage 4 (sub-stage b).

Consideration of project staging is discussed with respect to compensation outcomes for streams and wetlands in section 13.0.

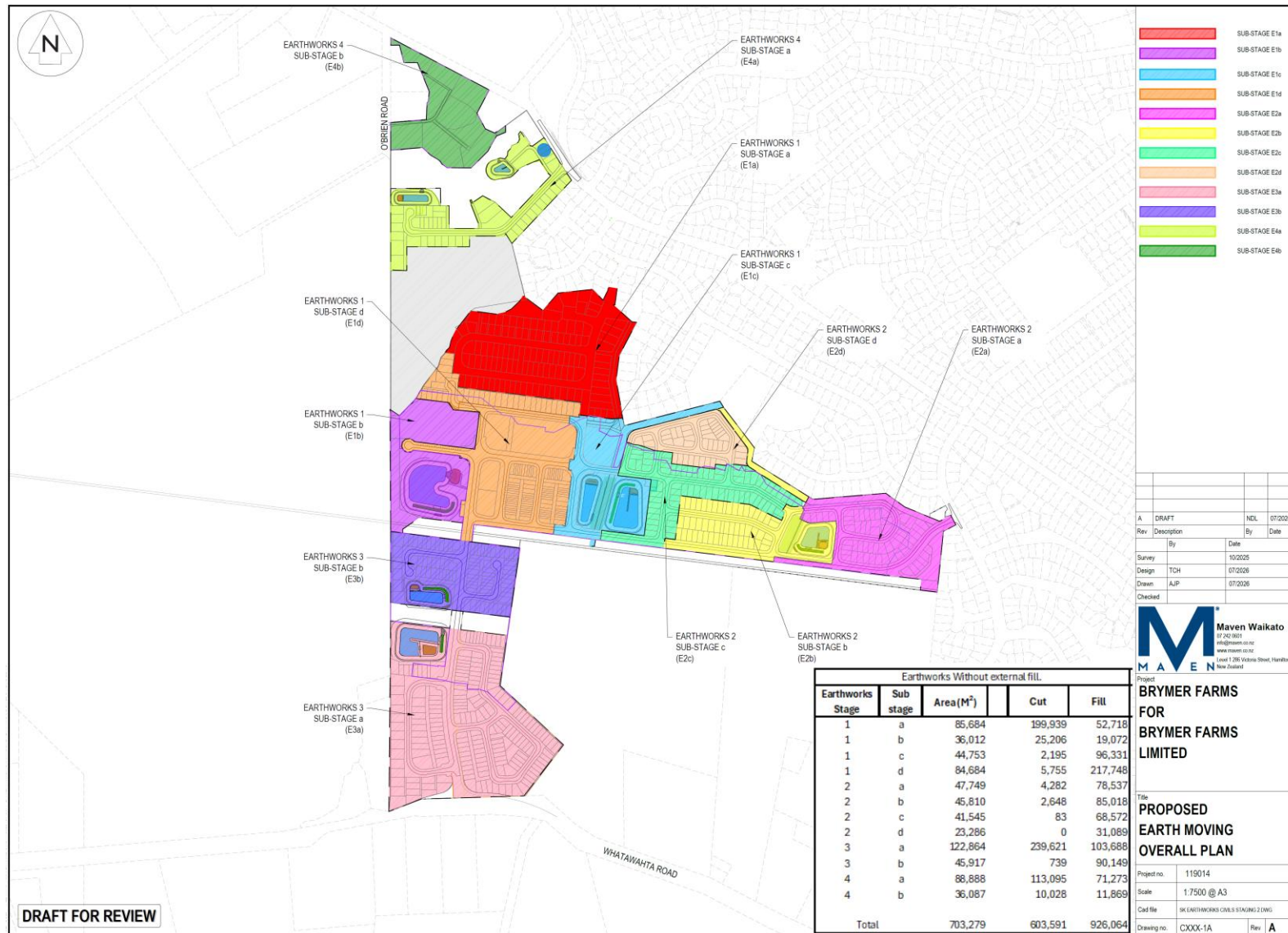


Figure 21: Staging Plan.

10.0 Terrestrial Effects and Impact Management

10.1 Introduction

The Brymer Project has the potential to cause impacts on terrestrial features summarised below and discussed in Sections 10.2 to 10.4. The design has considered terrestrial habitat with the highest ecological values and/ or restoration potential (e.g., kānuka treeland) provides for the protection and enhancement of this feature.

In accordance with EclA guidelines, measures to avoid, minimise and remedy adverse effects are focused on terrestrial fauna and habitats where the level of effect was assessed to be 'moderate', 'high' or 'very high', or in cases of a 'low' level of effect, if the Wildlife Act applies. Potential effects of the Project on the terrestrial environment are summarised below and in Table 22 in Section 10.5.

Prior to effects management the actual and potential effects of the Project on terrestrial ecology include:

- Vegetation and habitat removal.
 - o Botanical loss.
 - o Habitat loss for birds, lizards and bats.
 - o Direct effects associated with removal (potential risk of mortality) on birds, lizards and bats.
- Operational disturbance of bats.
- Loss of roost trees for long tailed bats.
- Biosecurity and introduction of unwanted organisms during earthworks and planting.

Measures to address actual and potential effects of the Project on terrestrial ecology include:

- Retention, legal and physical protection of the existing kānuka treeland (1.52 ha).
- Legal and physical protection and enhancement of existing wetland habitat (1.2 ha), riparian and wetland buffer areas and hillsides (18.4 ha) and stormwater reserve areas (7.1 ha) (total 26.7 ha).
- Plant and animal pest control within planted and protected areas noted above.
- Inclusion of native plants within stormwater treatment devices, and integration of these areas with other natural and vegetated areas within the Site.
- Residual effect management (e.g., wetland creation).

10.2 Riparian and Landscape Planting

A significant component of the Project is restoration of ecological features (e.g. streams and wetlands) and retirement of steep farmland. Planting locations, species selection and number of plants is provided in the landscape plan prepared by B&A.

Natural wetlands (1.2 ha) and riparian and wetland buffer areas and hillsides (18.4 ha) will be restored through native planting and pest plant and animal control. An area in the north of the Site referred to as Character Area E in the landscape plan prepared by B&A has been designed to integrate wetland and stream corridors and create a link to the existing kānuka treeland. Stormwater treatment wetlands (7.1 ha) will include native planting and where appropriate will integrate with other natural areas within the Site.

A total area of 26.7 ha (excluding house lot and streetscape planting) within the Site will be planted and is expected to result in a positive ecological outcome. The benefit to fauna, wetland and stream ecological values is discussed below.

10.3 Vegetation Removal

10.3.1 Botanical Values

Vegetation within the Earthworks footprint comprised approximately 68 ha of pasture and cropping land considered to have ‘negligible’ ecological values from a botanical perspective and 2 ha of mature trees (mostly exotic) and weeds which were considered to have ‘low’ ecological values. While no specific mitigation is needed to replace the loss of this vegetation, the extensive planting proposed within the Site within and adjacent to streams and wetlands will replace the vegetation lost with native vegetation and will result in a net positive outcome. Stabilisation of bare soils following earthworks (i.e., reseeding with grass) will also assist in limiting sediment run off into watercourses and wetlands during the lag time between earthworks of the land and its subsequent development into residential housing.

10.3.2 Lizards

Based on the outcomes of this survey, in which two undetermined skinks were observed, and locally conducted surveys in similar rural landscapes (e.g., where grazing and cropping are undertaken), copper skink and possibly ornate skink are the only native skinks expected to be present on Site (in very low densities). As these species are considered ‘At Risk – Declining’ (Hitchmough et al. 2026), they have ‘high’ ecological value in the EcIA guideline framework, and will require management during habitat removal to mitigate direct adverse effects. Lizard salvage and relocation actions are set out in the Lizard Management Plan (LMP) for the Project, provided as Appendix F (Ecological Solutions 2026a). Provided lizards within the Earthworks footprint are managed during habitat removal, the residual adverse effect on lizards is considered ‘low’.

Lizard habitat within the Site was considered to have ‘low-moderate’ ecological values, with the earthwork’s footprint avoiding areas with greater restoration potential for lizards (e.g., the kānuka treeland). Earthworks will result in the temporary loss of c. 2.2 ha lizard habitat (of low- moderate quality) (considered to be a low magnitude of effect).

Lizard habitat within the Site will be replaced by c. 18.4 ha native planting suitable for lizards in the upper edge and buffer zones of streams and wetlands, connected to an additional 7.1 ha of native vegetation within stormwater reserves (including stormwater wetlands). These areas, along with the kānuka treeland will also be subject to animal pest control. In the immediate term, 25 wood log stacks at the lizard release site will also be installed to provide short term habitat (refer to LMP, provided as Appendix F (Ecological Solutions 2026a)).

The proposed planting within the Site will result in a net gain in lizard habitat, which is consistent with the objective of the National Policy Statement for Indigenous Biodiversity (NPS-IB), which is to maintain indigenous biodiversity across New Zealand so that there is at least no overall loss. The resulting overall level of effect on lizard habitat is a net positive outcome, with an additional 16.2 ha of habitat created as a result of the project.

10.3.3 Birds

The ecological values of birds and their habitat within the Site were considered to be ‘low’. Bird species observed within the Site and those expected to occur, consist predominantly of

common indigenous and exotic species typical of highly modified agricultural landscapes. Bird species of conservation interest present in the local landscape are only likely to be infrequent visitors to the Site given the lack of suitable habitat to support them. The magnitude of effect of temporary habitat removal on the local bird population is considered 'low', resulting in an overall 'low' level of effect that does not require mitigation provided normal precautions are taken to protect nesting birds. These precautions include clearing potential nesting habitat (e.g., trees, shrubs) outside the breeding season or if vegetation clearance occurs during the breeding season, a pre-clearance check for nests should be undertaken by a suitably qualified ecologist. If native bird nests are identified, trees with nests should be monitored until nesting birds have fledged or nests have been naturally abandoned.

10.3.4 Bats

The results of the bat survey indicate that while bats are present in the wider landscape, they likely only move through the Site on occasion, indicating it is unlikely to be core habitat. Impacts on commuting or feeding bats in the Site are therefore likely to be minimal, and likely limited to small effects on individuals, rather than at a population level.

Since so little bat activity has been identified within the Site or in recent surveys in the local landscape, it seems likely that potential foraging and roosting habitat (while present) is not recognised or utilised by local bats to any substantial degree. For this reason, the loss of open pasture and potential roost trees associated with the Project would be unlikely to lead to local population level impacts on bats. The likelihood of bats being within trees during felling is also considered low. However, there is still a risk bats could be present, so pre-clearance management to mitigate any direct effects on local bats using vegetation in the Earthworks footprint is provided for in the Bat Management Plan (BMP) for the Project, provided as Appendix G (Ecological Solutions 2026b). In the unlikely event a confirmed roost is encountered, its replacement with an artificial roost box is also set out within the BMP. Provided pre-clearance management is implemented, the residual level of effect on bats is considered 'low'.

Trees in the Site that provide potential roost features included a small stand of black locust (0.21 ha), a small area of blackwood (0.18 ha), an area of eucalypts and poplar (0.37 ha) and the native kānuka treeland (1.52 ha). At least thirteen stand-alone native and exotic trees were also present.

While kanuka treeland fall outside the earthworks extent, the other remaining trees fall within it. Although retention of these trees should be considered wherever possible, given the extent of earthworks required to undertake the Project, it seems unlikely that any trees could be retained. Wetland and riparian enhancement undertaken as a result of the Project will include native trees, including larger specimen trees (e.g., titoki, pukatea, kahikatea, matai, rewarewa etc), with the potential to provide bat roost features in future.

Bat habitat values within the Site were assessed as moderate, while the magnitude of effect associated with the temporary removal of habitat was assessed as 'low'. This reflects the temporary, albeit long-term, nature of the potential roost habitat loss and the limited effect that the removal of the habitat is expected to have on the local long-tailed bat population. Accordingly, the overall level of effect is assessed as 'low' and does not require mitigation under the EclA guidelines.

Notwithstanding this, the proposed planting associated with the Project is expected to further reduce the residual effects of temporary habitat removal on long-tailed bats over the longer term, resulting in a 'net positive' effect. The proposed planting will provide enhanced habitat values and increase the availability of potential roosting trees as vegetation establishes and matures.

The proposed masterplan (Figure 2) also comprises predominantly residential development, rather than roads and associated street lighting, adjacent to the principal planted riparian and wetland areas. This spatial arrangement is expected to minimise the potential for artificial light spill into these habitats, allowing them to retain relatively low-light conditions. Consequently, the masterplan will help maintain the suitability of these areas for potential long-tailed bat use over the longer term.

10.4 Earthworks and Biosecurity

While the proposed development is unlikely to pose any major risks to flora and terrestrial biosecurity, earthworks have the potential to spread the pathogen *Phytophthora agathidicida* responsible for kauri dieback. Furthermore, soil and remnant vegetation on machinery and other equipment also has the potential to introduce weeds and pest animals such as rainbow skinks and Argentine ants (*Linepithema humile*).

The kauri dieback pathogen can be moved in soil on roots of other plants, and by earthworks equipment (including tyres) used that may be contaminated with soil. Due to there being no kauri within the proposed development site, and no kauri proposed within the proposed planting in the Site, the effects associated with *Phytophthora agathidicida* are considered to be negligible.

Myrtle rust is spread by wind and is likely to reach the Site naturally. Some myrtaceous species, such as mānuka (*Leptospermum scoparium* agg.) and kānuka, are thought to be relatively resistant to infection. To eliminate risks associated with myrtle rust spread, any myrtaceous species being delivered to the Site must be accompanied by a signed Myrtle Rust Nursery Management Declaration that certifies that the plant producer has implemented the New Zealand Plant Producers Incorporated Myrtle Rust Nursery Management Protocol. In addition, native plants used for the restorative planting should be eco-sourced to the specific region – Hamilton.

Normal biosecurity practices are considered sufficient to reduce the risk of accidental introduction of plant and animal pests. Biosecurity protocols will be addressed within a Construction Management Plan.

10.5 Summary

There were no residual adverse effects after mitigation measures have been implemented that require further consideration of residual effects management with respect to terrestrial ecology (refer to Table 22).

Table 22: Magnitude and level of terrestrial ecology effects for the Project before and after mitigation.

Activity	Ecological feature / habitat affected	Effect	Ecological value	Magnitude of effect	Level of effect (no mitigation)	Proposed mitigation measures	Level of effect (with mitigation)
Planting and enhancement (Riparian areas, wetlands, and kānuka treeland)	Wetlands, modified watercourses and kānuka treeland	Planting of c.26.7 ha within the Site	Negligible - moderate	Positive	Net positive	None proposed	Net positive
		Potential introduction of pathogens, weeds and animal pests. There are myrtaceous species present, and biosecurity breaches could affect the success of the plantings.	Negligible - moderate	High	Moderate	Normal biosecurity precautions for plant material, machinery and vehicles entering the Site. Monitoring to detect biosecurity breaches and follow up control. Ensure any myrtaceous species being delivered to the Site is accompanied by a signed Myrtle Rust Nursery Management Declaration that certifies that the plant producer has implemented the New Zealand Plant Producers Incorporated Myrtle Rust Nursery Management Protocol.	Low
Vegetation and habitat clearance.	Exotic grassland	Removal of pasture (approx. 68 ha).	Negligible	Negligible	Very low	No mitigation for the loss of botanical values is required. However reseeding grass in the earthwork's footprint will help to reduce sediment inputs to the watercourses/ wetlands as development progresses.	Very low
	Exotic trees, shrubs and weeds	Removal of exotic trees and shrubby weeds, as well as occasional common natives (approx. 2 ha). Replacement with native planting in riparian and wetland areas.	Low	Low	Very low	Given the scale of the planting proposed, no mitigation for the loss of botanical values is required.	Net positive
		Temporary removal of bird habitat and replacement with native planting in riparian and wetland areas.	Low	Low	Very low	Birds are highly mobile species and are expected to relocate to suitable habitats nearby. No mitigation proposed.	Very low (short term) Net positive (medium – long term)
		Direct effects of clearance on native	Low	Low	Very low	Include consent condition to apply precautions including clearing potential	Very low (short – medium term)

		birds.				nesting habitat (e.g., trees, shrubs) outside the breeding season or if vegetation clearance occurs during the breeding season, a pre-clearance check for nests should be undertaken by a suitably qualified ecologist. If native bird nests are identified, trees with nests should be monitored until nesting birds have fledged or nests have been naturally abandoned. .Vegetation will be more than replaced by indigenous planting.	Net positive (long term)
		Temporary removal of lizard habitat and replacement with native planting along streams and within wetlands.	Moderate	Low	Low	Creation of log piles as temporary habitat at relocation sites, pest control.	Very low (short term) Net positive (medium – long term)
		Direct effects of habitat clearance on native lizards	High	Moderate	High	Salvage and relocation of captured individuals as set out in LMP (Appendix F).	Very low
		Temporary removal of bat habitat which is used for commuting and potentially used for foraging (though unlikely to be recognised for roosting). Replacement with native planting along streams and within wetlands. As well as enhancement of the kānuka treeland.	Moderate	Low	Low	Inclusion of tall forest trees in planting mixes to replace potential lost roost trees in the longer term. Replacement of any confirmed roost trees (in the unlikely event they are encountered during felling) with artificial roost boxes.	Low (short term) Net positive (long term)
		Direct effects of clearance on long tailed bats if they are roosting in trees during felling.	Very high	Moderate	High	Implementation of Bat Roost Protocols (DOC 2021) during vegetation removal to ensure no bats are present. Refer to BMP (Appendix G)	Low
Earthworks	The Site	Introduction of unwanted organisms such as pest plants and plant pathogens.	Negligible - Moderate	Moderate	Moderate	Implementation of appropriate protocols set out in Construction Management Plan to manage biosecurity risks	Low

	The Site	Construction disturbance of birds and bats.	Very high	Low	Low	Implementation of EMP to reduce effects	Very low
Change in land use from rural to residential	Development and associated lighting	Potential for lighting to disrupt long-tailed bat activity within the Site.	Moderate (habitat)	Low	Low	No mitigation proposed.	Low

11.0 Wetland Effects and Impact Management

11.1 Introduction

The proposed development has the potential to cause impacts on wetlands as summarised below and set out in Sections 11.2 to 11.5.

Wetlands within the Site are shown in Figure 13. Wetlands have the potential to be affected in the following ways:

- Restoration, by way of native planting, buffer planting and weed and animal pest control (1.2 ha).
- Direct removal (0.5140 ha).
- Creation of wetland (>0.75 ha) (note the specifics of this are set out in section 13.0).
- Changes to wetland hydrology as a result of earthworks (within 10m and 100m of wetlands), catchment modifications and redirection of water to stormwater treatment devices (including wetlands located within 100 m of the earthworks footprint).

Wetlands within the Site had very low values for native fauna, aside from foraging habitat for common native birds, and were not considered suitable habitat for native fish (including black mudfish). The photographs of the wetlands presented in Section 6 demonstrate the lack of fauna habitat in the wetlands currently. No adverse effects on native fauna due to the removal or alteration of wetlands are considered likely.

In accordance with EcIA guidelines, measures to avoid, minimise and remedy adverse effects are focused on wetlands where the level of effect was assessed to be 'moderate', 'high' or 'very high' as set out in the summary provided in Table 23, section 11.5.

11.2 Wetland Creation and Restoration

Natural wetlands within the Site (approx. 1.2 ha) (excluding Wetlands K, L, M and N) will be planted with a selection of suitable native plants including a 10 m buffer for each wetland (give or take) as per the Landscape Plan Plant Schedule Set (B&A Urban and Environmental, 2026). A minimum of 0.75 ha of new wetland will be created to compensate for the loss of wetland habitat (refer to the Residual Effects Section 13.4.1). The proposed wetland creation and enhancement is shown on Figure 22.

Wetland species will comprise a selection of native vegetation types that are adapted to varying moisture requirements (i.e., standing water, boggy and moist soils) as provided in the B&A Urban and Landscape Plan Set, Revision A).

Wetlands within the Site were dominated by exotic grasses, herbs and rush species and were in poor condition due to drainage and current or historic grazing. Restoration of these degraded wetlands through removing grazing, planting and implementing animal and pest control and the proposed wetland creation (discussed in Section 13.4) is expected to result in an overall net 'positive' outcome (Table 23).



Figure 22: Proposed wetland creation and enhancement.

11.3 Loss of Wetlands

Approximately 0.5140 ha of wetland habitat is expected to be removed as a result of the Project (Wetlands K, L, M and N). This loss is associated with the Harrogate roading connection and adjoining residential development in this part of the Site. The Harrogate connection is necessary to provide an integrated transport network and contribute to a well-functioning urban environment.

Retaining these wetlands would also materially constrain the earthworks and development response in this location. Their removal enables the road connection and adjoining residential areas to be formed as part of an integrated earthworks strategy, allowing for a more coherent final landform, appropriate finished slopes and levels, and effective integration with the surrounding development. This approach also enables stormwater, overland flow paths, landscape treatment and the wider receiving environment to be designed and managed comprehensively, rather than creating isolated wetland remnants within a substantially modified urban landform.

At the scale of the Site, the magnitude of the unmitigated effect is assessed as 'moderate', reflecting the permanent loss of a moderate proportion of the wetland habitat present within the Site. When combined with the 'moderate' ecological value of the affected wetlands, the overall level of effect is assessed as 'moderate'. As the loss cannot be directly remedied or mitigated, a residual effect remains.

Residual effects management is therefore proposed through the creation and restoration of wetlands elsewhere in the Site, outlined above and shown in Figure 22. These measures form the proposed wetland compensation package. The assessment of that package, including the proposed compensation actions and the resulting net positive outcome for wetland habitat within the Site, is provided in section 13.0 (Residual Effects Management).

11.4 Alterations to Wetland Hydrology

WGA (2026) have assessed the effects of earthworks and the development (i.e., creation of impervious surfaces) on wetland hydrology and report that the estimated reduction in groundwater recharge to each catchment within the Site will vary significantly (0–56% reduction) depending on the proportion of catchment being developed. The reduction in recharge and therefore potential reduction in baseflows to wetlands has been mitigated by designing the stormwater network to redirect treated stormwater flows into wetlands to maintain the existing hydrological regime of the wetlands and minimise changes to existing wetland flows (Maven 2026). With these measures in place the overall level of effect on wetland hydrology is assessed as 'low'.

11.5 Summary

The removal of wetland habitat results in a residual 'moderate' level of effect (after mitigation measures have been implemented), thus requiring further consideration of residual effects management as set out in Section 13.0.

Table 23: Magnitude and level of effects of the Project on wetlands, before and after mitigation.

Activity	Ecological feature / habitat affected	Effect	Ecological value	Magnitude of effect	Level of effect (no mitigation)	Proposed mitigation measures	Level of effect (with mitigation)
Planting and restoration	Modified natural inland wetlands	Positive replacement of exotic species with natural species, greater habitat connectivity, improved habitat value for fauna. Long term preservation of these features in perpetuity.	Moderate	Positive	-	None required.	Positive (note that this is considered as part of the compensation proposed as required below. Which results in a 13.2% net gain
Wetland creation	Pasture	Creation of wetland habitat to compensate that lost as a result of the development. Provision of habitat for native fauna and protection of this feature in perpetuity.	-	-	-	-	Positive (note that this is considered as part of the compensation proposed as required below, which results in a 13.2% net gain
Earthworks		Direct removal of wetlands (0.5104 ha).	Moderate	Moderate	Moderate	No mitigation proposed. Residual effects management.	Moderate Residual wetland loss. Compensation proposed. Refer to Section 13.0
		Potential effects of wetlands as a result in catchment changes.	Moderate	Moderate	Moderate	Recharge loss returned to the upper reaches of natural wetlands via the stormwater system.	Low

12.0 Freshwater Effects and Impact Management

12.1 Introduction

The development has potential to result in adverse and positive impacts on watercourses as summarised below and set out in Sections 12.2 to 12.8.

- Restoration of streams, by way of native planting, buffer planting and weed and animal pest control.
- Modification of artificial drains and conversion into planted swales to convey stormwater from the upstream piped network, through the Site and into the downstream catchment.
- Creation of 144 m of ephemeral watercourse (note the specifics of this are set out in Section 13.0).
- Removal of modified natural watercourses (133 m length) and artificial drains.
- Modification of modified natural watercourses via installation of culverts for road crossings (211 m of pipe and 74 m of erosion protection/rock rip rap).
- Improved fish passage (removal of old culverts and installation of new culverts).
- Removal of artificial drains and modified natural watercourses (and the direct effects of this activity on native fish such as eel).
- Earthworks effects on water hydrology and water quality.
- Stormwater discharge effects on downstream water quality.

Wastewater will be provided by connection to the IAWAI network, and is thus not considered any further here.

12.2 Watercourse Restoration

Modified ephemeral and perennial stream lengths within the Site (approx. 847 m) (excluding Watercourse W2a and less proposed culverts) will be planted with a selection of suitable native plants 10 m on either stream bank (give or take) as per the Landscape Plan Plant Schedule Set (B&A Urban and Environmental, 2026). An additional 803 m of modified watercourses will be planted up on one stream bank, with the stream channel straddling the Site boundary, while 749 m of artificial drain will also be planted on one bank (D9). The proposed stream enhancement is shown on Figure 23.

Streamside species will comprise sedges (e.g., *Carex virgata* and *C. secta*) which will over hang the stream bed, providing shading and habitat for aquatic insects and fish. A selection of taller species such as, cabbage tree (*Cordyline australis*) and toetoe (*Austroderia fulvida*) will provide immediate stream shading. Lower banks will be planted with trees and shrubs including manuka (*Leptospermum scorparium* agg.), kānuka (*Kunzea*) and karamū (*Coprosma robusta*), which will provide additional shading, filtration of run off and input of organic material to the streams. Upper banks will include secondary diversity species appropriate for the Hamilton Ecological District, such as mataī (*Prumnopitys taxifolia*), tītoki (*Alectryon excelsus*) and pukatea (*Laurelia novae-zealandiae*).

Restoring watercourses is a positive outcome of the development, that has the potential to improve water quality (reducing temperatures and filtering contaminants), reduce flooding and erosion risks and improve habitat for aquatic life.



Figure 23: Proposed stream creation and enhancement.

12.3 Modification of Artificial Drains to Planted Swales

Artificial drains currently border the northern extent of flat peat area where the Site abuts residential housing and capture stormwater from these areas, conveying it through the Site and downstream. Rather than remove these drains, they will be recontoured during earthworks and planted with species as set out in section 12.2 above.

While these features are artificial, they will be enhanced from their current condition and will provide higher quality habitat for aquatic fauna than what exists currently. Approximately 1,020 m of these drains will convey stormwater from the upstream residential catchment as they do currently (and will not form part of the stormwater treatment plan) while approximately 250 m will provide some stormwater treatment for adjacent roads and JOALs.

The retention and enhancement of these features is a positive effect of the development, as averted loss (they could otherwise be piped). They will provide improved habitat quality within the existing drains and additional terrestrial habitat corridors once planted.

12.4 Removal of Modified Natural Watercourses and Artificial Watercourses

12.4.1 Removal of Modified Natural Watercourses

Approximately 133 m of modified ephemeral watercourse is expected to be removed as a result of the Project (Watercourse W2a). The channel of Watercourse W2a begins below a culvert and is fed by Wetland K. Watercourse W2a had a low SEV score of 0.193 indicating poor ecological function and values.

Ecological Solutions understands that the loss of this watercourse is attributable to the Harrogate roading connection in this location, which is necessary to contribute to a well-functioning urban environment (refer to section 11.2, for a detailed explanation regarding the loss of features in this location).

The magnitude of this effect (without mitigation) at the scale of the Site is considered 'moderate' because it would be a permanent effect that would result in a loss of a moderate proportion of the feature (ephemeral streams) within the Site. The combination of streams with 'low' ecological values and a 'moderate' magnitude of effect, results in an overall 'low' level of effect. While the EclA guidelines (Roper-Lindsay et al. 2018) suggest that 'low' levels of effect should not normally be of concern, the NPS-FM (2020) is clear in its intent that the loss of river extent and values should be avoided, and that where this cannot occur the effects management hierarchy should be applied. As the removal of stream cannot be remediated or mitigated, residual effects management is appropriate as set out in section 13.0 (Residual Effects Management). The proposed compensation measures involve the creation of ephemeral stream (to ensure no net loss of stream extent) and restoration of the remaining modified watercourses within the Site.

12.4.2 Removal of Artificial Watercourses

Artificial drains within the Site are man-made and have negligible ecological values and ecosystem function values. Artificial drains are excluded from the definition of a 'River' under Waikato Regional Council guidelines and therefore their removal is permitted activity. Black mudfish were not recorded within artificial drains within the Site during the trapping or eDNA survey. Approximately 8,374 m of artificial drains will be removed as a result of the project earthworks.

12.4.3 Watercourse Removal and its Direct Effect on Native Fish

The removal and/ or modification of modified natural watercourses and/ or artificial drains has the potential to directly impact longfin eel and shortfin eel. Implementing the fish management plan (provided as Appendix H) will minimise the potential effects of this activity by relocating fish prior to earthworks. Implementing the fish management plan reduces the overall effects on native fish populations to very low.

12.5 Modification of Modified Natural Watercourses

12.5.1 Loss of Actual and Potential Stream Values

There are three box culverts and three circular culverts proposed along modified natural watercourses (Figure 24) to allow for the conveyance of stream flow and discharge from stormwater treatment wetlands under the roading network. The culvert crossings have been informed by 2D hydraulic modelling undertaken using HEC-RAS as part of the wider stormwater and flood assessment and further analysed in Hydroflow Software (pers. comm., N. Kaur, Maven and Associates, July 2026). Riprap sizing has been determined in accordance with the HEC-14: Hydraulic Design of Energy Dissipators for Culverts and Channels guidelines (pers. comm., N. Kaur, Maven and Associates, July 2026).

The total length of proposed box culverts is 161 m⁵ (with 48 m of riprap). These culverts will occur along Watercourse W1 and W2.

The total length of proposed circular culverts is 50 m⁵ (with 26 m of riprap). These culverts will occur along watercourses W3, W3b and W3c.

Approximately 72 m of existing farm culverts will be removed along modified natural watercourses and wetlands (Figure 25), making the additional length of culverting within the Site as a result of the development 139 m (211 m – 72 m).

All new culverts will provide fish passage (see section 12.5.2).

The magnitude of the effect of culverting 139 m of stream and adding an additional length of 74 m of rock rip rap (without mitigation) at the scale of the Site is considered 'moderate' because it would be a permanent effect that would result in the reduced ecological values (and potential ecological values) of a moderate proportion of streams within the Site. The combination of streams with 'low' ecological values and a 'moderate' magnitude of effect results in an overall level of effect of 'low'. While the EcIA guidelines (Roper-Lindsay et al. 2018) suggest that 'low' levels of effect should not normally be of concern, the NPS-FM (2020) is clear in its intent that the loss of river extent and river values should be avoided, and that where this cannot occur the effects management hierarchy should be applied. As the loss of actual and potential stream values cannot be remediated or mitigated at the point of impact (culvert), compensation (restoration of remaining streams) is appropriate as set out in section 13.0 (Residual Effects Management).

Watercourse W2, where it occurs across the flats, will be temporarily removed or modified during peat compaction works. Following completion of the works, the watercourse will be remediated to an open channel and restored in accordance with the landscape plan. This is considered a moderate temporary effect that can be appropriately mitigated at the point of impact, resulting in a 'low' overall level of effect.

12.5.2 Fish Passage

The replacement/ and or and construction of new culverts has the potential to adversely

⁵ Based on the shapefiles released by Maven 3 August 2026.

affect fish passage and reduce connectivity.

All new culverts have been designed and will be installed in accordance with the New Zealand Fish Passage Guidelines (Franklin et al. 2024) and NES-FW (2020) regulations and provide fish passage. This will result in a 'negligible' magnitude of effect and 'very low' overall level of effect on the fish fauna.

The removal of existing farm culverts from modified natural watercourses in the locations shown on Figure 25 (approx. 72m) will improve connectivity and fish passage along these reaches.



Figure 24: Proposed culverts.



Figure 25: Culverts proposed for removal.

12.6 Earthworks Effects on Hydrology and Water Quality

12.6.1 Hydrology

Soils across the low-lying areas of the Site, especially the peat deposits, are highly compressible and are to be compacted prior to construction. The compaction process would result in a reduction of soil porosity and a corresponding reduction in the hydraulic conductivity of the compacted soils (WGA 2026). WGA (2026) identified that the change in soil hydraulic characteristics may result in reduced rainfall infiltration and therefore reduced groundwater recharge and/or reduced lateral groundwater transmission through these soils. Therefore, the pre-loading of soils in the low-lying areas of the Site may result in a reduction in groundwater throughflow to drains. The potential decrease in groundwater contribution to watercourses has been accounted for in the development design to ensure there is no reduction in surface water flows or material changes to downstream hydrology (WGA 2026, Maven 2026) and the overall level of effect is assessed as 'low'.

WGA (2026) have identified that, in some cases, the construction of stormwater wetlands and wastewater pumping stations are expected to temporarily cause watercourse depletion effects due to their design base levels being lower than the surveyed bed level of the adjacent farm drain. Groundwater intercepted during construction will be discharged to the receiving drain upstream of the works, as proposed through the Residential Development consent conditions (WGA 226). With these measures in place the temporary effects on watercourse flows are assessed as 'low'.

12.6.2 Water Quality

The proposed earthworks have the potential to result in fine sediment discharging to watercourses. The receiving environment comprises highly modified artificial drains and modified watercourses with poor water quality and low sensitivity to sediment inputs.

To avoid adverse effects all works will be carried out in accordance with the erosion and sediment control plan provided by Maven Associates. Erosion and sediment controls have been designed in accordance with Waikato Regional TR2009/02.

Without sediment and erosion control, earthworks have potential to result in a 'moderate' magnitude of effect and 'high overall level of effect on water and habitat quality. With the implementation of appropriate silt controls and treatment of stormwater during earthworks, the potential effects of earthworks on water and habitat quality during construction will be minimised and reduce the magnitude of effect to 'low' and result in an overall level of effect with mitigation assessed as 'low'.

12.7 Stormwater Discharge

The stormwater management for the Site is summarised in the Project Infrastructure Report (PIR) (Maven Associates 2026) and set out in detail within the Stormwater Management Plan (SMP), Appendix A of Maven Associates 2026. It is also summarised in Section 9.2.

Stormwater systems have been designed in accordance with Waikato's Regional Infrastructure Technical Specifications (RITS) and other relevant standards including TR20-06 Waikato Stormwater Runoff Modelling Guideline (TR20-06) and TR20-07 Waikato Stormwater Management Guideline (TR20-07).

Water quality in drains within the Site is typical of watercourses draining intensive agricultural land with elevated summer time water temperature, low summer time dissolved oxygen, elevated nutrients suspended solids and bacteria counts particularly during rain fall events. The treated stormwater discharges will meet all relevant guidelines and should

therefore avoid adverse water quality effects in the receiving environment.

The magnitude of effect of stormwater on the downstream aquatic environment without mitigation was assessed as 'moderate'. Implementing proposed stormwater mitigation measures in accordance with relevant guidelines to meet water quality standards will reduce the potential magnitude of effect to 'low' and result in an overall 'low' level of effect.

12.8 Summary

The loss of modified ephemeral watercourse W2a (133 m) and modification of modified perennial and ephemeral streams through culverting (additional 139 m) and installation of rock rip rap (74 m) were considered to result in low levels of effects (Table 24). However, the NPS-FM (2020) is clear in its intent that the loss of river extent and values should be avoided, and that where this cannot occur the effects management hierarchy should be applied. As the loss of actual and potential stream values cannot be remediated or mitigated at the point of impact, residual effects management is appropriate, as set out in section 13.0.

Restoring watercourses is a positive outcome of the development, that has the potential to improve water quality (reducing temperatures and filtering contaminants), reduce flooding and erosion risks and improve habitat for aquatic life.

The retention and enhancement of existing artificial drains is a positive effect of the development, as averted loss (they could otherwise be piped). They will provide improved habitat quality within the existing drains and additional terrestrial habitat corridors once planted.

Table 24: Magnitude and level of effects of the Project on watercourses, before and after mitigation.

Activity	Ecological feature / habitat affected	Effect	Ecological value	Magnitude of effect	Level of effect (no mitigation)	Proposed mitigation measures	Level of effect (with mitigation)
Planting and restoration	Modified Watercourses	Improvement in stream ecological values including shading, habitat etc.	Low	Positive	-		Positive note this forms part of the compensation, which results in a 47.6% net positive outcome
Planting and restoration (earthworks)	Artificial Drains	Recontouring and planting.	Negligible	Positive	-	-	Positive effect
Earthworks	Removal of modified natural Watercourse (W2a)	Loss of 133m of modified ephemeral stream channel extent	Low	Moderate	Low	While low levels of effect should not normally be of concern, the NPS-FM (2020) is clear in its intent that the loss of river extent and values should be avoided, and that where this cannot occur the effects management hierarchy should be applied. As the removal of stream cannot be remediated or mitigated, residual effects management is appropriate as set out Refer to Section 13.0	Compensation proposed Refer to Section 13.0
	Removal of Artificial drains	Loss of approximately 8,374 m of artificial drains	Negligible	Low	Low		Low
	Removal of artificial drains and modified watercourses.	Direct effects of habitat removal on native fish.	Low -High (depending on the fish species present)	Moderate	High	Implement fish relocation plan (Appendix H)	Low
Culvert construction	Modified watercourses	Loss of stream values due to alterations to stream bed (i.e. increase in impervious bed and shading, and conversion of soft bottomed bed to rock rip rap. Length of new culverts = 211 Length of new culverts less length of daylighted culverts = 139	Low	Moderate	Low	While low levels of effect should not normally be of concern, the NPS-FM (2020) is clear in its intent that the loss of river extent and values should be avoided, and that where this cannot occur the effects management hierarchy should be applied. As the removal of stream cannot be remediated or mitigated, residual effects management is appropriate as set out Refer to	Compensation proposed Refer to Section 13.0

Length of riprap = 74			Section 13.0				
Culvert construction	Modified watercourses	Potential to prevent fish passage (if not designed in accordance with applicable guidelines)	Low	Moderate	Low	Culverts designed in accordance with the NPS-FW (2020) and the New Zealand Fish Passage Guidelines (Franklin et al. 2024)	
Culvert removal	Modified watercourses	Increase in 72 m of stream length, improvement of fish passage.	Low	Neutral	-	This length is subtracted from the length of proposed new culverts. So does not count as a positive effect.	Neutral – subtracts from the new length of culverts proposed.
Earthworks and peat compaction	Modified watercourse W2	Temporary removal of stream channel during peat compaction.	Low	Moderate	Low	Reinstatement of channel once peat has been compacted. Restoration of channel in accordance with the landscape plan.	Very low
Earthworks	Modified watercourses and the downstream receiving environment	Discharge of sediment (impacts on the environment and fish and invertebrates present).	Low--high	Moderate	Moderate	Implement earthworks controls in accordance with the erosion and sediment control plan	Low
	Modified watercourses	Effects on hydrology and baseflows due to peat compaction.	Low--high	Moderate	Moderate	Development designed to account for potential reduction in groundwater recharge and lateral groundwater inflows to watercourses.	Low
Stormwater Discharge	Modified watercourses and the downstream receiving environment	Discharge of stormwater (impacts on the environment and fish and invertebrates present).	Low-high	Moderate	Moderate	Implement controls in accordance with the Stormwater Management Plan	Low

13.0 Residual Effects Management

13.1 Introduction

In accordance with the effects management hierarchy, once measures to avoid, minimise and remedy adverse effects have been applied, any residual adverse effects are proposed to be offset or compensated for through additional habitat restoration and enhancement activities.

As set out in sections 11.0 and 12.0 the residual adverse effects attributable to the development are:

- The loss of 0.5 ha of highly modified wetland.
- Modification of watercourse habitat resulting from an additional length of 139 m of culverting and 74 m of rock rip rap.
- The loss of 133 m of modified ephemeral stream.

The following sections set out the actions with respect to stream and wetland creation and enhancement within the Site, and demonstrate that these activities will result in a net positive outcome with respect to extent and values of these features.

13.2 Relevant Planning Instruments

Biodiversity offsetting and ecological compensation are characterised by adherence to demonstratable core principles as outlined in the NPS-FM (MfE 2025a) and NPS-IB (MfE 2025b).

Specifically, offsetting differs from compensation, in that offsetting relates to a measurable outcome, that has been quantified through a robust and transparent process, whereas compensation relies on qualitative data and professional expertise and opinion (New Zealand Government 2014; Maseyk et al. 2018, Baber et al. 2021).

Offsetting is preferable to compensation, as reflected in the effects management hierarchy, whereby compensation is to be considered only after the potential for offsetting effects has been assessed and the level of certainty in the outcome or 'trade-off' is determined to be inadequate.

While offsetting is preferred, in this case the residual adverse effects attributable to the Project cannot be demonstrably offset with adequate certainty due to the complexity of wetland and stream habitats and the difficulty in measuring functional attributes within a suitable timeframe. Where these situations persist, compensation measures are typically proposed.

Key ecological compensation principles for wetlands, streams and indigenous biodiversity are set out in the National Policy Statement for Freshwater Management 2020 (NPS-FM) (Appendix 7) which includes the principles of:

- Adherence to the effects management hierarchy. Aquatic compensation is a commitment to redress more than minor residual adverse effects, and should be contemplated only after steps to avoid, minimise, remedy, and offset adverse effects are demonstrated to have been sequentially exhausted.
- Scale. The extent or values to be lost to which the aquatic compensation applies are addressed by positive effects that outweigh the adverse effects.
- Additionality. Aquatic compensation achieves gains in extent or values above and beyond gains that would have occurred in the absence of the compensation, such as

gains that are additional to any minimisation and remediation or offsetting undertaken in relation to the adverse effects of the activity.

- Leakage. Aquatic compensation design and implementation avoids displacing harm to other locations (including harm to existing biodiversity at the compensation site).
- Long-term outcomes (preferably in perpetuity).
- Leakage, that is the design and implementation avoids displacing harm to other locations (e.g., it does not harm biodiversity at the compensation site).
- Landscape context. Aquatic compensation action is undertaken where this will result in the best ecological outcome, preferably close to the impact site or within the same ecological district.
- Time lag. The delay between loss of extent or values at the impact site and the gain or maturity of extent or values at the aquatic compensation site is minimised so that the calculated gains are achieved within the consent period or, as appropriate, a longer period (but not more than 35 years).
- Trading up. When trading up forms part of aquatic compensation, the proposal demonstrates that the extent or values gained are demonstrably of greater or higher value than those lost and that the values lost are not to Threatened or At-Risk/Declining species or species considered vulnerable or irreplaceable.
- Transparency, the design and implementation of aquatic compensation and communication of the results to the public are undertaken in a transparency and timely manner.

13.3 Biodiversity Compensation Modelling Approach

The Biodiversity Compensation Model (BCM) (Baber et al. 2021a) was used as a decision-support tool to complement and 'sense check' professional judgement with respect to the proposed stream and wetland measures, and to structure, quantify, and test the adequacy of the proposed measures.

The BCM approach and methods are described in detail in the User Guide developed by Tonkin & Taylor Ltd (Baber et al. 2021a) with the validity of the modelling approach set out in Baber et al. (2021a, b and 2025). In summary, the BCM calculates the type and quantum of compensation likely required to achieve net positive outcomes by:

- Multiplying the habitat value(s) within the impact site by its areal extent, then applying contingency multipliers that account for biodiversity risk based on ecological value and impact uncertainty, to determine an impact score; and
- Multiplying the projected lift in habitat value(s) at the compensation site(s) by their areal extent, then applying a time-lag discount and a likelihood-of-success contingency, to determine a compensation score.

Any biodiversity model has limitations, constraints and uncertainties in its application, that has the potential to generate false positives i.e. instances where the model generates net positive outcomes when the converse is true. To address this risk, the BCM model inputs are deliberately conservative, and use a net positive outcome target of 10%.

13.4 Wetland Compensation

13.4.1 Wetland Creation/Restoration Site Location

The areas selected for creating and restoring wetland habitat are located within the Site and are referred to as new 'wetland creation' and existing 'restoration wetlands' as shown in Figure 22.

With respect to the wetland creation area, hydrogeological assessments were undertaken by WGA to confirm that a created wetland would be viable and stable based on the geology and hydrology of the area. The area was selected for its connectivity to other ecological areas (e.g., the stream and wetland network to the west), and due to its topography (low lying) with existing peat soils.

The proposed wetland creation is as close to 'like for like' as possible given the created wetlands will be situated on land characterised as exotic grassland (retired farmland) and, with respect to the wetlands being lost, will have similar characteristics.

Figure 22 shows the created wetland, existing wetlands and the integration of these features with existing native vegetation and stormwater treatment devices.

None of the areas selected for wetland restoration are currently subject to restoration (e.g., planting, weed and animal pest control) of any kind, nor are the areas legally protected.

13.4.2 Model Used and Assumptions

BCM model

The BCM model requires assessment of the reduction in habitat value or population/assemblage at the impact site(s) due to the project activities. The BCM also requires a qualitative assessment of the increase in habitat value or population/assemblage that can be directly attributed to compensation actions at the habitat restoration and enhancement site(s) within a fixed time period.

Wetland Creation

The following summarises the assumptions for creating wetland habitat:

- The area where wetlands are proposed to be created has historically been farmed with existing vegetation communities comprising exotic grassland communities without any active weed or animal pest control and has 'negligible' ecological value.
- The area does not currently meet vegetation criteria to be considered a natural inland wetland.
- The wetland creation will involve the construction of >0.75 ha of wetland habitat to ensure no loss of wetland extent within the Site (and a net positive outcome for ecological values, when combined with restoring existing wetlands).
- Earthworks are proposed to recontour the area to increase water storage capacity, connect the area to the water table, and create wetland habitat and diffuse zones that will be subject to periodic or semi-permanent inundation.
- The created wetland will have suitable hydrology (with variable water depths) capable of supporting wetland flora and fauna. The modified watercourse, groundwater, and additional treated stormwater (if required) will contribute to wetland hydrology.
- The created wetland will comprise four key native vegetation types that are adapted to varying moisture requirements (refer to B&A Urban and Landscape Plan Set,

Revision A). Proposed planting within and around the wetland will link to riparian vegetation through to the existing kānuka treeland, and also to the stormwater wetland planting.

- An on average 10 m wide wetland buffer (additional to the >0.75 ha of wetland creation) will be planted with native species.
- Plant species known to occur within the Hamilton Ecological District, and those likely to have historically occurred within the Site have been selected.
- The created wetlands will be legally protected in perpetuity via a covenant.
- Maintenance and weed and animal pest control will be carried out for a minimum of 5 years, and be on a trajectory to reach a net positive outcome at 15 years.
- The predicted net positive outcome would be expected to occur at 15 years.

Restoration of Existing Wetlands

The following summarises the specifications for restoring wetland habitat:

- Wetland restoration will be undertaken within all the remaining wetlands within the Site which are assessed as having 'moderate' ecological value and cover an area of approximately 1.197 ha.
- Wetlands will be planted with four key native vegetation types that are adapted to varying moisture requirements (refer to B&A Urban and Landscape Plan Set, Revision A).
- Wetland buffer planting will link to other riparian planting within the Site.
- An on average 10 m wide wetland buffer (additional to the 1.197 ha of wetland restoration) will be planted with native species.
- Plant species known to occur within the Hamilton Ecological District, and those likely to have historically occurred within the Site have been selected.
- The restored wetlands will be legally protected in perpetuity via a covenant.
- Maintenance and weed and animal pest control will be carried out for a minimum of 5 years, and be on a trajectory to reach a net positive outcome at 15 years.
- The predicted a 'net gain/ positive' outcome would be expected to occur at 15 years.

13.4.3 BCM Inputs

Table 25 provides an explanation of the data inputs to the model. We have taken a conservative approach to achieving a net positive outcome to address the risks to successful compensation delivery. This has the practical effect of increasing the size of the compensation package proposed. Full BCM inputs and Outputs are provided in Appendix I. The BCM results in a **13.2%** net positive outcome. This gives us confidence that the proposed activities are appropriately sized to compensate for effects on wetland habitat.

Table 25: BCM inputs and assumptions.

Model inputs	Explanation
Project name/ref	Brymer Substantive Development
Biodiversity type	Riverine wetland dominated by exotic vegetation.
Technical expert Inputs	Rebecca Bodley

Benchmark	5 – Best Available The benchmark in the model is always 5. This represents a hypothetical, but realistic, potential state. i.e., a wetland ecosystem that has been subject to intensive weed and mammalian pest control over the long term and has a full suite of expected wetland adapted indigenous flora and fauna present at or near carrying capacity.
How many types or sites are affected	1 – Exotic dominated wetland. Moderate value wetland (moderate ecological values according to EcIA guidelines).
Number of proposed compensation actions	3 • Creation of wetland habitat: area and hydrology. • Planting of Created Wetlands: habitat enhancement (planting, fencing, weed and animal pest control), within <u>created</u> wetland habitat and 10 m wide buffer of native plants). Physical and legal protect in perpetuity. • Restoration of remaining wetland habitat within the Site: habitat enhancement (enrichment planting, weed and animal pest control), within <u>existing</u> wetland habitat. Physical and legal protect in perpetuity.
Net gain target	10% .
Habitat/site impacts	
Impact risk contingency	2 – Moderate risk/Moderate value The impact risk contingency addresses the increased likelihood that adverse effects will result in the permanent and irreplaceable loss of significant biodiversity values when impacting on habitats or species that are of higher ecological value. The assigned ecological value is based on the EcIA guidelines ecological values assessment. A value of 2 multiplies the impact score by 1.05 (adds 5%).
Impact uncertainty contingency	1 – Low uncertainty This addresses the increased risk of permanent or irreplaceable biodiversity loss. We consider this to be 'low' because the habitat is not complex, is predominantly exotic and the values are relatively easy to quantify.
Aerial extent of impact (ha)	0.514ha
Value prior to impact	2.75 – Moderate to High We considered the impacted wetlands to have 'moderate' ecological values according to the EcIA guidelines assessment equivalent to a score of 2, as stated above, a score of 2.75 is based on the <u>potential</u> value of the wetlands if restored. If restored, the wetlands would be unlikely to achieve 'high to very high' value because of their small size, poor ecological connection, location in the catchment, the surrounding land use and existing modifications to the catchment. Note the NPS-FW requires decision makers to consider loss of potential values (Section 3.21 (numerous references including definitions of effects management hierarchy and loss of value) and Section 3.22, item 3(a)(i)).
Value after impact	0.001 Assumes all wetland habitat will be lost.
Compensation ⁶	

⁶ As previously stated, the BCM uses the term compensation, but we consider the proposed activities would achieve NNL/NG outcomes (i.e., offsetting).

Compensation actions	Creation of Wetland Habitat
Discount rate	3% The discount rate accounts for the time lag between loss of values at the impact site and the gain in values at the compensation site. A discount rate of 3% is recommended (Baber et al. 2021a). This is the same as the discount rate recommended in the BOAS user guide (Maseyk et al. 2015), which was informed by research in Gibbons et al. 2015.
Finite end point	1 year 1 year allow for works to create wetland hydrology (and subsequently wet soils) that will be able to support wetland plants.
Compensation confidence contingency	3 – moderate confidence This is a measure of how successful the management action is likely to be. We have used 'moderate' in this instance because wetland creation attempts are generally successful, but can be difficult to achieve. WGA have assessed wetland hydrology in the proposed wetland creation area and it is considered likely that the wetland hydrology at the site could be sustained.
Aerial extent of compensation action	0.75 ha
Value score prior to compensation action	0.001 (no value) The non-wetland areas are not current wetlands and would not revert to wetlands without intervention.
Value score after compensation measure	1 – low Restoration of wetland hydrology is expected to result in the opportunity for wetland plants to establish.
Compensation actions	Planting of 'Created' wetlands
Discount rate	3% As above.
Finite end point	15 years 15 years provides sufficient time for plants to establish and grow and gains due to pest control and fencing to materialise and be confirmed.
Compensation confidence contingency	2 – High confidence Recent studies on wetland restoration are demonstrating that restoration is achievable and is improving ecosystem services and biodiversity (for example refer to Tomscha et al. 2021).
Aerial extent of compensation action	0.75 ha
Value score prior to compensation action	1 – Low The created wetland habitat will have low value, and will essentially be wet soils that will have the ability to support water adapted vegetation.
Value score after compensation measure	2.7 – Moderate-high Expecting a gain in existing biodiversity values over a duration of 15 years. This is expected to be achieved through the retirement of these areas, exclusion of livestock, planting of dense native species, native plant diversity and abundance. The proximity of wetlands within the catchment will also help support species dispersal. A higher score was not used because some of the indigenous biodiversity values will take longer than 15 years to materialise and as above, the biodiversity potential of the sites would likely be limited.

Compensation actions	Restoration of Existing Wetlands within the Site
Discount rate	3% As above.
Finite end point	15 years 15 years provides sufficient time for plants to establish and grow and gains due to pest control and fencing to materialise and be confirmed.
Compensation confidence contingency	2 – High confidence Recent studies on wetland restoration are demonstrating that restoration is achievable and is improving ecosystem services and biodiversity (for example refer to Tomscha et al. 2021).
Aerial extent of compensation action	1.197 ha
Value score prior to compensation action	2 – Moderate The wetlands within the Site are considered to have 'moderate' ecological values, as a reflection of habitat type, rather than their condition which is highly modified and degraded.
Value score after compensation measure	3 – High Expecting a gain in existing biodiversity values over a duration of 15 years. This is expected to be achieved through the replacement of exotic species with native species, increased native plant diversity and abundance and an increase in indigenous fauna values as a result of animal pest control. The wetlands will be better buffered as a result of the surrounding planting. The restoration wetlands (unlike the impact wetland) link in well with the existing stream network, kānuka treeland and compensation wetland, overall contributing to a more robust and well-functioning community. A higher score was not used because some of the indigenous biodiversity values will take longer than 15 years to materialise and as above, the biodiversity potential of the sites would likely be limited.

13.5 Stream Compensation

13.5.1 Introduction

This section outlines the compensation approach for the unavoidable loss of modified ephemeral stream (133 m x 0.5 m wide) and the modification of an additional 139 m (conservatively estimated to be on streams with a bed 1 m wide) of culverting and 74 m of rock rip rap.

13.5.2 Restoration site location

The areas selected for stream creation and enhancement are located within the Site and comprise the existing streams (referred to as restoration streams) and an area of stream creation (referred to as created stream) as shown in Figure 23.

With respect to the area airmarked for stream creation, this will be fed from a stormwater pipe and is likely to have seasonal flow, similar to the ephemeral stream being lost.

None of the areas selected for stream creation or enhancement are currently subject to restoration (e.g., planting, weed and animal pest control) of any kind, nor are the areas legally protected.

Although not counted in this assessment an additional 749 m of artificial drain (D9)

(connected to watercourse W1 and W2) will be planted on one bank with indigenous riparian plant communities.

13.5.3 Model Used and Assumptions

Stream Habitat Creation

The following summarises the specifications for creating stream habitat:

- The area where stream is being created has historically been farmed with existing vegetation communities comprising exotic grassland communities without any active weed or animal pest control and has 'negligible' ecological value.
- The stream creation will involve the creation of 134 m x 0.5m wide stream channel habitat to ensure no loss of stream extent within the Site (and no net loss of ecological values, when combined with restoring existing streams).
- The low flow channel (0.5 m wide) will naturally meander within a 2 m wide flood plain area (see example in Figure 26).
- The created stream channel will comprise three native vegetation types that are adapted to varying moisture requirements (refer to B&A Urban and Environmental Landscape Plan set). Proposed planting within and around the stream will link to riparian/ and stormwater reserve planting.
- Plant species known to occur within the Hamilton Ecological District, and those likely to have historically occurred within the Site have been selected.
- The created stream will be legally protected in perpetuity
- Maintenance and weed and animal pest control will be carried out for a minimum of 5 years, and be on a trajectory to reach a net positive outcome at 15 years.
- The predicted a 'net gain/ positive' outcome would be expected to occur at 15 years.

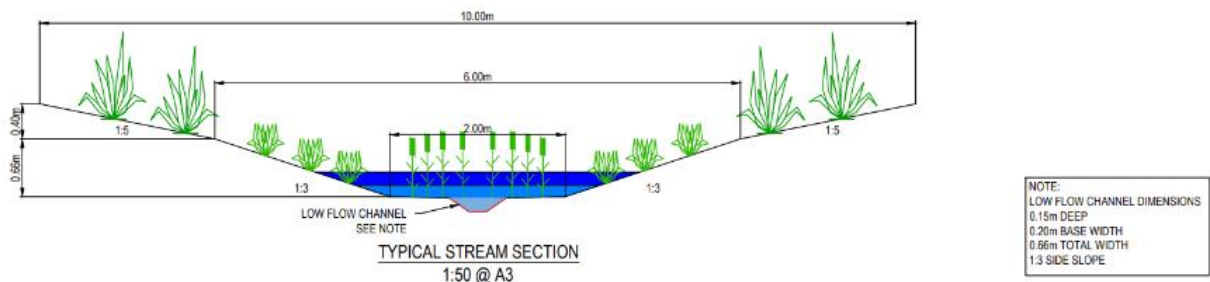


Figure 26: Example stream cross section (image supplied by Tim Hawke, Maven).

Restoration of Existing Streams

The following summarises the assumptions for creating stream habitat:

- The streams within the site proposed for restoration include:
 - o Restoration of existing ephemeral streams (459 m x 0.5 m wide).
 - o Restoration of existing perennial streams (503 m x 1 m wide).
 - o Restoration of existing perennial streams (666 m x 1 m wide, on one stream bank).
- All of the above restoration reaches have been farmed with existing vegetation

communities comprising exotic grassland communities without any active weed or animal pest control and have 'low' ecological values.

- A 10 m wide buffer on either stream bank will be planted with three native vegetation types that are adapted to varying moisture requirements (refer to B&A Urban and Environmental Landscape Plan set). Proposed planting within and around the streams will link to other riparian, wetland and stormwater reserve planting.
- Plant species known to occur within the Hamilton Ecological District, and those likely to have historically occurred within the Site have been selected.
- The restored streams will be legally protected in perpetuity
- Maintenance and weed and animal pest control will be carried out for a minimum of 5 years, and be on a trajectory to reach a net positive outcome at 15 years.
- The predicted a 'net gain/ positive' outcome would be expected to occur at 15 years.

13.5.4 BCM Inputs

Table 26 provides an explanation of the data inputs to the model. We have taken a conservative approach to achieving a net positive outcome to address the risks to successful compensation delivery. This has the practical effect of increasing the size of the compensation package proposed. Full BCM inputs and Outputs are provided in Appendix I. The BCM results in a **47.6%** net positive outcome. This gives us confidence that the creation and enhancement activities are appropriately sized to compensate for effects on stream habitat.

Table 26: BCM inputs and assumptions.

Model inputs	Explanation
Project name/ref	Brymer
Biodiversity type	Modified ephemeral and perennial watercourses
Technical expert Inputs	Rebecca Bodley
Benchmark	5 – Best Available The benchmark in the model is always 5. This represents a hypothetical, but realistic, potential state. i.e., a stream ecosystem that has been subject to intensive weed and mammalian pest control over the long term and has a full suite of expected indigenous flora and fauna present at or near carrying capacity.
How many types or sites are affected	3 – Modified perennial and ephemeral streams (low ecological values according to EclA guidelines). Impacted by total loss (133 m x 0.5m wide of ephemeral stream) and modification (111 m x 1 m wide bed of culverting) and (62 m or lining with rock rip rap).
Number of proposed compensation actions	4 • Creation of a new ephemeral stream channel (134 m x 0.5 m wide). • Restoration of existing ephemeral streams (459 m x 0.5 m wide). • Restoration of existing perennial streams (503 m x 1 m wide). • Restoration of existing perennial streams (666 m x 1 m wide, on one stream bank).
Net gain target	10% .

Habitat/site impacts	W2a Ephemeral Stream Loss
Impact risk contingency	2 – Moderate risk/Moderate value The impact risk contingency addresses the increased likelihood that adverse effects will result in the permanent and irreplaceable loss of significant biodiversity values when impacting on habitats or species that are of higher ecological value. The assigned ecological value is based on the EcIA guidelines ecological values assessment. A value of 2 multiplies the impact score by 1.05 (adds 5%).
Impact uncertainty contingency	1 – Low uncertainty This addresses the increased risk of permanent or irreplaceable biodiversity loss. We consider this to be 'low' because the habitat is not complex, is predominantly exotic and the values are relatively easy to quantify.
Aerial extent of impact (ha)	0.0065 ha
Value prior to impact	2.0 – Moderate We considered the impacted stream to have 'low' ecological values according to the EcIA guidelines assessment equivalent to a score of 1, as stated above, a score of 2 is based on the <u>potential</u> value of the stream if restored. If restored, the stream would be unlikely to achieve 'high to very high' value because of its small size, poor ecological connection, location in the catchment, the surrounding land use and existing modifications to the catchment. Note the NPS-FW requires decision makers to consider loss of potential values (Section 3.21 (numerous references including definitions of effects management hierarchy and loss of value) and Section 3.22, item 3(a)(i)).
Value after impact	0.001 Assumes the stream will be lost.
Habitat/site impacts	Culverting
Impact risk contingency	2 – Moderate risk/Moderate value The impact risk contingency addresses the increased likelihood that adverse effects will result in the permanent and irreplaceable loss of significant biodiversity values when impacting on habitats or species that are of higher ecological value. The assigned ecological value is based on the EcIA guidelines ecological values assessment. A value of 2 multiplies the impact score by 1.05 (adds 5%).
Impact uncertainty contingency	1 – Low uncertainty This addresses the increased risk of permanent or irreplaceable biodiversity loss. We consider this to be 'low' because the habitat is not complex, is predominantly exotic and the values are relatively easy to quantify.
Aerial extent of impact (ha)	0.0139 ha
Value prior to impact	2.0 – Moderate We considered the impacted stream to have 'low' ecological values according to the EcIA guidelines assessment equivalent to a score of 1, as stated above, a score of 2 is based on the <u>potential</u> value of the stream if restored. If restored, the stream would be unlikely to achieve 'high to very high' value because of its small size, poor ecological connection, location in the catchment, the surrounding land use and existing modifications to the catchment. Note the NPS-FW requires decision makers to consider loss of potential values (Section 3.21 (numerous references including definitions of effects management hierarchy and loss of value) and Section 3.22, item 3(a)(i)).

Value after impact	0.5 Assumes the stream will have negligible to low ecological values in the location of the culvert.
Habitat/site impacts	Rock rip rap.
Impact risk contingency	2 – Moderate risk/Moderate value The impact risk contingency addresses the increased likelihood that adverse effects will result in the permanent and irreplaceable loss of significant biodiversity values when impacting on habitats or species that are of higher ecological value. The assigned ecological value is based on the EcIA guidelines ecological values assessment. A value of 2 multiplies the impact score by 1.05 (adds 5%).
Impact uncertainty contingency	1 – Low uncertainty This addresses the increased risk of permanent or irreplaceable biodiversity loss. We consider this to be 'low' because the habitat is not complex, is predominantly exotic and the values are relatively easy to quantify.
Aerial extent of impact (ha)	0.0074 ha
Value prior to impact	2.0 – Moderate We considered the impacted stream to have 'low' ecological values according to the EcIA guidelines assessment equivalent to a score of 1, as stated above, a score of 2 is based on the <u>potential</u> value of the stream if restored. If restored, the stream would be unlikely to achieve 'high to very high' value because of its small size, poor ecological connection, location in the catchment, the surrounding land use and existing modifications to the catchment. Note the NPS-FW requires decision makers to consider loss of potential values (Section 3.21 (numerous references including definitions of effects management hierarchy and loss of value) and Section 3.22, item 3(a)(i)).
Value after impact	0.75 Assumes the stream will have negligible to low ecological values in the location of the rock rip rap, but higher values than a culvert as each stream bank can still be planted with native species.
Compensation	
Compensation actions	Creation of ephemeral stream habitat
Discount rate	3% The discount rate accounts for the time lag between loss of values at the impact site and the gain in values at the offset site. A discount rate of 3% is recommended (Baber et al. 2021a). This is the same as the discount rate recommended in the BOAS user guide (Maseyk et al. 2015), which was informed by research in Gibbons et al. 2015.
Finite end point	15 years provides sufficient time for plants to establish and grow and gains due to pest control and fencing to materialise and be confirmed.
Compensation confidence contingency	3 – moderate confidence This is a measure of how successful the management action is likely to be. We have used 'moderate' in this instance because we believe creating an ephemeral stream in this location should be achievable noting the source of water from the upstream developed area combined with groundwater in the peat area should be sufficient to feed the stream for at least 3 months of each year.
Aerial extent of compensation	0.067 ha (134 x 0.5 m wide)

action	
Value score prior to compensation action	0.001 (no value) There is no stream in this location currently.
Value score after compensation measure	1.75 – low to moderate Expecting a gain in existing biodiversity values over a duration of 15 years. This is expected to be achieved through the exclusion of livestock, planting of dense native species, native plant diversity and abundance. A higher value as not used because of the new streams position in the catchment. With the exception of linking to the planted artificial drain (stormwater reserve area) at the downstream extent, it cannot be linked with other vegetation and is constrained by development. A higher score was not used because some of the indigenous biodiversity values will take longer than 15 years to materialise and as above, the biodiversity potential of the sites would likely be limited.
Compensation actions	Restoration of existing ephemeral streams
Discount rate	3% As above.
Finite end point	15 years 15 years provides sufficient time for plants to establish and grow and gains due to pest control and fencing to materialise and be confirmed.
Compensation confidence contingency	2 – High confidence The benefits of stream restoration are well documented and accepted.
Aerial extent of compensation action	0.0299 ha (459 x 0.5 m)
Value score prior to compensation action	1 – Low The existing values of the modified ephemeral streams is low.
Value score after compensation measure	2.2 – Moderate Expecting a gain in existing biodiversity values over a duration of 15 years. This is expected to be achieved through the retirement of these areas, exclusion of livestock, planting of dense native species, native plant diversity and abundance. The proximity of wetlands and other streams within the catchment and the connectivity to these features will also help support species dispersal. For the most part, modified ephemeral streams were more natural and less modified than the perennial streams within the site. A higher score was not used because some of the indigenous biodiversity values will take longer than 15 years to materialise.
Compensation actions	Restoration of existing perennial streams
Discount rate	3% As above.
Finite end point	15 years 15 years provides sufficient time for plants to establish and grow and gains due to pest control and fencing to materialise and be confirmed.
Compensation confidence contingency	2 – High confidence The benefits of stream restoration are well documented and accepted.
Aerial extent of compensation action	0.0503ha (503 x 1.0 m wide)
Value score prior to	1 – Low

compensation action	The existing values of the modified perennial streams is low.
Value score after compensation measure	2 – Moderate Expecting a gain in existing biodiversity values over a duration of 15 years. This is expected to be achieved through the retirement of these areas, exclusion of livestock, planting of dense native species, native plant diversity and abundance. The proximity of wetlands and other streams within the catchment and the connectivity to these features will also help support species dispersal. For the most part, modified perennial streams were in a less natural state than ephemeral streams within the Site. There is also minimal scope to naturalise channels thus the potential gain is limited. A higher score was not used because some of the indigenous biodiversity values will take longer than 15 years to materialise.
Compensation actions	Restoration of existing perennial streams (one stream bank within the Site)
Discount rate	3% As above.
Finite end point	15 years 15 years provides sufficient time for plants to establish and grow and gains due to pest control and fencing to materialise and be confirmed.
Compensation confidence contingency	2 – High confidence The benefits of stream restoration are well documented and accepted.
Aerial extent of compensation action	0.066 ha (666 m x 1.0 m wide)
Value score prior to compensation action	1 – Low The existing values of the modified perennial streams is low.
Value score after compensation measure	1.5 – Low-Moderate Expecting a gain in existing biodiversity values over a duration of 15 years. This is expected to be achieved through the retirement of these areas, exclusion of livestock, planting of dense native species, native plant diversity and abundance. The proximity of wetlands and other streams within the catchment and the connectivity to these features will also help support species dispersal. For the most part, modified perennial streams along the boundary were entirely channelised. There is no scope to naturalise channels given they are for the most part offsite. A higher score was not used because some of the indigenous biodiversity values will take longer than 15 years to materialise.

13.6 Compensation Staging

Although project staging (section 9.4) will result in a partial temporal lag between the loss of stream and wetland habitats (Stage 1) and implementation of the full compensation package outlined in sections 13.4 and 13.5 above, net positive effects (with respect to BCM calculations) on both stream and wetland habitats within the Site are still projected to occur at Stage 1.

Stage 1 will include all of the proposed wetland creation and, restoration of 88.5% of existing wetlands proposed for compensation. The restoration of wetlands O3 (where it occurs within the Site), B, C and D, will occur during Stage 4. With respect to the BCM model, if the aerial extent of compensation action (restoration of existing wetlands) is reduced to 1.06 ha, the expected net positive outcome at Stage 1 is still expected to be 8.6%.

Stream restoration in Stage 1 will include, W1 (749 m), W1a (51 m) and W2 (133 m) which equate to approximately 53 % of streams included within the compensation package. With respect to the BCM model, if the aerial extent of compensation actions (restoration of existing ephemeral and perennial streams) is reduced to account for the above (and the creation of stream extent is removed), the expected net positive outcome at Stage 1 is still 17.5%.

Stream creation (134 m) will occur in Stage 2 (sub-stage a). The remaining stream restoration will occur in Stage 4 and is focused within the northern extent of the Site.

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APPENDIX A

Plant Species List

Common Name	Scientific Name
<u>Conifers / Gymnosperms - Trees</u>	
Kahikatea	<i>Dacrycarpus dacrydioides</i> *
Maritime pine	<i>Pinus radiata</i>
Tōtara	<i>Podocarpus totara</i> *
<u>Dicotyledons - Trees & Shrubs</u>	
Blackwood	<i>Acacia melanoxylon</i>
Barberry	<i>Berberis glaucocarpa</i>
Hawthorn	<i>Crataegus monogyna</i>
Eucalypts	<i>Eucalyptus</i> spp.
Kānuka	<i>Kunzea robusta</i> *
Tree privet	<i>Ligustrum lucidum</i>
Small-leaved privet	<i>Ligustrum sinense</i>
Māhoe	<i>Melicactus ramiflorus</i> *
Māpou	<i>Myrsine australis</i> *
Karo	<i>Pittosporum crassifolium</i> *
Kōhūhū	<i>Pittosporum tenuifolium</i> *
Poplar	<i>Poplar x canadensis</i>
Kāmahi	<i>Pterophylla racemosa</i> *
Pin oak	<i>Quercus palustris</i>
Black locust	<i>Robinia pseudoacacia</i>
Crack willow	<i>Salix fragilis</i>
Woolly nightshade	<i>Solanum mauritianum</i>
Gorse	<i>Ulex europaeus</i>
<u>Monocot - Trees and Shrubs</u>	
Ti kōuka / cabbage tree	<i>Cordyline australis</i> *
<u>Dicotyledons - Herbs</u>	
Water celery	<i>Apium nodiflorum</i>
Fleabane	<i>Conyza parva</i>
Starwort	<i>Callitriche stagnalis</i>
Cat's ear	<i>Hypochaeris radicata</i>
Hawkbitt	<i>Leontodon taraxacoides</i>
Lotus	<i>Lotus pedunculatus</i>
Water purslane	<i>Ludwigia palustris</i>
Gypsywort	<i>Lycopus europaeus</i>
Water pepper	<i>Persicaria hydropiper</i>
Inkweed	<i>Phytolacca octandra</i>
Narrow-leaved plantain	<i>Plantago lanceolata</i>
Broad-leaved plantain	<i>Plantago major</i>
Selfheal	<i>Prunella vulgaris</i>
Spearwort	<i>Ranunculus flammula</i>
Creeping buttercup	<i>Ranunculus repens</i>
Celery-leaved buttercup	<i>Ranunculus sceleratus</i>
Clustered dock	<i>Rumex conglomeratus</i>
Broadleaved dock	<i>Rumex obtusifolius</i>
Black nightshade	<i>Solanum nigrum</i>
Dandelion	<i>Taraxacum officinale</i>

White clover	<i>Trifolium repens</i>
Red clover	<i>Trifolium pratense</i>
<u>Monocot - Herbs</u>	
Arum lily	<i>Zantedeschia aethiopica</i>
<u>Sedges</u>	
Nut sedge	<i>Cyperus eragrostis</i>
<u>Rushes</u>	
Sharp-fruited rush	<i>Juncus acuminatus</i>
Jointed rush	<i>Juncus articulatus</i>
Edgar's rush	<i>Juncus edgariae*</i>
Soft rush	<i>Juncus effusus</i>
Track rush	<i>Juncus tenuis</i>
<u>Grasses</u>	
Creeping bent	<i>Agrostis capillaris</i>
Sweet vernal	<i>Anthoxanthum odoratum</i>
Pampas grass	<i>Cortaderia selloana</i>
Cocksfoot	<i>Dactylis glomerata</i>
Glaucous sweetgrass	<i>Glyceria declinata</i>
Yorkshire fog	<i>Holcus lanatus</i>
Tall fescue	<i>Lolium arundinaceum</i>
Italian rye grass	<i>Lolium multiflorum</i>
Perennial rye grass	<i>Lolium perenne</i>
Bush rice grass	<i>Microlaena stipoides*</i>
Paspalum	<i>Paspalum dilatatum</i>
Mercer grass	<i>Paspalum distichum</i>
Maize	<i>Zea mays</i>
<u>Ferns & Allied Plants</u>	
Wheki	<i>Dicksonia squarrosa*</i>
Water fern	<i>Histiopteris incisa*</i>
Shaking brake	<i>Pteris tremula</i>
<u>Lianes and Climbers</u>	
Pōhuehue	<i>Muehlenbeckia australis*</i>
Blackberry	<i>Rubus fruticosus</i> agg.

Note: A total of 69 vascular plant species were recorded (55 exotic/ 14 native).
 An asterisk (*) next to a species denotes 'native' biostatus.

Appendix B

eBird Bird Species (within 10 km of the Site)

Common name	Scientific name	Conservation status (Robertson et al. 2021)
African collared-dove	<i>Streptopelia risoria</i>	–
Australasian bittern	<i>Botaurus poiciloptilus</i>	Threatened – Nationally Critical
Australasian shoveler	<i>Spatula rhynchotis</i>	Not Threatened
Australasian swamphen/pūkeko	<i>Porphyrio melanotus</i>	Not Threatened
Australian magpie	<i>Gymnorhina tibicen</i>	–
Black swan	<i>Cygnus atratus</i>	–
Budgerigar	<i>Melopsittacus undulatus</i>	–
California quail	<i>Callipepla californica</i>	–
Canada goose	<i>Branta canadensis</i>	–
Caspian tern	<i>Hydroprogne caspia</i>	Threatened – Naturally Vulnerable
Common chaffinch	<i>Fringilla coelebs</i>	–
Common myna	<i>Acridotheres tristis</i>	–
Cook's Petrel	<i>Pterodroma cookii</i>	At Risk – Relict
Domestic goose sp. (Domestic type)	<i>Anser</i> sp. (Domestic type)	–
Dunnoek	<i>Prunella modularis</i>	–
Eastern rosella	<i>Platycercus eximius</i>	–
Eurasian blackbird	<i>Turdus merula</i>	–
Eurasian coot	<i>Fulica atra</i>	At Risk – Naturally uncommon
Eurasian skylark	<i>Alauda arvensis</i>	–
European goldfinch	<i>Carduelis carduelis</i>	–
European greenfinch	<i>Chloris chloris</i>	–
European starling	<i>Sturnus vulgaris</i>	–
Golden Pheasant	<i>Chrysolophus pictus</i>	–
Gray warbler	<i>Gerygone igata</i>	Not Threatened
Gray teal	<i>Anas gracilis</i>	Not Threatened
Graylag Goose	<i>Anser anser</i>	–
Great Cormorant	<i>Phalacrocorax carbo</i>	At Risk – Relict
Great Egret	<i>Ardea alba</i>	Threatened – Nationally Critical
Helmeted Guineafowl	<i>Numida meleagris</i>	–
House sparrow	<i>Passer domesticus</i>	–
Indian peafowl	<i>Pavo cristatus</i>	–
Kelp Gull	<i>Larus dominicanus</i>	Not Threatened
Latham's Snipe	<i>Gallinago hardwickii</i>	Vagrant
Little Black Cormorant	<i>Phalacrocorax sulcirostris</i>	At Risk – Naturally Uncommon
Little Pied Cormorant	<i>Microcarbo melanoleucos</i>	At Risk – Relict
Lesser redpoll	<i>Acanthis flammea</i>	–
Mallard	<i>Anas platyrhynchos</i>	–
Masked lapwing	<i>Vanellus miles</i>	Not Threatened
Morepork	<i>Ninox novaeseelandiae</i>	Not Threatened
Muscovy duck	<i>Cairina moschata</i>	–
Mute swan	<i>Cygnus olor</i>	–
New Zealand bellbird	<i>Anthornis melanura</i>	Not Threatened
New Zealand falcon	<i>Falco novaeseelandiae</i>	Threatened – Nationally Increasing
New Zealand fantail	<i>Rhipidura fuliginosa</i>	Not Threatened
New Zealand fernbird	<i>Poodytes punctatus</i>	At Risk – Declining
New Zealand dabchick/weweia	<i>Poliiocephalus rufopectus</i>	Threatened – Nationally Increasing

New Zealand kākā	<i>Nestor meridionalis</i>	At Risk – Recovering
New Zealand pigeon	<i>Hemiphaga novaeseelandiae</i>	Not Threatened
New Zealand pipit	<i>Anthus n. novaeseelandiae</i>	At Risk – Declining
New Zealand Scaup	<i>Aythya novaeseelandiae</i>	Not Threatened
North Island Robin	<i>Petroica longipes</i>	At Risk – Declining
Pacific black duck	<i>Anas superciliosa</i>	–
Paradise shelduck	<i>Tadorna variegata</i>	Not Threatened
Parakeet	<i>Psittaciformes</i> (parakeet)	–
Pied cormorant	<i>Phalacrocorax varius</i>	At Risk – Recovering
Pied stilt	<i>Himantopus himantopus</i>	Not Threatened
Red junglefowl	<i>Gallus gallus</i>	–
Redpoll	<i>Acanthis flammea</i>	–
Ring-necked pheasant	<i>Phasianus colchicus</i>	–
Rock pigeon	<i>Columba livia</i>	–
Rook	<i>Corvus frugilegus</i>	–
Royal spoonbill	<i>Platalea regia</i>	At Risk – Naturally Uncommon
Sacred kingfisher	<i>Todiramphus sanctus</i>	Not Threatened
Shining bronze-cuckoo	<i>Chrysococcyx lucidus</i>	Not Threatened
Silver gull	<i>Chroicocephalus novaehollandiae</i>	At Risk – Declining
Silvereye	<i>Zosterops lateralis</i>	Not Threatened
Song thrush	<i>Turdus philomelos</i>	–
South Island pied oystercatcher	<i>Haematopus finschi</i>	At Risk – Declining
Spotless crane	<i>Zapornia tabuensis</i>	At Risk – Declining
Spotted dove	<i>Streptopelia chinensis</i>	–
Sulphur-crested cockatoo	<i>Cacatua galerita</i>	–
Swamp harrier	<i>Circus approximans</i>	Not Threatened
Swan goose	<i>Anser cygnoides</i>	–
Tomtit	<i>Petroica macrocephala</i>	Not Threatened
Tui	<i>Prothemadera novaeseelandiae</i>	Not Threatened
Welcome swallow	<i>Hirundo neoxena</i>	Not Threatened
White-faced Heron	<i>Egretta novaehollandiae</i>	Not Threatened
White-fronted Tern	<i>Sterna striata</i>	Not Threatened
Wild turkey	<i>Meleagris gallopavo</i>	–
Wood duck	<i>Aix sponsa</i>	–
Yellow-crowned parakeet	<i>Cyanoramphus auriceps</i>	At Risk - Declining
Yellowhammer	<i>Emberiza citrinella</i>	–

APPENDIX C

Wetland Data

Appendix C

Appendix C

Appendix C

Appendix C

Appendix C

Appendix C

Appendix C

APPENDIX D

Environmental DNA Results

September 2025

CommonName	Sample 1	Sample 1	Sample 1	Sample 1	Sample 1	Sample 1	Sample 3	Sample 3	Sample 3	Sample 3	Sample 3	Sample 3	Sample 3	Sample 2	Sample 2	Sample 2	Sample 2	Sample 2	Sample 2
Shortfin eel	1,861	2,140	1,043	272	4,278	2,689	1,237	704	76	55	1,027	0	37	957	231	485	182	593	
Mosquitofish	1,102	1,617	5,643	55	970	0	0	0	0	0	0	0	25	0	184	224	217	182	
Eels	0	218	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

December 2025

ScientificName	CommonName	Sample 4	Sample 4	Sample 4	Sample 4	Sample 4	Sample 4	Sample 5 (1)	Sample 5 (2)	Sample 5 (3)	Sample 5 (4)	Sample 5 (5)	Sample 5 (6)
<i>Gambusia affinis</i>	Mosquitofish	6,760	7,486	5,517	9,418	7,968	8,969	0	0	4,013	3,463	0	5
<i>Anguilla australis</i>	Shortfin eel	5,870	3,677	3,651	3,889	5,218	3,836	4,265	1,766	923	2,643	850	710
<i>Carassius auratus</i>	Goldfish, morihana	392	436	112	656	656	889	0	0	0	0	0	0
<i>Anguilla dieffenbachii</i>	Longfin eel	26	34	20	0	175	52	17	0	0	0	0	0
<i>Gambusia</i>	Gambusia; Mosquitofish	0	144	0	283	0	0	0	0	0	0	0	0
<i>Anguilla</i>	Eels	0	0	0	0	0	12	0	0	0	0	0	0

APPENDIX E

Stream Ecological Valuation Data

			W1 (upper)	W1 (lower)	W2 (upper)	W2 (lower)	W2a
Hydraulic	NFR	Vchann	0.100	0.100	0.100	0.240	0.220
		Vlining	0.800	0.800	0.800	0.680	0.800
		Vpipe	0.300	0.300	0.300	0.300	0.700
		=	0.100	0.100	0.100	0.116	0.289
	FLE	Vbank	0.240	0.200	0.200	0.200	0.520
		Vrough	0.400	0.400	0.500	0.400	0.020
		=	0.096	0.080	0.100	0.080	0.010
		Vbarr	0.200	0.200	0.200	0.200	0.300
	CSM	=	0.200	0.200	0.200	0.200	0.300
		Vchanshape	0.200	0.200	0.200	0.200	0.480
	Vlining	0.800	0.800	0.800	0.800	0.800	
	CGW	=	0.600	0.600	0.600	0.600	0.693
Hydraulic function mean score			0.249	0.245	0.250	0.249	0.323
Biogeochemical	WTC	Vshade	0.020	0.000	0.000	0.000	0.120
		=	0.020	0.000	0.000	0.000	0.120
		Vdod	0.400	0.400	0.340	0.400	0.335
		=	0.400	0.400	0.340	0.400	0.335
	DOM	Vripar	0.100	0.200	0.200	0.300	0.300
		Vdecid	0.000	0.000	0.000	0.000	0.000
		=	0.050	0.100	0.100	0.150	0.150
		Vmacro	0.300	0.800	0.900	0.700	0.500
	IPR	Vretain	0.100	0.200	0.200	0.200	0.200
		=	0.100	0.200	0.200	0.200	0.200
		Vsurf	1.000	1.000	1.000	1.000	0.320
		Vripfilt	0.400	0.500	0.500	0.500	0.400
DOP	=	0.700	0.750	0.750	0.750	0.360	
Biogeochemical function mean score			0.254	0.290	0.278	0.300	0.233
Habitat provision	FSH	Vgalspwn	1.000	1.000	1.000	1.000	1.000
		Vgalqual	0.000	0.000	0.000	0.000	0.000
		Vgobspwn	0.100	0.100	0.100	0.100	0.100
		=	0.050	0.050	0.050	0.050	0.050
	HAF	Vphyshab	0.250	0.350	0.240	0.310	0.250
		Vwatqual	0.000	0.000	0.000	0.000	0.000
		Vimperv	0.600	0.100	0.400	0.100	0.300
		=	0.275	0.200	0.220	0.180	0.200
Habitat provision function mean score			0.163	0.125	0.135	0.115	0.125
Biodiversity	FFI	Vfish	0.000	0.000	0.000	0.000	0.000
		=	0.000	0.000	0.000	0.000	0.000
		Vmci	0.000	0.000	0.000	0.000	0.000
		Vept	0.000	0.000	0.000	0.000	0.000
	IFI	Vinvert	0.000	0.000	0.000	0.000	0.000
		=	0.000	0.000	0.000	0.000	0.000
		Vripcond	0.150	0.150	0.200	0.200	0.200
		Vripconn	0.070	0.070	0.200	0.065	0.070
	RVI	=	0.011	0.011	0.070	0.013	0.000
Biodiversity function mean score			0.004	0.004	0.023	0.004	0.000
SEV score			0.186	0.192	0.195	0.196	0.193

APPENDIX F

Lizard Management Plan

DRAFT

ecoLogical Solutions

Environmental Consultants



August 2026

Brymer Farms Development Lizard Management Plan

Submitted to:
Brymer Farms Limited



water



fauna



flora



land

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Appendices

Appendix A – Habitat Examples

1.0 Introduction

1.1 Background

Brymer Farms Limited is applying under the Fast Track Approvals Act (2024) for consent to undertake a residential development called Brymer Farms (the 'Project'). The Project area encompasses 81 ha of rural land, located between Brymer Road and Whatawhata Road, on the western side of Hamilton (the 'Site') (Figure 1).

This Lizard Management Plan (LMP) has been prepared along with a suite of other fauna management plans for the substantive application that will be lodged with the Environmental Protection Agency (EPA) for consideration by an expert panel.

Copper skinks (*Oligosoma aeneum*) are known to occur within the area and habitat on the site is consistent with habitats used by copper skink and ornate skink (*Oligosoma ornatum*) more broadly in the Waikato rural region. There is no habitat proposed to be removed on the Site that could support arboreal lizards, especially given the rural farming history of the Site, the complete removal of the original vegetation cover, and the absence of systematic pest animal control over the Site.

The removal of vegetation may adversely affect native lizards via direct injury/death, and habitat loss. Native lizards are absolutely protected under the Wildlife Act 1953.

1.2 Purpose and Objectives

The purpose of this LMP is to ensure adverse effects on native lizards at the Site are minimised during vegetation clearance and earthworks.

This LMP outlines the timing and methods to achieve:

- The pre-clearance capture of native lizards within the development footprint from identified lizard habitat areas to be affected by vegetation clearance and their relocation to the release site.
- Enhance/augment lizard habitat within the release site through the construction of one artificial refuge (e.g., eco-stack/ piles of logs/branches/stones) for every one lizard captured and released. Five artificial refuge(s) to be constructed in advance of lizard salvage, with any additional refuge required to be established concurrently with lizard release.

1.3 Permits

Brymer Farms Limited will submit this LMP to support an application for a Wildlife Act Authorisation (WAA) from the Department of Conservation (DOC). Any capture and relocation of native lizards will be carried out in accordance with a valid WAA.

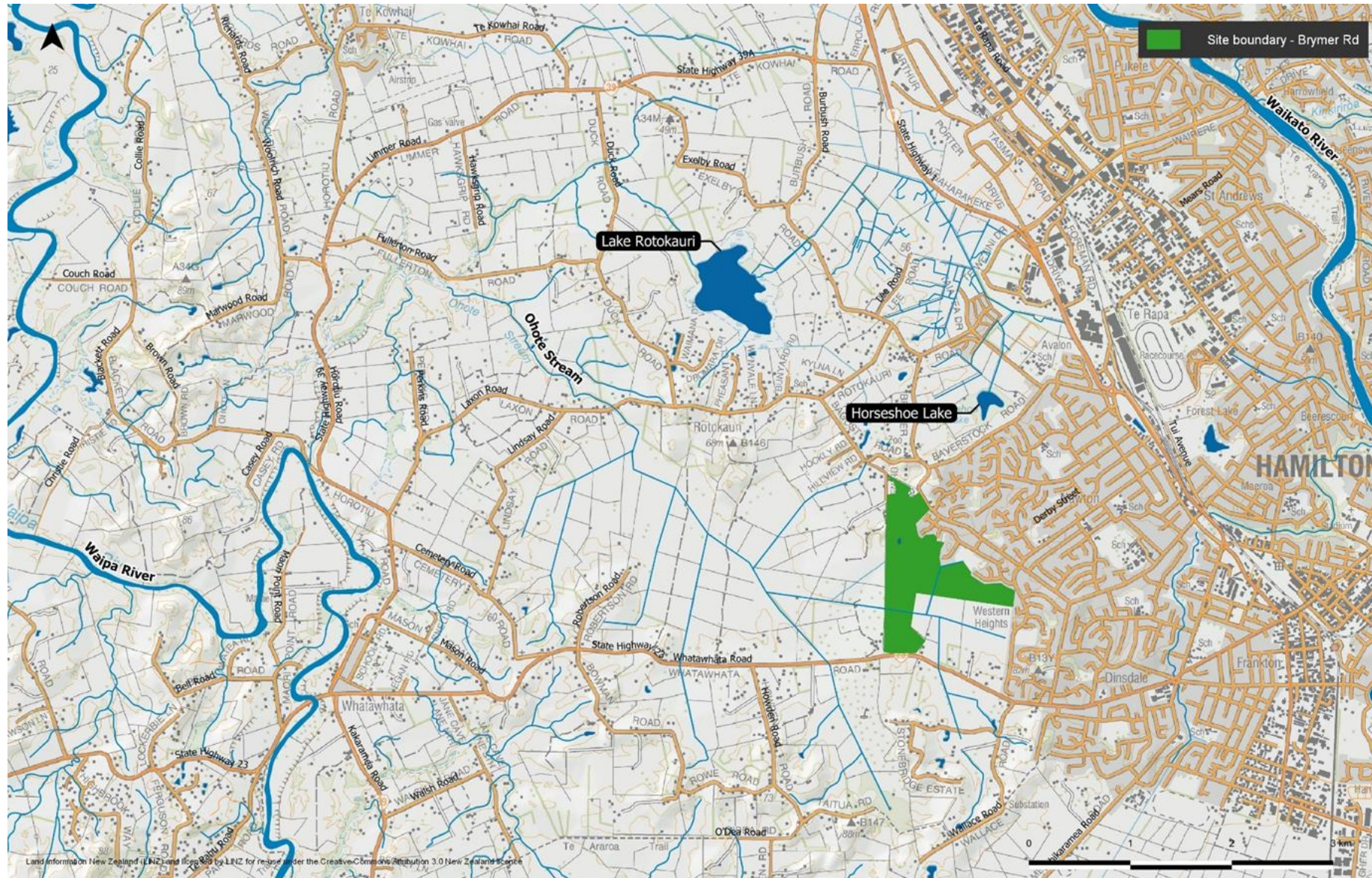


Figure 1: Location of the Brymer Farms Development.

1.4 Responsibilities and Key Contacts

This LMP has been prepared by Ecological Solutions Limited and reviewed by Graham Ussher from RMA Ecology Ltd.

Brymer Farms Limited as the consent holder is responsible for submitting this LMP to Hamilton City Council for approval no less than thirty (30) working days prior to commencement of any construction works.

In advance of any lizard capture or relocation activities on the Site, Brymer Farms Limited must have obtained a WAA from the DOC to authorise the activities outlined in this plan. Brymer Farms Limited holds overall accountability for implementation of and compliance with this plan and any associated Wildlife Act Authority (WAA) conditions.

Implementation of the lizard management plan will be carried out by Graham Ussher (RMA Ecology Ltd), who has extensive experience implementing Lizard Management Plans in the Waikato Region. Graham Ussher can be contacted on 027 272 7930 and graham.usscher@rmaecology.co.nz.

When required, Graham will be assisted by a suitably qualified and experienced ecologist who will assist with the implementation of the LMP.

2.0 Summary of Lizard Values

2.1 Site Description

The Site was likely cleared of its original forest cover to facilitate farming, which has continued to be the dominant land use to this day. Most of the Site comprised grazed pasture (or crops) unsuitable for lizards, but there were occasional pockets of other habitat types that could support native ground lizards scattered across the Site (as shown in Figure 2) including:

- Low growing shrubs, rank grass, ornamental gardens, and miscellaneous debris around buildings, as well as areas in or under the buildings themselves (mapped as Buildings and Surrounds, Figure 2)
- A large pile of concrete near the centre of the Site (mapped as Concrete Pile, Figure 2).
- Areas of scrub in the margins of and slopes above wetlands (mapped as Wetland Margin, Figure 2).
- Isolated areas of woody debris (mapped as Woody Debris, Figure 2).
- The kanuka treeland, which contained occasional woody debris and rank grass. This vegetation had a sparse/ absent sub-canopy and understory, minimal ground cover, significant canopy gaps, and no connectivity to any remnant vegetation or other relevant habitats and is unlikely to support arboreal lizards.

Examples of each of the above habitats are shown in Appendix A.

Habitat on Site was suitable for copper skink, which have been found within 12 km of the Site. Habitat was also suitable for ornate skink (*Oligosoma ornatum*) and whilst there were no nearby records of ornate skink in our database search, they are present in similar habitat throughout the Waikato, and may therefore be present on this Site. Both ornate skink and copper skink are 'At Risk – Declining' (Hitchmough et al., 2026).

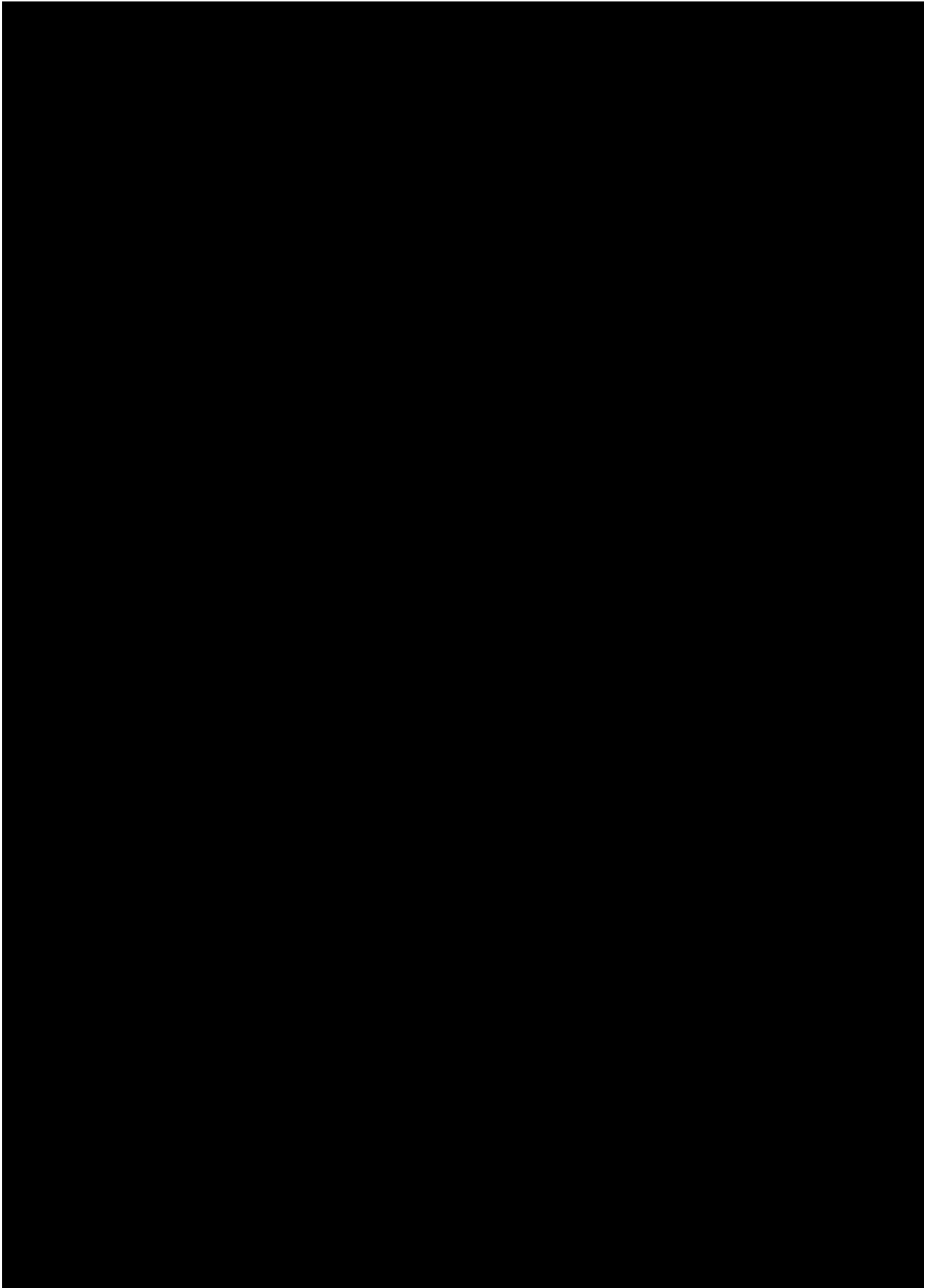


Figure 2: Potential lizard habitat within the Site.

2.2 Lizard Survey

Lizard habitat was manually searched on 13 November 2025. The manual search involved walking slowly and systematically through potential habitats whilst visually scanning the surroundings for basking or foraging lizards. This included investigating vegetation, the ground, and lifting potential refuges such as rocks, loose vegetation, and debris. Manual searches were undertaken for a total of 1.5 person-hours.

Two unidentified skinks, presumed to be either copper skink, ornate skink, or exotic rainbow skink due to their size, shape and the known and expected diversity of lizards in the landscape, were identified during the search of lizard habitat (locations shown on Figure 2). These skinks were observed within grazed pasture under isolated logs.

2.3 Habitat to be Impacted

Table 1 summarises area of each habitat type likely to be impacted by bulk earthworks. The habitats associated with buildings and surrounds, and the concrete pile are proposed to be completely removed. Almost all woody debris habitat is proposed to be removed, with the exception of some of the area closest to the treeland. The majority of the wetland margin habitat is proposed to be retained; however, it is likely weed control and subsequent planting, will alter vegetation (and thus habitat) to some degree. All of the kanuka treeland within the western bounds of the Site is proposed to be retained. Habitat to be removed as a result of earthworks or retained is shown in Figure 3.

Table 1: Areas of lizard habitat on site and areas to be impacted.

Habitat	Area (m ²)	Area (m ²) to be impacted
Buildings and Surrounds	13,948	13,948
Concrete Pile	75	75
Kanuka Treeland	16,993	0
Wetland Margin	14,822	1,842
Woody Debris	6,569	5,865
Total	52,407	21,730



Figure 3: Potential lizard habitat within the Site to be removed or retained.

3.0 Managing Effects on Lizards

3.1 Introduction

The approach to lizard management will follow the key principles for lizard salvage and transfer in New Zealand (DOC 2019).

Complete avoidance of actual or potential adverse effects on indigenous lizards and their habitats cannot be achieved due to the proposed extent of the project design and the practical difficulty of searching for and capturing lizards at low densities. Therefore, managing adverse effects will involve the implementation of a lizard capture and relocation (salvage) campaign in accordance with a Wildlife Act Authorisation, combined with release site habitat enhancement and augmentation as a means of providing additional resources for released and resident indigenous lizards.

The lizard salvage methods described in this report are reflective of best practice and are designed to capture ground dwelling lizards. Lizard management methods will involve the supervision of vegetation clearance, as well as manual searching, capture, and relocation, as described in the following section.

3.2 Methodology

3.2.1 Site Demarcation

Prior to undertaking any lizard salvage activities, the extent of the vegetation clearance and earthworks will be clearly marked (e.g., flagging tape, tree dazzle, or pegs) to ensure the project herpetologist clearly understands the full extent of the area of impact. Lizard salvage will be required where vegetation clearance is to be undertaken within identified lizard habitat shown in Figure 2.

3.2.2 Lizard Salvage

A DOC authorised herpetologist and suitably qualified assistant ecologist(s) will undertake targeted search and salvage campaigns prior to and during vegetation clearance. Vegetation clearance within lizard habitat areas, and therefore lizard search and salvage campaigns, are to be undertaken between October and April inclusive. The search and salvage campaigns will be undertaken in two phases.

- *Phase 1:* Pre-vegetation clearance systematic manual habitat searches and a live capture and relocation programme.
- *Phase 2:* Within Phase 1 areas where native lizards are detected, machine assisted destructive search (vegetation clearance supervision).

The specific salvage methods for each of the Phases are detailed below.

Phase 1: Pre-vegetation clearance systematic searches and live trapping programme

Systematic Searches

Diurnal (day) searches will be undertaken.

- Day time systematic manual habitat searches will be undertaken within lizard habitat areas to be cleared on days when temperatures are expected to be between 12–20°C, and there is no rain. Manual searches will include lifting debris (e.g., logs, rocks, and organic and inorganic material), searching through vegetation foliage, scrub/rank grass, and the concrete pile by hand or with the assistance of rakes (Hare 2012).

Phase 2. Vegetation clearance supervision and machine-assisted searches

Vegetation clearance supervision and machine assisted searching is a contingency measure, recognising that not every native lizard may be captured during Phase 1.

- Destructive searches will involve searching through potential habitat during vegetation removal, and with the assistance of an excavator fitted with a toothed bucket or rake.
- Searches will cover all habitat where native lizards have been detected during Phase 1 works, within the vegetation clearance area and continue until the supervising ecologist is satisfied that the potential habitats are sufficiently removed or degraded that lizards are unlikely to be present.

Coordination and communication between the supervising ecologist and vegetation clearance contractors will be important to ensure injury to lizards, and the supervising ecologist, is avoided.

3.2.3 Lizard Handling and Temporary Containment

All native lizards caught will be placed in a temporary containment box, which will be filled with local vegetation matter and leaf litter and misted with water. Lizards will only be held temporarily for the period of the active searches or retreat inspections, or in all cases less than two hours, after which the lizards will be transported to and released at the approved relocation site set out in Section 4.1 below.

It is not anticipated that any lizard taxa with threat classifications higher than 'At Risk' will be encountered within the Site. However, if this were to occur, the individual(s) will be captured and held temporarily in a containment box, and work will cease while DOC (Waikato Office) is notified, and further advice and instruction is given to the herpetologist.

3.2.4 Data Collection

When a native lizard has been captured, the following morphometric and geospatial information will be recorded:

- Species of native lizard;
- Sex;
- Time and date of capture;
- Age class (adult, sub-adult, juvenile);
- Net weight (minus holding container);
- Length – snout-vent, regenerating tail and original tail;
- Reproductive status;
- Photograph taken of animal (dorsal and ventral view to record colour and scale patterns) and habitat; and
- GPS coordinates of capture site and physical mark on high-definition aerial map of location.

In addition, the total time spent searching and number of personnel involved will be recorded to obtain an estimate of captures per unit search effort across days, habitats, and species.

3.2.5 Unintentional Lizard Injury or Death

Injured lizards will be kept in an appropriate portable enclosure (i.e., a clean, well-ventilated plastic container) under the direction of the project herpetologist to ensure the animal is

handled appropriately until the lizard(s) can be assessed and treated.

The following steps will be implemented if any injured or dead lizards are found during the salvage campaign:

- The project herpetologist will notify DOC (0800 DOC HOT (0800 362 468) at the earliest opportunity within 24 hours after any injured or dead lizard is found;
- Injured lizards found during salvage will be taken to the Hamilton Zoo Native Wildlife Rehabilitation team (07 838 6720 - 183 Brymer Road, Hamilton) as soon as possible for assessment and treatment.
- Any 'Threatened', 'At Risk' lizard species death shall be sent to Massey University Wildlife Post-mortem Service for necropsy, or alternatively – subject to mana whenua approval – will be buried on the site or at a site nominated by mana whenua in keeping with tikanga.
- Appropriate measures will be undertaken to minimise any further lizard deaths.

3.2.6 Lizard Salvage Timeframe

The duration of the pre-clearance manual habitat searches will be undertaken over a period of four days of suitable weather (i.e., temperatures between 12–20°C). However, the following contingency plan is proposed to ensure that all reasonable effort is made to salvage every lizard. If:

- No lizards have been caught over the 4-day search period or the herpetologist has determined that the habitat is no longer suitable to support lizards, the salvage operation will cease, OR
- Lizards are still being caught on day four, searching will continue until no lizards are captured within a 24-hour period employing the same search effort.

4.0 Lizard Release

4.1 Release Site

The successful transfer, re-establishment, and sustainability of relocated lizards is dependent on the quality and suitability of the relocation site. A relocation site should offer equal or greater opportunity (i.e., shelter, food resources, access to mates) for survival and long-term health of lizards compared to the habitat of origin.

The primary release site is Waiwhakareke Natural Heritage Park (Waiwhakareke), an approximately 60 ha area of native forest, with well-developed leaf litter and debris. Waiwhakareke is less than half a kilometre from the Site (Figure 4). The Department of Conservation representative Andrew Styche indicated this was DOCs preferred release site during pre-consultation discussions for the Project.

Lizard habitat at Waiwhakareke is well developed, with several log stacks constructed for other release projects (Figure 5), and a predator proof fence currently under construction¹. Discussions with Hamilton City Council are currently ongoing on how best to support lizard habitat within Waiwhakareke, and we propose constructing one eco-stack for every native lizard released. Table 2 outlines Waiwhakareke's suitability as a release site.

¹ <https://hamiltonzoo.co.nz/about/stories/predator-proof-fence-at-waiwhakareke-natural-heritage-park>

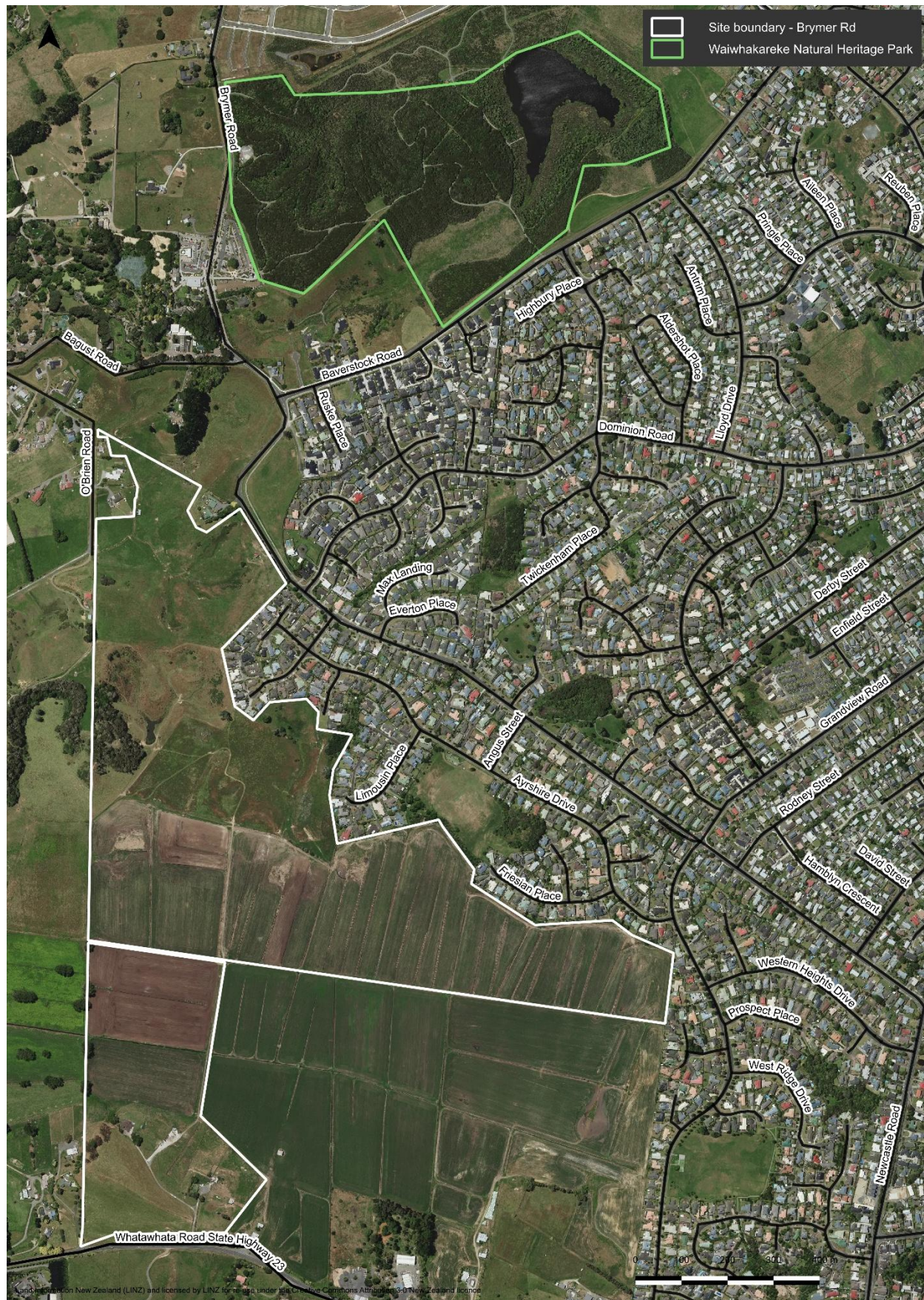


Figure 4: Waiwhakareke Natural Heritage Park relative to salvage site.



Figure 5: Eco-stack constructed at Waiwhakareke Natural Heritage Park.

Table 2: Waiwhakareke Natural Heritage Park release site suitability.

Suitability factor	Release site description
Suitability of existing habitat	Waiwhakareke Natural Heritage Park includes large areas of indigenous forest, with well-developed leaf litter with woody debris and several pre-constructed eco-stacks.
Long-term protection of the site	Waiwhakareke Natural Heritage Park is secured by the Reserves Act 1977 and the protection principles associated with the overlay classification.
Accessibility for release	There are several walking tracks and predator control trails, as well as vehicle accessways, providing easy access to much of the available habitat.
Size of the release site and its connectivity to other habitat	The release site is approximately 60 hectares of indigenous forest. It is expected that the habitat available is more than large enough to accommodate the relocated lizards (and any resident lizards).
Existing lizard populations	The existing population of lizards at the proposed release site is unknown; however, the abundance of available habitat and the low number of lizards expected to be captured provides confidence that the carrying capacity will be adequate.
Existing predator control or opportunities to enhance predator control	There is existing predator control at the release site as well as a predator proof fence currently under construction. In 2023, TrapNZ data showed catches of nearly 400 rats, over 20 possums, and nearly 20 hedgehogs. Predator control is intended to continue until a switch to an eradication scheme post-construction of the predator proof fence.

4.2 Release Strategy

All lizards will be hard released (i.e., no staging pens) into appropriate indigenous forest habitat within the release site. It is expected that the abundance of available natural habitat and ongoing predator control will assist in achieving high survival and sustainability of relocated lizards at the release site. Lizards will be released in groups of no more than five, with gaps of at least 100 m between groups.

All relocated lizard species will be recorded and measured with basic morphometric features photographed where possible.

4.3 Department of Conservation Principles of Salvage

Table 3 details how the lizard management described in this plan addresses the Department of Conservation's Nine Principles of Lizard Salvage (Department of Conservation Lizard Technical Advisory Group, 2019).

Table 3: Department of Conservation Principles of Lizard Salvage.

Principle	Steps to address principle
Principle 1: Lizard species' values and site significance must be assessed at both the development and receiving sites	As part of the ecological assessment of the site, surveys to determine lizard populations at the impact site were undertaken (though no lizards were found). Suitability, carrying capacity, area, habitat improvements, and long-term management required at the release site were also considered.
Principle 2: Actual and potential development-related effects and their significance must be assessed	Effects have been assessed in the Ecological Impact Assessment undertaken by Ecological Solutions and included with the Fast Track application associated with this proposed development. This included an assessment of the values, significance, and adverse effects of the development proposal.
Principle 3: Alternatives to moving lizards must be considered	Alternatives to moving are inappropriate in this instance, due to the potential for mortality if lizards are not moved. However, the release site has been selected so lizards can be moved into a nearby, protected suitable habitat.
Principle 4: Threatened lizard species require more careful consideration than less-threatened species	It is not anticipated that any 'Threatened' species will be found on this site. However, if any are found, DOC will be contacted immediately for advice on how to proceed.
Principle 5: Lizard salvage, transfer and release must use the best available methodology	Methods will be applied in accordance with the DOC handbook on salvage methods, as well as developing refinements to these for specific environments where pre-clearance salvage methods can be used to extract a greater number of lizards than the DOC methods assume. ACOs, manual search, machine assisted search (log rolling), and machine assisted clearance are proposed to be used. Lizards caught will be held in pre-prepared terraria with damp leaf litter, and are kept out of sun. Release will happen in shortest possible time.

Principle 6: Receiving sites and their carrying capacity must be suitable in the long term

The release site is protected in perpetuity under the Reserve Act 1977. Given the small number of lizards expected to be found, the release site's carrying capacity is expected to be suitable.

Principle 7: Monitoring is required to evaluate the salvage operation

Measures of success or failure with a relocation is inherently difficult, and this is particularly true with the expected number of lizards to be captured at this site. Monitoring of existing pest control being undertaken is ongoing. However, monitoring techniques for a small lizard population will involve a large amount of habitat destruction. If the population relocated is large enough for a reliable and non-destructive monitoring scheme, then a monitoring plan will be developed in that eventuality.

Principle 8: Reporting is required to communicate outcomes of salvage operations and encourage process improvements

Results of lizard salvage including the methods applied, number of lizards salvaged and where they were released and will be reported to the DOC by way of an Amphibian and Reptile Distribution Scheme (ARDS) card and in accordance with any specific Wildlife Act Authorisation conditions

Principle 9: Contingency actions are required when lizard salvage and transfer activities fail

Contingency actions are relevant only if monitoring can be undertaken.

5.0 Reporting and Closure

The project herpetologist will report the results of the lizard relocation work to Brymer Farms Limited and Waikato Regional Council within 20-days of completion. Results of lizard salvage including the methods applied, number of lizards salvaged and where they were released and will be reported to the DOC by way of an Amphibian and Reptile Distribution Scheme (ARDS) card and in accordance with any specific Wildlife Act Authorisation conditions.

Results will include the following information:

- Date and time of capture.
- Capture method(s).
- Lizard species caught.
- Number caught (including any accidentally killed).
- Length range.
- Health/condition (i.e., visible disease or injury).
- Location of release.

The Project herpetologist will notify DOC at the earliest opportunity within 24 hours after any injured or dead lizard is found. All lizard capture data will be uploaded to the DOC Herpetofauna Database.

Lizard management may be considered closed after the completion of twenty-five years of predator control within the release site.

6.0 References

Department of Conservation Lizard Technical Advisory Group (2019). Key principles for lizard salvage and transfer in New Zealand. Department of Conservation, Wellington.

Ecological Solutions. 2026. Brymer Ridge Development Assessment of Ecological Effects. Prepared for Brymer Farms Limited. January 2026.

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APPENDIX A

Habitat Examples



Figure 6: Building and Surrounds example.



Figure 7: Concrete Pile.



Figure 8: Wetland Margin example



Figure 9: Woody Debris example.



Figure 10: Kanuka Treeland.

APPENDIX G

Bat Management Plan

DRAFT

ecoLogical Solutions

Environmental Consultants



August 2026

Brymer Farms Development Bat Management Plan

Submitted to:
Brymer Farms Limited



water



fauna



flora



land

Quality Assurance

This report has been prepared and reviewed by the following:

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Appendices

Appendix A – ABM Placement Details

1.0 Introduction

1.1 Background

Brymer Farms Limited are applying under the Fast Track Approvals Act 2024 (FTAA) for consent to undertake a residential development called Brymer Farms ('the Project'). The Project area encompasses 81 ha of rural land, on the western side of Hamilton City, located between Brymer Road and Whatawhata Road (584 Whatawhata Rd) ('the Site') as shown in Figure 1.

This Bat Management Plan (BMP) has been prepared along with a suite of other fauna management plans for the substantive application that will be lodged with the Environmental Protection Agency (EPA) for consideration by an expert panel. This BMP is supplementary to the Ecological Impact Assessment (EcIA) prepared by Ecological Solutions (Ecological Solutions 2026).

Long-tailed bats (*Chalinolobus tuberculatus*) have been recorded using the Site. The EcIA (Ecological Solutions 2026) identifies the clearance of mature vegetation during earthworks and construction as a direct adverse effect on long-tailed bats, should roosting be occurring on-site. The felling of trees with potential bat roost features could result in direct injury, death, or displacement of bats. Long-tailed bats are 'Threatened – Nationally Critical' (O'Donnell et al 2022) and are absolutely protected under the Wildlife Act (1953).

In accordance with the EcIA (Ecological Solutions 2026), if the Bat Roost Protocols (DOC 2024) are implemented, then direct effects on long tailed bats, such as injury or death, can be avoided. The residual adverse effects of potential bat habitat loss were assessed as 'low'. However, loss of confirmed roosts will also be mitigated through the use of artificial roost boxes in the short term. In the long term, a 40 m wide planted corridor running in an east-west direction through the site, and c. 46 ha of native planting including streams and wetlands will lead to an increase in potential bat habitat.

This BMP considers the National Policy Statement for Indigenous Biodiversity (NPS-IB; MfE 2025), and the Wildlife Act 1953.

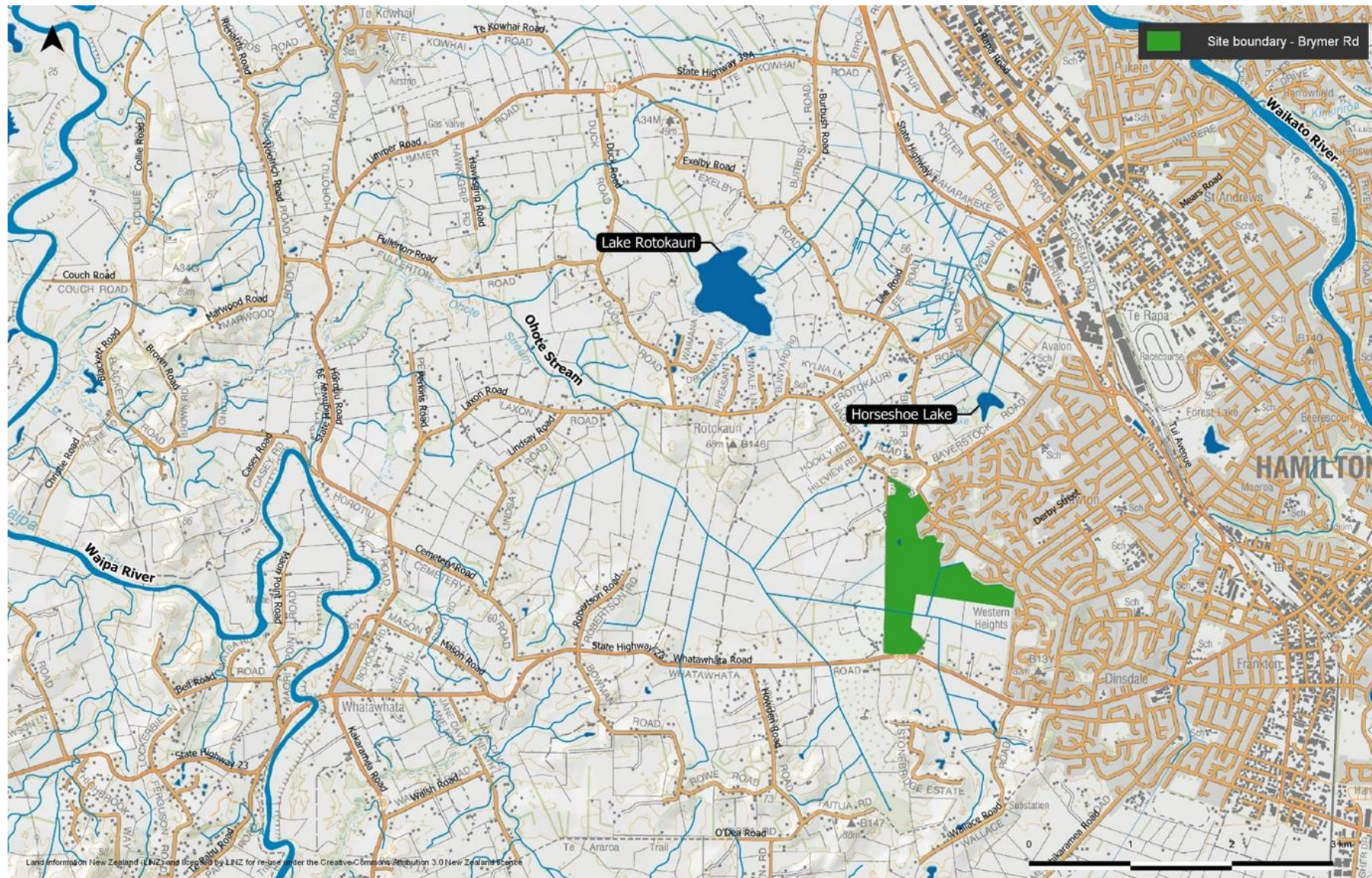


Figure 1: Site location.

1.2 Purpose and Objectives

The purpose of bat management is to avoid injury to, or mortality of, long-tailed bats during construction and minimise disturbance of long-tailed bats during operation.

This will be achieved through the following objectives:

- Avoid, remedy, or mitigate (as appropriate) adverse effects on long-tailed bats, during habitat removal in areas identified in the EclA (Ecological Solutions 2026).
- Avoid clearance of potential bat roost trees outside the period of greatest bat activity (October to April inclusive).
- Avoid injury or death of bats during clearance of 'high risk' potential bat roost trees through implementation of the Department of Conservation's Bat Roost Protocols (DOC 2024) prior to the felling (October to April inclusive).
- Replace any confirmed roosts with artificial roost boxes.

1.3 Responsibilities and Key Contacts

This BMP has been prepared by Ecological Solutions Limited.

Coordination of specific roles, functions and responsibilities will be undertaken by Brymer Farms Limited as the holder of the consents and authorisations. Brymer Farms Limited will establish systems and standards that ensure the timely and efficient implementation of management actions and resolve any trade-offs that arise.

Appropriately qualified ecologists will hold responsibility for overseeing implementation of ecological aspects of the BMP and working with contractors to ensure delivery as set out in the plan. A Department of Conservation (DOC) certified bat ecologist will carry out roost checks and implement the bat roost protocols as outlined in Section 3.0.

Accountability for the delivery of management actions and the achievement of expected outcomes will be embedded in the resource consent conditions relating to the certification and implementation of the BMP and reporting on its outcomes.

Waikato Regional Council are responsible for certifying this BMP and monitoring compliance.

2.0 Habitat and Proposed Works

2.1 Habitat and Bat Activity

Tree species observed included a small stand of *Robinia pseudoacacia* (0.21 ha) which contained Potential Roost Features such as hollows, cavities, and knot holes. A small area of blackwood (0.18 ha), an area of *Eucalyptus* sp. and *Populus* spp. (0.37 ha) and the kānuka tree land (1.52 ha). At least thirteen stand-alone native and exotic trees were also present, with several old growth *Pinus radiata* with broken or dead branches/stems were scattered across developed grassland slopes.

During the onsite ABM survey (Ecological Solutions 2026) two long-tailed bat passes were detected on 7 November 2025 just prior to midnight. Both ABMs were located adjacent to a Wetland (one on a waratah and one within a pine tree). The passes were considered most likely to be commuting calls. The low level of activity recorded in the survey was expected

based on the results of other local surveys in close proximity to the Site.

Based on the results of other local surveys and the survey conducted to inform the EclA, Ecological Solutions (2026) concluded, it unlikely that potential roosting habitat within the Site (while present) was being used by local bats. Therefore, the trees present are currently unlikely to be of 'high' value to local bat populations. However, given the highly mobile nature of long-tailed bats, bat roost protocols are still necessary to ensure direct effects on bats are avoided.

2.2 Works Area

The extent of earthworks covers much of the Site. Whilst the kanuka treeland and one area of blackwood are unimpacted, many areas of potential bat habitat are proposed to be removed. This includes potential roosting habitat, in the form of several specimen trees and small copses of trees, such as the Eucalyptus treeland in the south of the site. Potential habitats impacted on site are summarised in Figure 2.



Figure 2: Impact of earthworks on potential bat habitat features.

3.0 Approach to Managing Effects on Bats

3.1 Project Bat Ecologist

Implementation of this BMP is to be supervised by a DOC certified competent bat specialist. The project bat ecologist (PBE) will be experienced at implementing bat management protocols and a recognised competent bat ecologist, with a minimum accreditation of Level 3.1 and 3.3 (DOC 2024).

3.2 Vegetation Clearance

3.2.1 Introduction

Vegetation removal increases the risk of death or injury to bats through removal of potentially active roosts.

The following Bat Roost Protocols (BRPs) detail measures required to mitigate direct or indirect injury and or mortality risks to bats during clearance of potential bat roost trees. These measures are aligned with DOC's Protocols for minimising the risk of felling occupied bat roosts (DOC 2024). Where they may differ in interpretation, the DOC BRP guidance document will prevail.

Implementation of the Bat Roost Protocols version 4 (DOC 2024) will ensure adverse effects on bats are avoided by:

- Identifying potential roost trees requiring management.
- Specifying timing of tree clearance.
- Undertaking pre-clearance acoustic monitoring and visual roost watch surveys where required.
- Outlining actions for detecting and encountering bats during pre-felling.
- Felling trees within the recommended window when bats are most active and environmental conditions are most suitable (i.e., between October–April inclusive).

3.2.2 Potential Bat Roost Tree Survey

A partial survey for potential bat roost trees within the Site was completed as part of the EcIA (Ecological Solutions 2026). Given the anticipated time delay between when this assessment was performed and the commencement of vegetation clearance activities, a follow up survey will be undertaken prior to vegetation clearance to identify any trees within the earthworks footprint and/ or development area) that may have developed roost features in the intervening time.

Potential bat roost trees are defined as:

Trees >15cm diameter at breast height (DBH) with potential bat roost features.

Potential bat roost features in trees include:

- Broken branches or trunks.
- Cavities.
- Cracks.
- Epiphytes.

- Flaking, peeling, or loose bark.
- Hollows.
- Knot holes.
- Shelter features (cavities/hollows) formed as a result of double leader growth.

Any trees of 15 cm DBH or greater that have not already been identified as having potential bat roost features will be surveyed by the PBE or an ecologist with competency 3.3 (DOC 2024). All trees identified as potential bat roost trees will be marked in the field, georeferenced and recorded in terms of species, diameter at breast height and type of potential bat roost feature. Details of the potential bat roost trees to be managed will be submitted to Hamilton City Council in a completion/compliance report as outlined in section 0 below.

All trees identified as having potential bat roost features and needing to be felled will be subject to implementation of the bat roost protocols for vegetation clearance outlined below, prior to felling.

3.2.3 Bat Roost Protocols

The following steps are illustrated in DOC's decision-making flow chart for tree removal in bat areas (DOC 2024) (Figure 3) and are to be undertaken within all areas identified onsite as having potential bat roost trees. These measures may be used in combination at the discretion of the PBE, but as a minimum should adhere to the steps outlined below, and in the Bat Roost Protocols (DOC 2024).

3.2.3.1 Pre-felling Bat Occupancy Checks (1 October – 30 April)

After potential bat roosts trees have been identified and demarcated, occupancy by bats will be confirmed immediately prior to felling. No tree shall be felled where there is any evidence of occupancy. Occupancy will be determined through one or more of the following methodologies to the satisfaction of the PBE or an ecologist holding relevant level 3 certification and experience implementing BRPs.

If during implementation of the below methods bats are sighted, or sign detected, or a roost (active/inactive) is confirmed, the PBE, as soon as possible, shall:

- Notify the tree felling supervisor to inform them which affected tree(s) cannot be felled due to detection of bat sign.
- Provide in writing (e.g., by email) to the construction manager, Hamilton City Council's bat ecologist, and DOC (Waikato Region), details of the results of the survey and an outline of measures for the protection or relocation of the roost tree.
- Record (including photos) any vegetation containing bat roosts, detailing the date; size, location and species of tree or other vegetation; roost type, e.g., cavity, peeling bark, broken branch; detail outlining how presence of bats was confirmed; the number of bats present; and species present, if known.

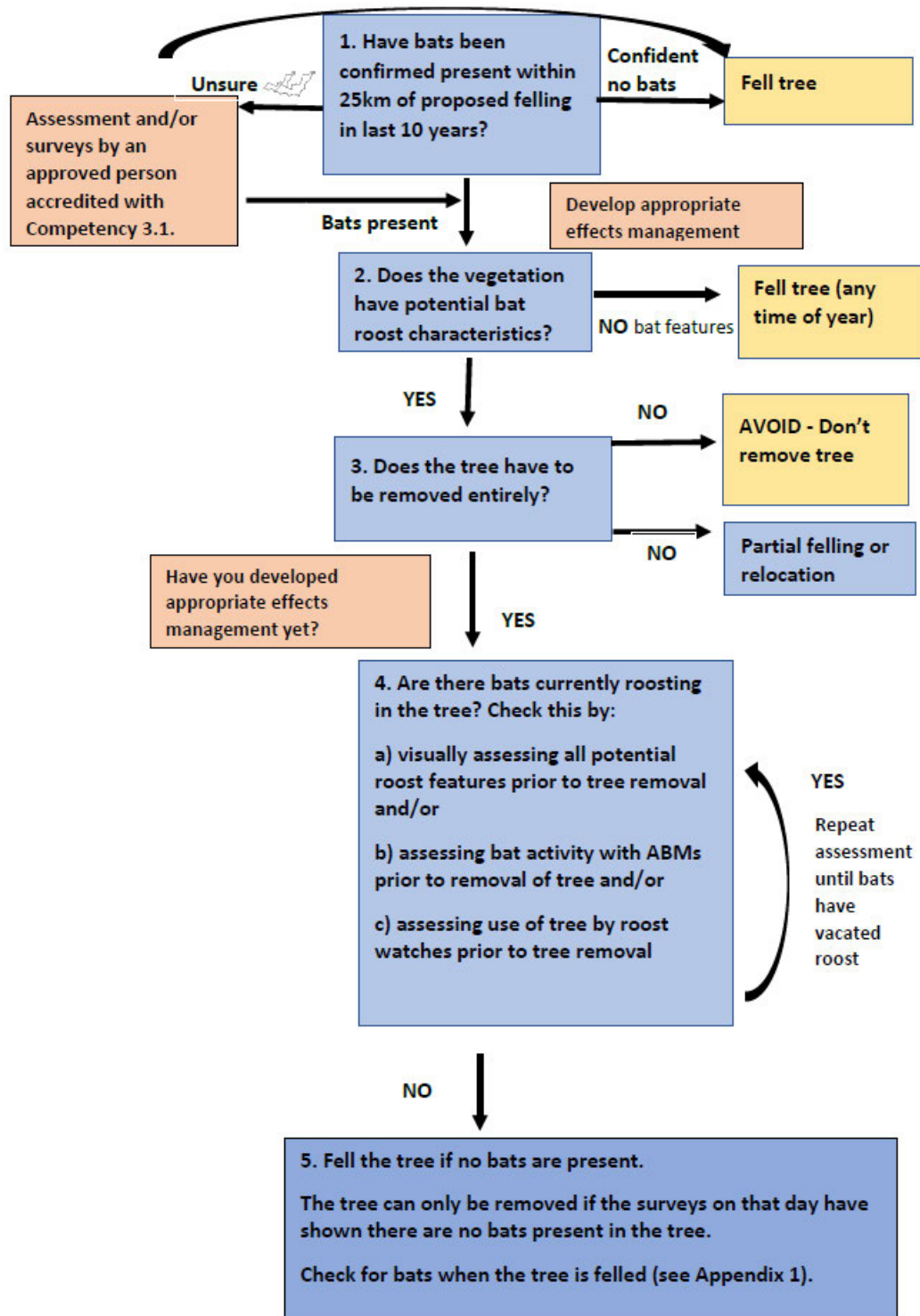


Figure 3: Tree Removal in Bat Areas Flow Chart (DOC BRP, version 4, October 2024).

3.2.3.1.1 Automatic Bat Monitor (ABM) Surveys

This section discusses the use of ABMs to confirm roost occupancy. It is noted that if bat activity is expected to occur consistently in the area, and 2 nights with zero bat passes is unlikely to be obtained, visual inspection or roost watching methods shall be used.

- ABM surveys shall use DOC AR-4/AR-5 model detectors or a professional grade full spectrum static device.
- Monitoring during a full moon should be avoided. Monitoring is to be carried out from one hour prior to dusk to one hour after dawn.
- The ABM(s) should be placed so that detection of bats is likely if they are using the potential roost/s.
- As it is possible for bats to enter or leave a roost without echolocating, or to not leave the roost for a night, monitoring will be undertaken for at least two valid survey nights immediately prior to clearance.
- ABM data is to be analysed by the PBE on the morning of proposed felling to indicate the potential for bat roosting.
- If no bats are detected, the vegetation must be removed on the day immediately following the last valid survey night following the vegetation removal protocols below, OR
- If bats are detected, re-consider again whether the tree must be felled. Where the tree requires felling, evidence that bats have vacated the roost shall be confirmed by:
 - o ABM survey must continue until no bat activity is recorded for two consecutive nights; or
 - o Visual inspections methodologies shall be carried out; or
 - o Roost watch methodologies shall be carried out.

3.2.3.1.2 Visual Inspections

Each tree with identified bat roost features may be inspected to confirm the presence of a roost. This may be subsequent or prior to ABM monitoring. Potential roost features must be visually inspected for occupancy in a manner that minimises roost disturbance. This may include inspection from the ground, by climbing or by using a scissor lift. All climbing must take place under the careful supervision of the PBE to prevent roost damage and injury to roosting bats.

1. To undertake an inspection while climbing, an arborist or trained climber will relay any potential evidence of bats (e.g. staining, cavities, guano) by way of live audio-visual equipment and/or photographs for review by a PBE prior to removal. A borescope may be required to inspect deeper cracks and hollows. The PBE will provide a toolbox workshop to all climbers on the limitations and risks of using borescopes and their potential to injure or disturb bats if not used correctly.
2. The climber(s) will be required to check all potential bat roost features:
 - **Can bats be seen** - An endoscopic camera should be available for this step and every possible corner of each potential roosting feature inspected, i.e., cavity/crack etc. Cracks, holes, and splits may lead to cavities or may be superficial. A cavity may be wet indicating no/low potential as a bat roost.
 - **Can bats be heard** - Search of tree features should be accompanied by use of a hand-held bat detector. If bats are present and not in torpor, then detection of

presence listening at 25 kHz (for social calls) and 40 kHz (for echolocation calls) may help to determine if long-tailed bats are present. It is recommended that a hand-held detector which can save recordings is used to allow for the PBE to carefully inspect any potential calls heard by climbing arborists.

- **Are there signs of bats** - Is guano present or urine staining?
3. If potential roost locations are within tree ferns or other 'delicate' vegetation, climbing will only be undertaken if it is safe to do so for the climber and if this will not damage the roost and potentially roosting bats during the time of inspection.
 4. If roosting features are too large, complex, or delicate to be sufficiently searched, then roost watches will be required.
 5. If no bats are detected, the vegetation can be removed on the day of the inspection following vegetation removal protocols below. OR
 6. If the tree is confirmed as a roost, then the tree must not be cut down until bats vacate the roost. At this point re-consider again whether the tree must be felled. Where the tree requires felling, evidence that bats have vacated the roost shall be confirmed by methods which minimise roost disturbance and a final climbing re-inspection:
 - ABM survey or roost watching methodologies must be followed to determine bats have vacated the roost; and
 - Where evidence indicates the roost is vacated, a final climbing re-inspection shall be undertaken immediately prior to felling.

3.2.3.1.3 *Roost Watches*

If absence cannot be confirmed using ABMs or visual inspections of the roost, observations of bat roosting activity will provide an alternative roost confirmation methodology. This more labour-intensive method involves watching trees to identify bats emerging from or returning to roosts.

Roost watches requires supervision from an accredited person with competency 3.2 (DOC 2024).

It should be used in combination with activity patterns as assessed by previous ABM monitoring at the site. Where watches are being done as the sole survey method, a minimum of two valid survey nights and two valid survey mornings are required at each potential roost tree. Roost watches will occur immediately prior to clearance of potential bat roosts. In this instance, the following methodology should be implemented:

Roost emergence watches

1. Each subject tree must be watched initially from no less than 30 minutes prior to sunset until it becomes too dark to see (~1 hour after sunset) by sufficient people to observe all potential exit points. Surveyors will need to employ night vision aids such as infrared/thermal cameras to all watches to extend up to 1.5 hours after sunset.
2. Ambient temperature should be >10°C and there should be no precipitation (otherwise bats may not emerge).
3. Mean wind speed during watches should not be greater than 18 km/h.
4. Observations shall be carried out close to the subject roost sites where flying bats are backlit against the sky. It may be useful to have more than one person observing potential roost sites from different angles to determine precise trees or vegetation and exit holes.

5. Hand-held bat detectors will be used to alert the ecologist(s) to the presence of bats nearby, narrowing down the potential roost site locations and allowing roosts to be confirmed.
6. An ABM will be installed for the period of the watch to ensure no bats have been missed.

Roost re-entry watches

Roost re-entry watch timing should be based on patterns of activity recorded onsite with ABMs. Where this information is not available and at minimum, watches shall begin two hours prior to official sunrise until one hour after sunrise time. The PBE shall trigger longer watches should prior ABM activity indicate potential early roost re-entry.

1. Subsequent to emergence watches described above, observers must return the next morning and watch the tree to determine whether bats return to the subject vegetation.
2. At minimum, watches shall begin two hours prior to official sunrise until one hour after sunrise time.
3. If there are strong periods of wind or rain (more than 2.5 mm of rain, wind speeds greater than 18 km/h or wind gusts greater 60 km/h) throughout the night (after emergence watch but before re-entry watch) this may impact the timings of re-entry. If this occurs, then re-entry watches may need to be undertaken again during more favourable conditions.
4. Observations shall be carried out close to potential roost sites where flying bats are backlit against the sky. It may be useful to have more than one person observing potential roost sites from different angles to determine precise trees or vegetation and exit holes.
5. Hand-held bat detectors will be used to alert the ecologist(s) to the presence of bats nearby, narrowing down the potential roost site locations and allowing roosts to be confirmed; and
6. Infra-red and /or thermal cameras will be used as twilight will restrict observers to only see bats up to one hour prior to sunrise.
7. If no bats are detected during emergence and re-entry watches, the vegetation can be removed on the day of the last re-entry watch following the vegetation removal protocols below, OR
8. If the tree is confirmed as a roost, then the tree must not be cut down until bats vacate the roost. At this point re-consider again whether the tree must be felled. Where the tree requires felling, evidence that bats have vacated the roost shall be confirmed by methods which minimize roost disturbance and a final climbing re-inspection:
9. If the tree is confirmed as a roost, then the tree must not be cut down until bats vacate the roost. At this point re-consider again whether the tree must be felled. Where clearance is required, confirmation of bat absence is required over two consecutive nights. The PBE shall consider whether it is appropriate to continue watches or cease and recommence watches one week later over an additional two nights to increase the likelihood bats have shifted roosts. It is unlikely that ABMs or visual inspections are appropriate where roost watches are used, but if so, these shall be considered by the PBE.

3.2.3.2 Vegetation Removal

The following methodologies shall be undertaken following the implementation of potential bat roost tree identification and pre-felling occupancy checks. Vegetation clearance will ONLY occur if trees have been assessed as having no potential for bat roosting or there is sufficient evidence that bats are not occupying potential roost trees. This determination must be made by the PBE or a DOC approved ecologist with relevant Competency (DOC 2024).

3.2.3.2.1 *Trees with No Bat Roosting Potential*

Any tree that is identified as having no potential for bat roosting (i.e., $\leq 14\text{cm}$ DBH or $\geq 15\text{cm}$ DBH with no roosting features) can be removed at any time of year. The removal of these trees needs to be undertaken in a manner that does not disturb any potential roost trees which may be in its vicinity. A minimum radius of 25m should be established around potential bat roosts during clearance of trees with no roosting potential to avoid disturbance to these trees if bats are roosting. Removal of these trees must occur within 6 months of the original roost identification survey, if this does not occur these trees may need to be assessed again in case roost features have developed over time.

3.2.3.2.2 *Potential Bat Roost Trees*

1. Trees will only be felled from 1 October to 30 April inclusive.
2. Vegetation removal must take place on the day of surveys that confirm that there are no bats present.
3. If potential bat roosts are confirmed from emergence and roost re-entry watches, these trees will not be felled and a minimum 25m no works radius will be set around them to prevent disturbance.
4. The PBE will be on-site to supervise the removal of all potential bat roost trees.
5. If safe to do so, the PBE will immediately inspect felled potential roost trees for signs of bats. To assist in this, the PBE will use a handheld bat detector and endoscope to scan and inspect roosting features to detect injured or stunned bats.
6. If bat activity is observed during vegetation clearance, then clearance will stop immediately and will not commence until further monitoring confirms that the bats have abandoned the roost. Trees and vegetation shall be marked, and site staff briefed immediately to indicate a roost is present.

3.2.3.3 Bat Injury or Mortality

Implementation of the above methods aim to directly mitigate the risk of bats being injured or killed during tree felling. Unforeseen circumstances may still however lead to bats being injured or killed following the fulfilment of these protocols. In this instance, the following procedures will be implemented and supported by the PBE.

The following procedures should also be followed if tree felling contractors find bats while felling a tree not identified as a potential bat roost, the PBE and DOC must be contacted immediately if this occurs.

1. If bats are found on the ground or in the tree once felled, all further felling work must immediately cease. The felled tree must be thoroughly inspected for further bats. Felling can only re-start once permission has been obtained from the PBE after consultation with DOC.
2. If any bats are found on the ground or in the tree once felled, place the bat in a cloth bag in a dark, quiet place at ambient (or slightly warmer) temperature and take to the veterinarian at Hamilton Zoo Native Wildlife Rehabilitation team (07 838

6720 – 183 Brymer Road, Hamilton) for assessment as soon as possible. A maximum of two bats should be kept in one bag. After delivering the bat to the vet, contact DOC (0800 DOC HOT, 0800 362 468). Bat handling should ideally occur under the supervision of the PBE. However, if bats are encountered while the PBE is not present, animal welfare should take precedence and bats can be handled in line with the guidance here.

3. Bats must be kept for three days under observation and must be kept out of torpor for this time. The PBE and vet must consult with DOC to consider appropriate rehabilitation options where suffering is minimal and chances of return to the wild are high.
4. Any dead bats found must be handed to DOC.
5. An incident investigation report will be prepared by the PBE following the discovery of the injured/dead bats. At minimum, the report shall provide details into the methods used to mitigate the event, the number of animals found injured or dead, the fate of the animals following vet care, and any additional mitigation measures that shall be undertaken prior to further tree removal. This report shall be submitted to DOC and Hamilton City Council within one week of the discovery of the animals.

3.3 Artificial Bat Roosts

Whilst implementation of the bat roost protocols outlined in the above sections should prevent roosts being removed whilst bats are present, the removal of roosts still constitutes a loss of habitat, as it is possible bats could have returned to reuse the roost, or the roost could have been used by other bats.

Any confirmed roosts removed during the development of the site will be replaced with artificial roost boxes. Confirmed roosts are any potential roost feature where there is evidence of recent bat activity, including guano in or outside the roost, or bats being found during the implementation of Bat Roost Protocols.

Bat boxes will be Kent bat boxes, and installation will be supervised by the PBE. Bat boxes will be installed on suitably sized trees within the Site, no more than one year from the removal of confirmed roosts.

There is limited research into the effectiveness of different bat box designs in New Zealand. Uptake of bat boxes by bats is generally low, as Long tailed bats are known to select their roosts based on specific microclimate (O'Sullivan 2026, Robinson et al 2023). For this reason, bat boxes will be provisions on a 5:1 basis for any confirmed roosts removed.

To maximise the likelihood that bats will use the bat boxes:

- The bat boxes will be installed in a variety of locations and trees. In particular, facing north-east and south-west. This will create a variety of microclimates in the boxes, suitable for male and female bats (DOC 2025).
- Bat box installation will be prioritised on the interior of remnant stands of trees, rather than the edge, as research shows a preference for sheltered bat boxes among long tailed bats (Robinson et al 2023).
- All bat boxes should receive shade for at least part of the day, to lower the risk of overheating in the boxes. A variety of bat box locations with differing amounts of shade will be ideal. Lighter coloured boxes will also aid with reducing heat absorption, as well as use of multi-chambered or longer boxes, boxes with external insulation and an internal heat storage layer or constructing boxes from more insulative materials (DOC 2025).

Bat boxes will be installed in accordance with the latest New Zealand Bat Recovery Group Advice Note (DOC 2025), and therefore will:

- Be placed >3 m from the ground.
- Where feasible, roost boxes will be installed in a manner that will allow for roost occupancy checks to be undertaken from the ground with the use of binoculars and/or night vision aids.
- Include pest banding to prevent access to roosts by predators, such as cats. This will include removal of nearby tree branches where needed, to prevent their use as “bridges” into the roost. The banding should be c. 60 cm wide and fastened loosely to allow for tree growth. All predator bands will be installed under the direct supervision of the PBE.

Bat boxes will be actively maintained for 10 years following installation. This ten-year window allows time for trees planted on site to develop natural bat roost features to compensate for the short-term loss of features on Site. This maintenance will be undertaken in accordance with the latest New Zealand Bat Recovery Group Advice Note (Department of Conservation 2025), and will include:

- Annual checks for occupancy.
- Twice annual maintenance of predator proof banding on host trees.
- Annual removal of non-bat species (e.g. insects), and bird nesting material. Note however, that active nesting birds cannot be removed without a Wildlife Act Authorisation.
- Twice annual checks that the boxes remain secure in host trees.
- Repairs to boxes or artificial roosts will only be undertaken when bats are known to be absent from the structures.

4.0 Reporting and Closure

A compliance monitoring report will be prepared following the completion of each episode of vegetation removal which includes:

- Confirmation that vegetation removal was undertaken in accordance with the Bat Roost Protocols (DOC 2024) and associated consent conditions.
- Details of the survey and monitoring information collected prior to the removal of high-risk bat roost trees (photos, date, size (db), location, species, roost type, methodology used, number of bats (if present) and bat species).

The compliance monitoring report will also be updated annually in the event that construction of bat boxes is necessary (i.e., confirmed roost features are found). This will detail all construction and maintenance undertaken on bat boxes.

Bat management may be considered closed after implementation of bat roost protocols is complete, if no confirmed roosts are found. If confirmed roost are found, bat management may be considered closed after 10 years of maintenance on erected bat boxes.

5.0 References

- Department of Conservation 2024. Protocols for minimising the risk of felling occupied bat roosts (Bat Roost Protocols): Version 4, DOC Bat Recovery Group, October 2024.
- Department of Conservation, 2025. New Zealand Bat Recovery Group Advice Note – The Use of Artificial Bat Roosts.
- Ecological Solutions. 2026. Brymer Farms Development: Ecological Impact Assessment. Prepared for Brymer Farms Limited. August 2026.
- Ministry for the Environment (MfE) 2025. National Policy Statement for Indigenous Biodiversity 2020, Amended December 2025.
- O'Donnell, C.F.J., Borkin, K.M., Christie, J., Davidson-Watts, I., Dennis, G., Pryde, M., Michel, P., 2022. Conservation status of bats in Aotearoa New Zealand, 2022.
- O'Sullivan, A. 2026. Microclimate conditions of bat boxes occupied by New Zealand's native long-tailed bat (*Chalinolobus tuberculatus*) in Hamilton City. University of Waikato Research Commons
- Robinson, H., Ling, N., Tempero, G.W., 2024. Occupation of artificial roosts by long-tailed bats (*Chalinolobus tuberculatus*) in Hamilton City, New Zealand. New Zealand Journal of Zoology 51, 186–199. <https://doi.org/10.1080/03014223.2023.2249417>

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APPENDIX A

ABM Placement Details

ABM Number	Tree Species/Placement Method
57	Unid sp.
59	<i>Pinus radiata</i>
61	<i>Ginkgo</i> sp.
67	<i>Populus robusta</i>
70	<i>Pinus radiata</i>
71	<i>Citrus</i> × <i>sinensis</i>
74	<i>Alnus</i> sp.
76	<i>Crataegus</i> sp.
80	<i>Kunzea ericoides</i>
83	Waratah
84	Waratah
86	<i>Crataegus</i> sp.
88	<i>Crataegus</i> sp.
89	Waratah
92	<i>Populus robusta</i> Inside Te Kooti park, dead
93	<i>Leptospermum scoparium</i>
101	Unid sp.
103	<i>Eucalyptus</i> sp.
109	<i>Robin pseudoacacia</i>
110	<i>Populus robusta</i>

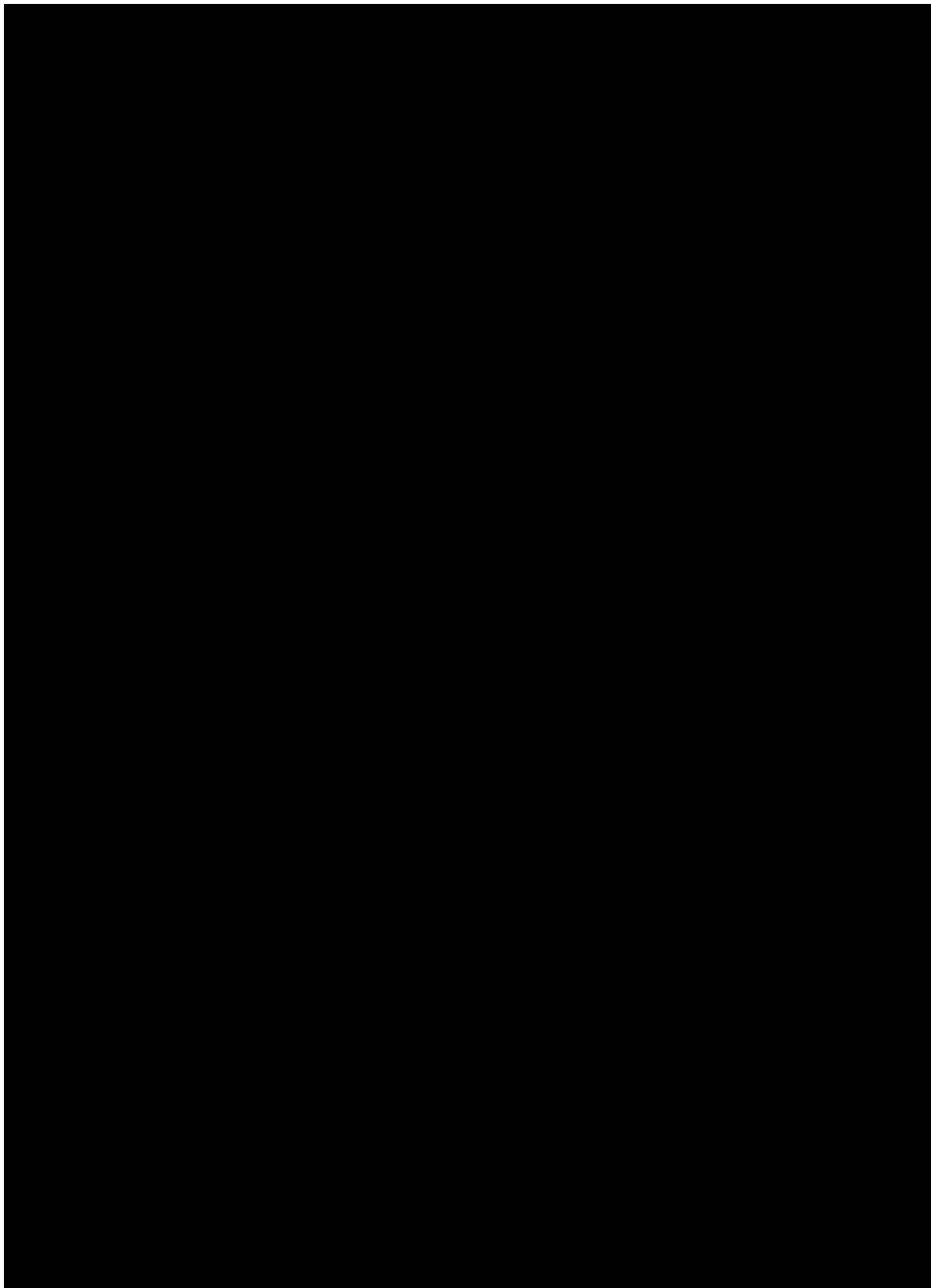


Figure 4: ABM locations and recorded bat activity.

APPENDIX H

Fish Management Plan

DRAFT

ecoLogical Solutions

Environmental Consultants



August 2026

Brymer Farms Development Fish Management Plan

Submitted to: Brymer Farms Limited



water



fauna



flora



land

Quality Assurance

This report has been prepared and reviewed by the following:

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Status: Draftv0

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1.0 Introduction

1.1 Background

Brymer Farms Limited are applying under the Fast Track Approvals Act 2024 (FTAA) for consent to undertake a residential development called Brymer Farms ('the Project'). The Project area encompasses 81 ha of rural land on the western side of Hamilton City, located between Brymer Road and Whatawhata Road (584 Whatawhata Rd) ('the Site') (Figure 1).

This Fish Management Plan (FMP) has been prepared along with a suite of other fauna management plans for the substantive application that will be lodged with the Environmental Protection Agency (EPA) for consideration by an expert panel. This FMP is supplementary to the Ecological Impact Assessment (EclA) prepared by Ecological Solutions (Ecological Solutions 2026).

The Brymer Farms development will result in the modification of natural watercourses due to replacement or construction of new culverts and the removal and/or modification of modified watercourses and artificial drains which provide habitat to indigenous fish. This FMP outlines the methodology for how native fish will be captured and relocated from watercourses prior to and during works including responsibilities, methodology, relocation sites, and reporting.

1.2 Responsibilities

This FMP has been prepared by Ecological Solutions Ltd.

Brymer Farms Limited as the holder of the consents is responsible for ensuring the FMP is implemented and that all results are reported to the appropriate entities (e.g., WRC, Waikato Tainui).

Appropriately qualified ecologists will hold responsibility for implementation of the FMP, working with contractors to ensure delivery as set out in the plan and upload of data to the New Zealand Freshwater Fish Database.

The Construction Site Manager is responsible for earthworks, construction, diversion, dewatering, and reclamation/infilling. These responsibilities also include the management of environmental impacts and their own personal health and safety.

Waikato Regional Council are responsible for certifying this FMP and monitoring compliance.

1.3 Permits

Fish relocations are to be carried out under the relevant permits including:

- A special permit from the Ministry of Primary Industries to capture fish using methods outside of amateur fishing regulations.
- An approval to transfer aquatic life under either section 26ZM(2) or 26ZM(3) of the Conservation Act 1987. Section 26ZM(2) is administered by the Ministry of Primary Industries in situations where a species is being translocated to locations where it already occurs while Section 26ZM(3) is administered by the Department of Conservation authorising the translocation of species to locations where that species is absent.

2.0 Habitat and Proposed Works

2.1 Habitat and Fish Present

Aquatic habitat in artificial drains and modified watercourses within the Site provided very poor-quality habitat for native fish (e.g., uniform, poor cover/shelter). No native fish were captured during trapping surveys and one koi carp was observed in an unnamed drain.

Environmental DNA samples indicated the presence of longfin eel (*Anguilla dieffenbachii*), shortfin eel (*Anguilla australis*), rudd (*Scardinius erythrophthalmus*), goldfish (*Carassius auratus*) and gambusia (*Gambusia affinis*). Survey results indicate the fish fauna within the Site is likely to be limited by poor water quality, poor habitat conditions, and possibly downstream barriers to migration restricting access.

2.2 Proposed Works

The proposed works are shown on Figure 1 and include:

- Recontouring and planting artificial drains which currently border the northern extent of a flat peat area where the Site abuts residential housing.
- Removal of c. 133 m of modified ephemeral watercourse.
- Removal of c. 8,374 m of artificial drains.
- Installation of three box culverts and three circular culverts along modified natural watercourses.



Figure 1: The Site and proposed streamworks.

3.0 Fish Relocation Methodology

3.1 Introduction

The staging of earthworks means pre-works fish relocations are able to be carried out in shorter manageable sections prior to works. This means impact reaches will be more effectively fished prior to and during earthworks.

Longer sections of the watercourse to fish will be divided into shorter reaches, if required, to make them more manageable to fish effectively. If a reach is divided into sub-sections, exclusion nets would be installed and maintained over the duration of fishing and until it can be assured that fish will not move back into the reach. The decision to divide a reach into sub-reaches using exclusion nets will be determined by the ecologist based on the size of the watercourse and with consideration of the number of fish captured or likely number of fish present.

The staged earthworks approach and implementing the option to divide longer reaches into shorter reaches (using exclusion nets) will allow a more focused fishing effort and reduce the likelihood of missing fish.

Fish relocations will be implemented in the following phases:

- Stage 1: Pre-works fish relocations.
- Stage 2: Dewatering fish relocations.
- Stage 3: Excavation fish relocations (if required).

3.2 Isolation of the Capture Area

Fish barriers will be placed at the downstream extent of the capture areas and upstream if there is habitat present above the works area. The purpose of these barriers is to isolate discrete reaches within the capture area to prevent fish from moving between them. This will help to maximise the efficiency of the capture and relocation programme.

The barriers will be constructed from heavy-duty shade cloth (approximately 3 mm mesh) held in place by steel waratahs driven into the bank and watercourse bed to block fish passage while still allowing water to flow through. The barriers will be constructed so that they extend above the normal water level to reduce the risk of them becoming overtopped during rain events.

The fish barriers will remain in place until a more permanent bund is in place or the stream works have been completed to prevent fish from moving into the area of works. For this reason, the barriers will be placed as close to the commencement of the stream works as possible to minimise the length of time that they will be required to be in place.

High flow events or having the mesh clogged with debris may result in overtopping or breaching of the barriers, which will reduce their effectiveness. Therefore, all barriers will be checked daily by the contractor for intactness for the duration of the fish capture and relocation programme.

The majority of the drains to be reclaimed are connected to the highly modified permanent watercourse flowing from east to west at the southern boundary of the Site. To reduce the risk of fish reestablishing in the drains in between the various stages of reclamation, the

isolation of these drains should be carried out from south to north. In this way the link to the main watercourse will be detached serving as a barrier to fish passage.

3.3 Stage 1: Pre-Works Relocations

Fyke Netting

Pre-works netting will be undertaken within each works reach using fine-mesh fyke nets, spaced at approximately 10 m intervals where water depth and vegetation allow. The project ecologist will assess the suitability of the watercourses for fyke nets and if they cannot be used the pre-works relocations will move to electric fishing.

Nets will be baited, set overnight, and checked the following morning. If dissolved oxygen levels are low, nets will be set with an air gap to allow fish to surface and gulp air. Netting will continue over consecutive nights for a minimum of two nights until the mean catch rate within a salvage reach falls to <1 fish/trap/night. Any fish captured will be handled as per protocols set out in the Section 3.7 (Fish Capture and Handling).

If the required catch rate cannot be achieved after a reasonable amount of time and effort, Waikato Regional Council will be notified and consideration given to halting trapping and moving onto the next stage.

Electric Fishing

Once the trapping and/or netting in the impact section has reached the target catch rate, the section will be electric fished as a final check that fish have been removed. Electric fishing will involve multiple passes carried out in short sections to maximise fishing effort and to ensure as many fish as possible are captured prior to diversion.

Once the ecologist is satisfied that electric fishing has captured as many fish as possible, the fished reach can be isolated (e.g., banded) and Stage 2 of fish relocations can commence.

3.4 Stage 2: Dewatering Relocations

Experience has shown that fish (e.g., mostly eels) are likely to remain in drains even after netting/trapping and intensive electric fishing. It is proposed that any remaining fish will be salvaged during the dewatering stage when water is diverted into temporary diversion channels and the impact section isolated.

A suitably qualified and experienced ecologist will be onsite during the dewatering. Any fish observed moving within the channel during the dewatering stage when water levels are lowered will be captured using hand-held nets and/or the potential use of an electric fishing machine if it is safe to do so. Any fish observed will be captured using hand-held nets and handled as per protocols set out in Section 3.7 (Fish Capture and Handling).

3.5 Stage 3: Excavation Relocations

After dewatering, there is still potential for eels to be present within the channel as they can burrow into drain edges or the soft-bottomed silt/mud bed. A suitably qualified and experienced ecologist will be onsite during the excavation. During the excavation stage, any material removed from the channel and deposited into designated holding areas will be

inspected by the ecologist. Any fish observed will be captured using hand-held nets and handled as per protocols set out in Section 3.7 (Fish Capture and Handling) below.

3.6 Unexpected Discoveries

If during the course of works, fish are discovered by the contractor, they shall contact the project ecologist to determine an appropriate course of action. The action taken will depend on the species and number of fish present. Any fish captured will be handled in accordance with Section 3.7 (Fish Capture and Handling) below.

3.7 Fish Capture and Handling

The following procedures will be followed for the transfer of fish.

- All fish captured will be immediately transferred into a clean bucket or fish bin of water from the existing habitat and placed in a well-shaded location. Water may be collected from the release site to ensure it is cool and of good quality.
- Multiple fish bins will be used if there are large numbers of fish captured to reduce stress on captured fish.
- Battery powered aquarium pumps will be used to maintain dissolved oxygen in fish bins, if required.
- Fish will be checked to ensure that all aquatic plant material is removed prior to transfer into the bucket/fish bin.
- Native fish will be monitored and released within two hours of capture if water quality is poor and fish are displaying signs of stress.
- Pest fish will be humanely euthanised.
- If large numbers of eels are collected, immediately prior to release, eels will be transferred from fish bins into catch bags, to enable safer transport (i.e., carrying by hand) from the vehicle to the release site.

3.8 Fish Release Locations

The following outlines recommended fish relocation sites:

- Fish release sites will be located within the Brymer Farms Site at two locations (Figure 2) to ensure biodiversity values are retained.
- After fish capture, consideration will be given to the number of fish captured, life stage of the captured fish, stocking rates, and proximity of the release site to the capture location to minimise stress on the released fish.

3.9 Culvert Design and Installation

All culverts and crossings at the Site will be designed, installed, and monitored in accordance with the National Environmental Standards for Freshwater (MfE 2020) and the New Zealand Fish Passage Guidelines (Franklin et al., 2024). Where culverts are to be installed, the site will be isolated and fish removed prior to instream works in accordance with the methods described above.

3.10 Reporting

Ecological Solutions will report the results of the fish relocation work to the consent holder within one month of completion. It is the consent holder's responsibility to report the Waikato Regional Council. Results will include the following information:

- Fish species caught.
- Number caught.
- Health/condition.
- Location of capture.
- Location of release.

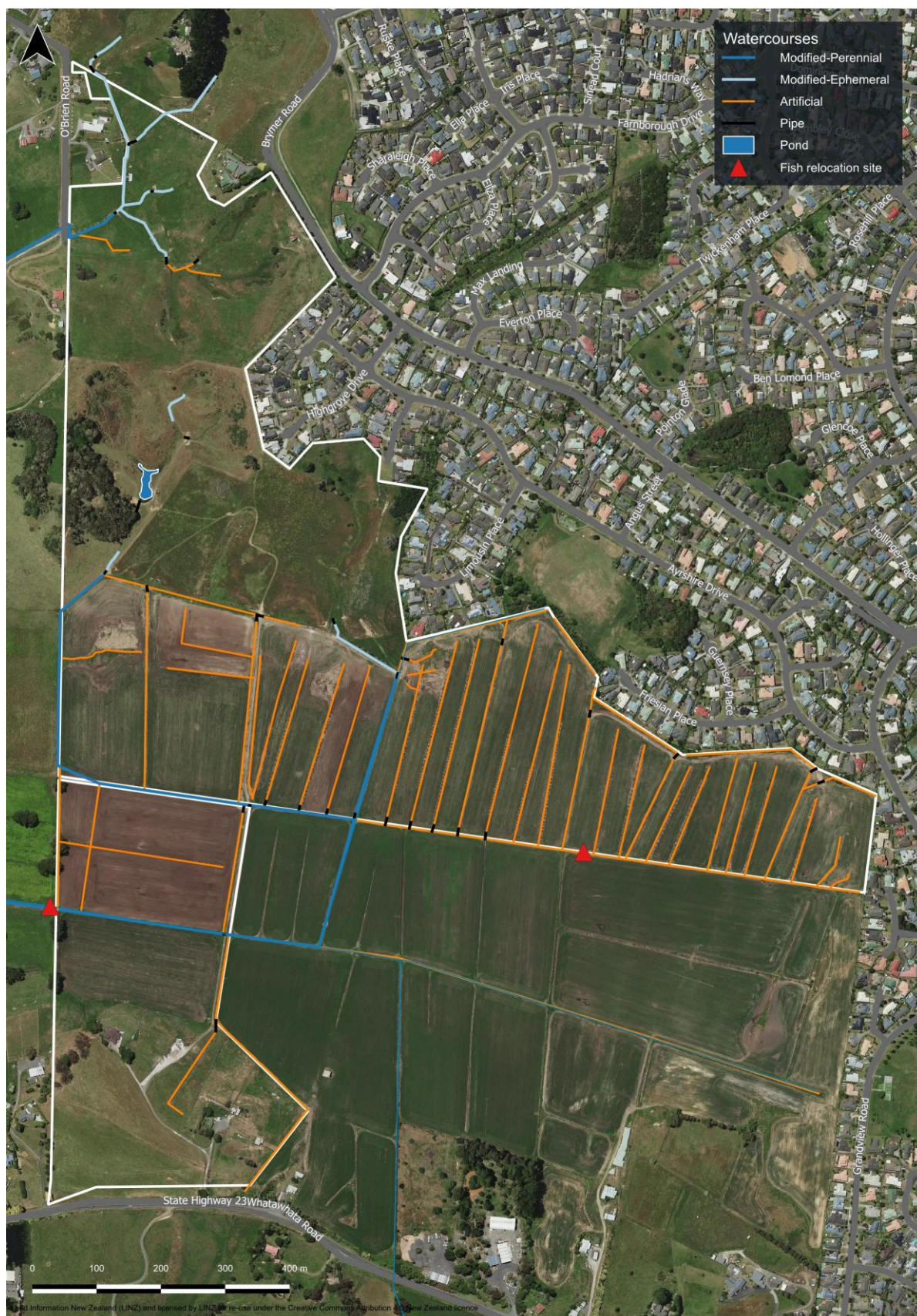


Figure 2: Location of fish relocation sites.

4.0 References

Ecological Solutions 2026. Brymer Farms Development Ecological Impact Assessment. Submitted to Brymer Farms Limited.

Franklin P., Baker B., Gee E., Bowie S., Melchior M., Egan E., Aghazadegan L., Vojdovsky E. New Zealand Fish Passage Guidelines. Version 2.0. Prepared for Ministry for the Environment. June 2024.

MfE 2020. Resource Management (National Environmental Standards for Freshwater) Regulations 2020. Version as at 15 January 2026.

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APPENDIX I

Biodiversity Compensation Model Data

Model Inputs				
Input descriptors		Input data		
Project/reference name		Brymer		
Biodiversity type		Wetland		
Technical expert(s) input		RB		
Benchmark		5		
How many habitat types OR sites are impacted		1		
Number of proposed compensation actions		3		
Net gain target		10%		
Habitat/Site Impact(s)		Harrogate		
Impact risk contingency:		2		
Impact uncertainty contingency:		1		
Areal extent of impact (ha):		0.514		
Value score prior to impact:		2.75		
Value score after impact:		0.001		
Compensation Action(s)		Wetland creation	Created planting and weed control buffer	Existing planting and pest control
Discount rate:		3.0%	3.0%	3.0%
Finite end point (years):		1	15	15
Compensation confidence contingency:		3	2	2
Areal extent (ha) of compensation type:		0.76	0.76	1.1973
Value score prior to compensation:		0.001	1	2
Value score after compensation:		1	2.7	3

Model outputs				
Impact score	Total impact score	Harrogate		
	-0.31156	-0.31156		
Compensation score	Total compensation score	Wetland creation	Created planting and weed control buffer	Existing planting and pest control
	0.35578	0.09214	0.13683	0.12680
Net gain outcome		14.2%		

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Model Inputs				
Input descriptors	Input data			
Project/reference name	Brymer			
Biodiversity type	Stream			
Technical expert(s) input	RB			
Benchmark	5			
How many habitat types OR sites are impacted	3			
Number of proposed compensation actions	4			
Net gain target	10%			
Habitat/Site Impact(s)	W2a	Culverts	Rock rip rap	
Impact risk contingency:	2	2	2	
Impact uncertainty contingency:	1	1	1	
Areal extent of impact (ha):	0.0065	0.01375	0.0074	
Value score prior to impact:	2	2	2	
Value score after impact:	0.001	0.5	0.75	
Compensation Action(s)	Creation new channel (0.5 x 1.24 m)	Res (E- 0.75m wide)	Res (P= 1 m wide)	Res (P= 1m wide one side)
Discount rate:	3.0%	3.0%	3.0%	3.0%
Finite end point (years):	15	15	15	15
Compensation confidence contingency:	3	2	2	1
Areal extent (ha) of compensation type:	0.0067	0.02785	0.06	0.0647
Value score prior to compensation:	0.001	1	1	1
Value score after compensation:	1.75	2.2	2	1.5

Model outputs					
	Total impact score	W2a	Culverts	Rock rip rap	
Impact score	-0.00945	-0.00287	-0.00455	-0.00204	
	Total compensation score	Creation New channel (0.5 x 1.24 m)	Res (E- 0.75m wide)	Res (P= 1 m wide)	Res (P= 1m wide one side)
Compensation score	0.01468	0.00094	0.00354	0.00635	0.00384
Net gain outcome	55.3%				

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