

BEFORE THE INDEPENDENT HEARINGS PANEL

PROPOSED WAIKATO DISTRICT PLAN (STAGE 1)

Under the Resource Management Act 1991 (**RMA**)

In the matter of hearing submissions and further submissions on the Proposed
Waikato District Plan (Stage 1) – **Hearing 25 Rezoning**

By Koning Family Trust and Martin Koning (Submitter #658,
Further Submitter #1329)

**Statement of evidence by Dr Mark Bellingham, Ecology New Zealand
(Ecology)**

Dated: January 2021

Introduction

1. This statement of ecological evidence on behalf of the Koning Family Trust and Martin Koning is in relation to the zoning of their landholdings under the Proposed Waikato District Plan. The Koning Family Trust and Martin Koning are a submitter (S658) and further submitter (FS1329). The Koning Family Trust and Martin Koning are referred to collectively as **Koning** in this evidence.

Qualifications and Experience

2. My full name is Robert Mark Bellingham.
3. I am a Principal Ecologist with Ecology New Zealand Ltd.
4. I am an accredited Ecology Specialist with the EIANZ's¹ Certified Environmental Practitioner Scheme and I am currently the President of the New Zealand Chapter of EIANZ.
5. I hold a PhD in Conservation Planning from Auckland University and I am a full member of the New Zealand Planning Institute. I have been a practicing ecological and planning consultant for over 25 years. My practice area has mainly been in the upper North Island, New Zealand.
6. I have appeared as an ecologist and planner before the Planning Tribunal/Environment Court and council plan reviews since 1986. The most recent major cases where I have appeared have been before the Independent Hearings Panel for the Auckland Unitary Plan, and then the Environment Court appeals on Rural Subdivision in the Auckland Unitary Plan.
7. I have also lectured in Environmental Planning at Auckland and Massey Universities. I have served on the Ministerial Advisory Committees for the

¹ Environment Institute of Australia and New Zealand

Review of Protected Area Legislation (1989-90) Oceans Policy (2002-4), and as an Auckland Regional Councillor.

Code of Conduct

8. I have read and agree to comply with the Environment Court's Expert Witness Code of Conduct (Consolidated Practice Note 2014). This evidence is within my area of expertise, except where I state that I am relying on the evidence of other experts. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

Scope of evidence

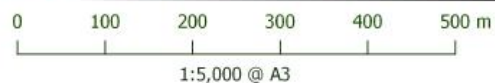
9. In my evidence I address the following issues:
- a) The ecological values of the Koning property in Raglan; and
 - b) Suitability of the property for rezoning for residential development.

Ecological values of the Koning Family Trust property

11. I have reviewed an ecological assessment of the Koning property at 339 Wainui Road, 393 Wainui Road, 146 Te Hutewai Road and 145-151 Te Hutewai Road, Raglan
- a) An Ecological Impact Assessment of the property by a team of Ecology New Zealand ecologists in 2018;
 - b) A native bat survey in November 2020 by an Ecology New Zealand ecologist; and
 - c) Planning evidence from Aidan Kirkby-McLeod, Bloxam Burnett & Olliver.
12. I am familiar with the Raglan locality and I have visited the site at 393 Wainui Road and 146 Te Hutewai Road, which reaches from the golf course across to the urban and peri-urban development on Wainui Road.
13. The area of the site proposed for rezoning follows a ridgeline from Te Hutewai Road in the east to Ahiawa Stream in the west of the property. The land cover is mainly improved dairy pasture. The site is drained by five small intermittent

streams of which four form part of the Ahiawa Stream catchment, a tributary of the wider Wainui Stream catchment, with the fifth flowing into the Joys Point Inlet as an unnamed stream system. The Ahiawa Stream generally forms the western property boundary and is outside the areas proposed for residential development.

14. The property is landlocked but close to the coast with Ngarunui Beach less than 1km to the west and the Wainui Inlet of the Raglan Harbour approximately 750m to the east. Raglan township is approximately 900m to the north-east of the site with the town's wastewater treatment plant lying adjacent to the northern boundary of the property. South of the property is predominately a continuation of dairy farmland, although a recycling centre, set amongst native bush, exists adjacent to the site's south-eastern boundary.
15. No significant natural areas (SNA's) were identified on-site, nor are identified in the Waikato Regional Policy Statement or Operative or Proposed District Plans. Indigenous vegetation covers about 1% (0.65ha) of the total area proposed for residential zoning. This vegetation is confined to a small wetland and indigenous planting along catchment 2, as identified in the below figure.



Sources: LINZ NZ Property Titles, LINZ Waikato 0.5m Rural Aerial Photos 2012-2013

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146 Te Hutewai Road, Raglan
Opportunities and Constraints Assessment

INDICATIVE ONLY

Date: 03 October 2018 | Revision: 2

Plan prepared for Koning Family Trust by Ecology New Zealand Limited
 Author: adam.field@ecologynz.nz

16. The birdlife on the site at the time of the site visit in 2020 was predominantly introduced birds with some native bird species. Indigenous bird habitat on the site is very low quality and could be enhanced with more riparian planting along stream courses, as part of a development plan.
17. No native reptiles were found on-site, although copper skink was located in low numbers under exotic vegetation near the treatment pond area in 2018. Copper skink are not a threatened species. The riparian vegetation on the site has some potential foraging habitat for skinks.
18. Ecology New Zealand's bat survey over 11 nights in November 2020 detected only one bat pass at an automated bat monitoring station along the vegetation corridor along Ahiawa Stream. The bat activity detected did not indicate feeding activity or roosting activity and was restricted to a vegetated corridor on the site's western boundary. The Ahiawa Stream corridor, parallel to Wainui Road, is a possible flightpath. This is not proposed for development and is predominantly exotic tree vegetation.
19. Further reptile surveys would be needed at subdivision resource consent stage to confirm the presence or not of reptiles, and the suitability of potential habitat and possible translocation within the site.
20. Ahiawa Stream is likely to be a migratory corridor for a range of native fish species that have been recorded upstream, including species of conservation concern. As such any access over this stream will need to be designed in a way that will not impact on fish passage.

Summary: Suitability for rezoning for residential development

21. I consider that the Koning property at 339 Wainui Road, 393 Wainui Road, 146 Te Hutewai Road and 145-151 Te Hutewai Road, Raglan could be designed in a manner to avoid key ecological features and allow for residential development.
22. The site is large, and the areas proposed for residential development provide significant scope for protection and enhancement of ecological values on the property. I support the recommendations and opportunities described on page 11 of the Koning Family Trust Rezoning document.
23. I note that recommendation 6 – further assessment of bat habitat on the site has been undertaken and minimal bat activity was detected. The enhancement of this riparian corridor along the Ahiawa Stream could enhance bat use of this feature in the future.
24. I understand the ecological opportunities proposed would be addressed at the subdivision consent stage of the process, when more detailed design would be presented to council, including:
 - a) Restoration of existing intermittent streams, permanent streams and wetland areas through pest plant and animal control and native infill planting.
 - b) Further protection of existing watercourses with riparian buffer planting along the edge of intermittent streams, permanent streams, and wetland areas.
 - c) Native revegetation along the stream at the eastern end of the site (Catchment 2).
 - d) Pest management planning, as well as the revegetation providing additional benefit by improving lizard habitat and protection from predators.



Dr Mark Bellingham

Principal Ecologist – Ecology New Zealand Ltd

MNZPI, PhD (Planning), CEnvP (Ecology Specialist)



Attachment 1

Ecology New Zealand Opportunities and Constraints Assessment for 146 Te Hutewai Road, dated September 2018

Opportunities & Constraints Assessment

146 Te Hutewai Road
Prepared for Bloxam, Burnett & Olliver
19 September 2018



ECOLOGY
NEW ZEALAND

OPPORTUNITIES & CONSTRAINTS ASSESSMENT

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Document Sign Off

Author(s): Adam Field
Senior Ecologist
Ecology New Zealand Limited



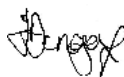
Marc Choromanski
Senior Ecologist
Ecology New Zealand Limited



Connor Whiteley
Senior Ecologist
Ecology New Zealand Limited



Review: Jasmine Dungey
Ecologist
Ecology New Zealand Limited



1.0 INTRODUCTION

1.1 Proposed Activity

The Koning Family Trust is proposing a rezone of approximately 62 ha of a 92 ha property, located at 146 Te Hutewai Road, Raglan. The rezone will be proposed via a submission to the recently notified Waikato District Plan. The plan change will seek to alter the property from a rural zone to enable residential development. The remaining 30 ha will remain undeveloped.

1.2 Report

This report¹, prepared by Ecology New Zealand Limited (ENZL) for Bloxam Burnett and Olliver ('the client'), presents a high-level Ecological Opportunities and Constraints Assessment (OCA) for the proposed activity. Specifically, this report will aim to assess any potential and actual ecological constraints to the proposed rezone and also advise on any ecological opportunities that could make the submission more attractive for consideration / approval.

1.3 Site Location, Description and Ecological Context

The site is located at 146 Te Hutewai Road, Raglan and is split across both Raglan and Kawhia Ecological Districts within the Tainui Ecological Region. The property is 92 ha in total size and currently operating as a dairy farm. Of this, approximately 62 ha is subject to the rezone and is the focus of this site assessment ('the site').

The property is landlocked but close to the coast with Ngarunui beach less than 1km to the west and the Wainui inlet of the Raglan harbour approximately 750 m to the east. Raglan township is approximately 900 m to the north-east of the site with the town's wastewater treatment plant lying adjacent to the northern boundary of the property. South of the property is predominately a continuation of dairy farmland, although a recycling centre, set amongst native bush, exists adjacent to the site's south-eastern boundary.

The site is classified under two bioclimatic zones² being lowland (0-300m ASL) internally and coastal (0-300m ASL & 1km from coast) around the peripheries. The predominant soil type across the site is moderately well drained clay loam soil.

The site is drained by five identified streams of which four form part of the Ahiawa Stream catchment, a tributary of the wider Wainui Stream catchment, with the fifth flowing into the Joys Point Inlet as an unnamed stream system. The Ahiawa Stream forms the western property boundary as a significant stream.

¹ This report is subject to the Report Limitations provided in Attachment A.

² WaikatoMaps – Vegetation Biodiversity



2.0 METHODOLOGY

2.1 Terrestrial Ecology

A site visit was carried out by three ENZL ecologists on the 30th of August 2018 to undertake the necessary field surveys to obtain the required level of information. Field assessments were undertaken via a high-level walk-over survey.

2.1.1 Vegetation

Vegetation (exotic and native) was assessed across the site with dominant systems identified and their associated structure, composition and ecological value documented. Onsite investigations were further supported through desktop assessments of the relevant flora and fauna distribution databases.

2.1.2 Fauna

A walkover of the entire site was carried out to investigate and validate the current quality of lizard, bird and bat habitat available onsite. This assessment was guided by database reviews detailing the results of previous local surveys and desktop analysis of current aerial photography.

Lizard habitat was assessed in line with the habitat preferences/requirements of Raglan's known species diversity. Habitat assessments took into consideration the availability of microhabitats such as woody debris, ground cover, tree trunks with loose bark, dead fern fronds, and clumping ground vegetation. Areas of potential herpetofauna habitat were subsequently mapped and detailed.

As well as habitat assessments onsite, a review of the DoC national bat distribution database was completed for records of long-tailed bat recordings/sightings in the local area. This was used to predict if bats are likely to make use of any of the onsite or surrounding habitat.

A list of all bird species seen or heard across the site and immediate surrounds was compiled during the site walkover.

2.2 Freshwater Ecology

A desktop assessment was carried out to establish the various stream catchments that flow through and out of the site. A site walkover was carried out to confirm the extent of the stream systems. All streams (including artificial and/or modified drainage channels) within the site were mapped. Stream physical parameters were assessed at a high level. Particular focus was placed on three key ecological function groups.

- Hydraulic functions (processes associated with water storage, conveyance, flood flow retention and sediment transport);
- Biogeochemical functions (processes associated with the processing of minerals, particulates and water chemistry); and
- Habitat provision functions (the type, amount and quality of habitat for flora and fauna).

A freshwater fauna assessment was deemed out of scope for this assessment however the New Zealand Freshwater Fish database was accessed on the 13/09/18 to determine the fish species present within the wider Wainui Stream catchment.



3.0 ECOLOGICAL SURVEY

3.1 Terrestrial Vegetation

Historic vegetation cover across the site is listed within the Landcare database³ (Jan. 22, 2018) as predominantly kahikatea-pukatea-tawa forest with minor instances of rimu/tawa-kamahi forest. Today, the site's vegetation is classified (LCDB v4.1) as High Production Exotic Grassland with no other vegetation types formally recognised (WaikatoMaps). Currently there are no significant natural areas (SNA's) identified onsite (proposed Waikato district plan) however, there is a terrestrial SNA (16888) on the neighbouring property adjacent to the south-eastern boundary.

Terrestrial vegetation was sparse across the site and isolated almost exclusively to riparian and wetland margins with the exception of planted areas on a bankside near the existing eastern dwelling. Within these areas, vegetation was dominated by a mixture of native and exotic species and included several areas of native plantings completed by the Koning family. Aquatic and semi-aquatic vegetation was limited largely to pugged wetlands and wet areas comprising for the most part reeds (*Juncus* sp.) and one instance of a raupo (*Typha orientalis*) wetland. Native plant diversity across the site was considered moderate with a total of 51 species identified, 30 of which were native. Though it is not the intent of this report to provide a full botanical survey of the site, these species give a good indication of the overall diversity.

Approximately 6,500 sqm of terrestrial native plantings exist at the eastern end of the site with approximately 2,600 sqm located on the west-facing bank below the existing dwelling, adjacent Te Hutewai Road. The balance of the plantings, approximately 3,900 sqm, were riparian in nature and located along Catchment 2 (see section 3.3 below). Plantings are approximately estimated at 5-7 years old and were showing variable levels of success with some areas reaching 90%+ canopy closure, with others less than 20%. Stock access was limited in areas, though was insufficient to ensure complete stock exclusion from the plantings. Bankside plantings comprised a typical revegetation species mix dominated by manuka (*Leptospermum scoparium*) with other species including karo (*Pittosporum crassifolium*), houhere (*Hoheria populnea*), akeake (*Dodaea viscosa*), koromiko (*Veronica stricta*), harakeke (*Phormium tenax*) and ti kouka (*Cordyline australis*). A full species list can be found in appendix B. Riparian plantings occurred amongst what appeared to be historic ti kouka stands and again showed varying success as functional riparian plantings with some areas achieving good canopy closure and others remaining sparse. Dominant species in these areas were ti kouka and harakeke with other understorey species including kawakawa (*Piper excelsum*), toatoa (*Haloragis erecta*), and hangehange (*Geniostoma ligustrifolium*). Various pest plant species existed in both planting areas and though some mature individuals occurred such as woolly nightshade (*Solanum mauritanum*) and pampas (*Cortaderia selloana*), presence on the whole was relatively low.

Isolated areas of predominately native vegetation occurred within open pasture at the eastern end of the site and were mostly clustered around the pre-described riparian vegetation. These comprised lone stands and single instances of tree and fern species such as ti kouka, tree fern (*Cyathea medullaris* and *dealbata*), kanuka (*Kunzea robusta*), mamangi (*Coprosma arborea*), as well as two mature rimu (*Dacrydium cupressinum*).

Small areas of mixed native and exotic vegetation occurred at both the eastern and western ends of the site. These sites were exclusively riparian and consisted of pre-existing native species including totara (*Podocarpus totara* var. *totara*), manuka, rough tree fern (*Dicksonia squarrosa*) and karamu (*Coprosma*

³ Potential vegetation of New Zealand – LCR / Informatics Team



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robusta), but also comprised mature poplar (*Populus* sp.) and pest plant species such as woolly nightshade, tree privet (*Ligustrum lucida*) and pampas.

At the western end of the site, along the true right bank of the Ahiawa, predominately exotic vegetation was present in the form of sparse and isolated lombardy poplars (*Populus nigra*), willows (*Salix* sp.) and arum lily (*Zantedeschia aethiopica*).

At the north-western corner of the site, adjacent to the property boundary and on the true right bank of the Ahiawa stream, a small stand of mature pine (*pinus* sp.), poplar and blackwood (*Acacia melanoxylon*) was present, approximately two to three trees wide. Though exotic in nature, these trees are providing some benefit to the site including shading and bank stabilisation of the stream, as well as potential habitat for bats (see section 3.2 below).



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Plate 1 Bankside plantings beside existing dwelling



Plate 2 Overview of riparian plantings at eastern end of site



Plate 3 Species composition within riparian plantings



Plate 4 Mixed native / exotic vegetation at eastern end of property



Plate 5 Predominantly exotic vegetation along Ahiawa stream at western end of site



Plate 6 Exotic tree stand at western end of site

3.2 Terrestrial fauna

3.2.1 Herpetofauna

Lizard habitat on-site was assessed overall as limited and marginal with vegetation comprising largely of grazed pasture. Where vegetation pockets and corridors existed onsite (see section 3.1), these were normally synonymous with low to moderate quality habitat for native skinks and low-quality habitat for native geckos. Previous searches of the Department of Conservation Herpetofauna Database⁴ have shown four instances of native lizards within 10km of the site. These included pacific gecko (*Dactylocnemis pacificus*) within 10km, forest gecko (*Mokopirirakau granulatus*) within 1.2km, Auckland green gecko (*Naultinus elegans*) within 1.2km and copper skink (*Oligosoma aeneum*) within 3.9km of the site. With the exception of copper skink which is 'Not Threatened', these lizards are classified as 'At Risk' under the current New Zealand Threat Classification System⁵.

No native skinks were detected onsite following preliminary opportunistic manual habitat searches, however, two copper skinks (*Oligosoma aeneum*) were detected under woody debris within a small pine / gum stand immediately north of the assessment area (approx. 60 metres), and within the property. The incidence of this species inhabiting sub-optimal novel habitat provides justification for its predicted presence across other vegetated areas onsite in addition to any areas of rank grass.

3.2.2 Bats

Long-tailed bats (*Chalinolobus tuberculatus*) which are classified as 'Threatened – Nationally Critical'⁶, have historically been detected approximately 3.5 km to the south-west of the site⁷ within the Te Hutewai State Forest; a significant tract of native forest. This forest presents a key area of suitable bat habitat within the local environment and could provide a stronghold for native bats which may commute and forage across the wider landscape during nocturnal hours. The closest known bat activity to this site was detected approximately 1 km to the east of the site on the Rangitahi Peninsula during ecological investigations for the Rangitahi Peninsula plan change⁸. Due to their ability to travel large distances in a single night, there is a moderate likelihood bats may be commuting from this forest and/or other pockets of suitable mature vegetation, along key landscape features such as gullies, streams and isolated bush pockets and intermittently utilising the site for commuting, foraging and potentially roosting activities.

Key features identified across the site for native bats include potential roosting habitat identified within exotic vegetation, drinking areas across large ponded areas, and foraging habitat across wetland areas and linear vegetated riparian corridors. Of particular note, some of the emergent pine, gum and blackwood trees located along the site's westernmost stream are of a size (>80cm DBH) and character (e.g. cracks, broken limbs and cavities) suitable for hosting bats. Similar suitable habitat was also noted in the pine / gum stand mentioned as suitable lizard habitat just north of the assessment area. Additionally, there is the existing SNA located immediately to the south of the property, at the eastern corner. Though not assessed, this area has potential for suitable bat foraging and roosting, and could

⁴ Boffa Miskell Ragitahi Peninsula Private Plan Change Ecology Assessment 20 May 2013

⁵ Hitchmough, R.; Barr, B.; Lettink, M.; Monks, J.; Reardon, J.; Tocher, M.; van Winkel, D; Rolfe, J. 2015. *Conservation status of New Zealand reptiles*. New Zealand Threat Classification Series, 17. 14 p.

⁶ C.F.J. O'Donnell, K.M. Borkin, J.E. Christie, B. Lloyd, S. Parsons and R.A. Hitchmough, 2017. *Conservation status of New Zealand bats*, New Zealand Threat Classification Series 21

⁷ Unpublished Survey Data 2017/18 Ecology New Zealand Limited

⁸ Boffa Miskell Ragitahi Peninsula Private Plan Change Ecology Assessment 20 May 2013



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see bats traversing across the site to and from here. Further assessment would be required to confirm any activity.

A reasonably vegetated riparian corridor associated with Catchment 2 commences near Te Hutewai State Forest and runs in a general northern direction through the site providing a potential commuting route along the western extent of the site for bats. This potential commuting route additionally overlaps with the potential exotic roosting areas to the west of the site previously described. Further bioacoustic surveys will be needed to confirm the presence of bats onsite and place further value on these potential key bat features.

3.2.3 Avifauna

Onsite vegetation supported various native and exotic birds common to a farmed landscape. A total of 15 birds were detected onsite, six of which were native. This diversity was considered moderate and expected for an operational dairy farm environment. This is potentially a reflection of the retained riparian vegetation and native plantings providing sufficient habitat for such species.

Of particular note, a limited but notable area of raupo wetland located internal to the site, has potential to support cryptic wetland bird species, at least on an intermittent basis. Though none were observed at the time of the site visit, further targeted surveys would be required to confirm or rule out their presence.

All birds observed are reasonably common and none are considered threatened or at-risk.

Table 1 list of all native species found onsite

Species	Common Name	Native/non-native	National Threat Status
<i>Gymnorhina tibicen</i>	Australasian magpie	Non-native	Introduced and naturalised
<i>Porphyrio melanotus</i>	pukeko	Native	Not threatened
<i>Alauda arvensis</i>	skylark	Non-native	Introduced and naturalised
<i>Hirundo tahitica</i>	welcome swallow	Native	Not threatened
<i>Prothemadera novaeseelandiae</i>	paradise shelduck	Native	Not threatened
<i>Sturnus vulgaris</i>	starling	Non-native	Introduced and naturalised
<i>Carduelis carduelis</i>	European goldfinch	Non-native	Introduced and naturalised
<i>Fringilla coelebs</i>	chaffinch	Non-native	Introduced and naturalised
<i>Rhipidura fuliginosa</i>	fantail	Native	Not threatened
<i>Todiramphus sanctus</i>	sacred kingfisher	Native	Not threatened
<i>Turdus merula</i>	blackbird	Non-native	Introduced and naturalised
<i>Phasianus colchicus</i>	pheasant	Non-native	Introduced and naturalised
<i>Platyercus eximius</i>	eastern rosella	Non-native	Introduced and naturalised
<i>Ardea novaehollandiae</i>	white-faced heron	Native	Not threatened
<i>Anas platyrhynchos</i>	mallard	Non-native	Introduced and naturalised



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Plate 7 Overview of site showing limited herpetofauna habitat



Plate 8 Raupo wetland areas with potential to host cryptic wetland birds (approximately 0.21 ha)



Plate 9 Copper skinks detected immediately north of the assessment area



Plate 10 Western boundary showing exotic trees with potential to support bats



3.3 Freshwater Ecology

The site encompassed six identifiable catchments. The catchments varied in complexity with some systems presenting a single intermittent 1st order stream up to some presenting main 4th order streams with several tributaries feeding them. For the purpose of this assessment the individual catchments have been named sequentially (as most catchments are formally unnamed) moving from east to west through the site. The sixth catchment is the only catchment not following this sequence as it occurs on the eastern side of Te Hutewai Rd.

Catchment 1

Catchment 1 was located at the north-eastern corner of the site, flowed in a northern direction and comprised of a single stream reach. The stream was classified as intermittent given the presence of a channel, clear flow of water along a defined channel, clear sediment sorting and clear material transport, due to the low level of flow the stream was deemed unlikely permanent. The stream flows for approximately 66m through the site before transitioning into a wetland. The stream reach was very degraded with direct stock access to the stream. Clear evidence of stock pugging was present throughout the reach. There was no shading present throughout the reach given the lack of any riparian vegetation, other than grazed pasture. In general, this water course presented very poor ecological function.



Plate 11 View of the start of intermittent stream



Plate 12 View of downstream looking into pugged wetland

Catchment 2

Catchment 2 flowed through the site from the southern property boundary to the northern boundary. The catchment was composed of a main channel and several tributaries, all of which were soft-bottomed, forming the catchment. In total there were approximately 1.1km of permanent stream reaches and approximately 300m of intermittent reaches. It was noted that due to seasonality and recent weather conditions, true intermittent-permanent interface was difficult to define. The catchment reaches can be separated into main stream channel and tributaries.

The main stream reach was characterised as permanent, running through the length of the site. The source of the stream occurred outside of the site and entered through a culvert from an artificial online pond outside of the site. From this point the stream flowed through a vegetated riparian corridor to the end of the site just after passing through a farm access culvert. Shading along the reach ranged from high to moderate and comprised regenerating native bush, which has an average width of 10m with the stream meandering through this corridor. Habitat within the main reach was relatively diverse with the presence of pool-riffle-run sequences, with the occasional piece of large woody debris and bank

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undercuts present. Fencing appeared to have excluded stock from most of the main reach. There was a significant culvert which the main channel flowed through for approximately 100m. In general, the main stream reach would be considered to have moderate ecological values likely increasing to moderate-high the longer the restoration planting is left to establish.

In contrast the tributaries of this catchment were significantly degraded. Three noted tributaries occurred off the main channel with each tributary containing permanent and intermittent reaches. In contrast to the main channel these tributaries generally had no fencing or had been only recently fenced, resulting in significant degradation through cattle access. Most reaches had no clear defined banks due to excessive pugging. This had also removed most habitat heterogeneity with the absence of pool-riffle-run sequences and undercut banks. Reaches of the tributaries presented anoxic conditions, with organic oils and sulphurous smells present. The tributaries were largely devoid of any significant riparian vegetation, resulting in low shading throughout most of the reaches. In general, the tributaries of catchment 2 would be considered to have low to moderate ecological values, which are unlikely to change without any restoration efforts.



Plate 13 Overview of Catchment 2



Plate 14 View of downstream looking up main stream channel



Plate 15 View of upstream of main stream channel



Plate 16 View of upstream tributary with recent fencing

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Catchment 3

Catchment 3 commenced within the site and flowed in a northern direction for approximately 200m as a permanent soft-bottomed stream. Catchment 3 was composed of a single stream channel flowing through a steep-sided gully. The channel appeared to have been recently fenced with evidence of historic stock access, due to the criss-crossing nature of the various subchannels in the upper reach. The stream was reasonably shaded by emergent *Ranunculus* and *Juncus* species throughout the channel. The riparian vegetation was very sparse with the occasional flax present. In-stream habitat diversity appeared relatively poor on account of the historic pugging and excessive emergent macrophyte growth. Upon leaving the site the stream entered two farm ponds which likely limit fish passage to the degraded upper reaches. In general, the ecological values of catchment 3 were considered poor but in time with natural regeneration due to fencing, the stream's ecological values will likely improve.



Plate 17 Overview of Catchment 3



Plate 18 View of stream channel heading downstream

Catchment 4

Catchment 4 commenced within the site and flowed in a northerly direction for approximately 200m as a permanent soft-bottomed stream with an additional 50m of intermittent stream. Catchment 4 was composed of a forked catchment which met at a confluence on the site. Both fork reaches were spring-fed and were classified as permanent in nature. In contrast to Catchment 3 the upper reaches of Catchment 4 had yet to be fenced and were still affected by stock access with significant pugging present. The lower reaches of the stream in contrast appeared to have been recently fenced following a similar process to Catchment 3. In general, the ecological values of catchment 4 were considered poor to very poor given current stock access.



Plate 19 View of upper true right-side fork on Catchment 4 showing clear effects of cattle pugging.



Plate 20 Overview of Catchment 4

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Catchment 5

Catchment 5 flowed through the site from the southern boundary to the northern boundary along the western boundary of the site. The catchment was composed of the main channel of the Ahiawa Stream and two identified tributaries.

The Ahiawa Stream was a typical 4th order stream reach flowing for approximately 850m through the site. The stream's wetted width at the time of assessment was greater than 3m throughout most of the reach. The shading along the reach ranged from moderate to poor given the sparse riparian vegetation. Habitat within the Ahiawa Stream was diverse with the presence of pool-riffle-run sequences, with the presence of woody debris and bank undercuts throughout the reach. Fencing appears to have excluded stock from most if not all of the Ahiawa Stream. The stream reach's channel morphology appears to be very natural with well-developed meanders. The Ahiawa Stream would likely have moderate ecological values given the absence of significant shading.

The tributaries can be broken down into a major tributary and a minor tributary. The minor tributary commenced on site and presented a similar system to that found within Catchment 3, with the same being true of the major tributary's lower reaches. However, the upper reaches of the major tributary presented a different stream characteristic.

The upper reaches of the major tributary presented a deeply incised channel surrounded by remnant tree ferns and riparian scrub. The benthic substrate was diverse with the presence of cobble to large stone and woody debris among the soft-bottom clays. Shading was relatively high through most of the reach, in large part due to the bank incision. Habitat was diverse with the presence of pool-riffle-run sequences and bank undercuts. While the presence of tree ferns and riparian scrub provided some ecological benefit, the vegetated riparian margin was limited to the immediate stream bank resulting in low filtration. In general, the upper reach of the major tributary presented ecological values that were moderate to high.



Plate 21 View of Ahiawa Stream reach at the upper reaches of the site



Plate 22 View of confluence of Ahiawa Stream and Major Tributary

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Plate 23 View of lower reaches of major tributary



Plate 24 View of upper reaches of major tributary

Catchment 6

Following ENZL's site visit, an additional catchment (Catchment 6) was requested for high-level assessment. Via desktop analysis of high-resolution drone imagery provided by BBO, the following assessment was made. Catchment 6 flows on the south eastern area of the site, east of Te Hutewai Road. The system comprises a stream and wetland margins which appear to be negatively impacted due to cattle access. The catchment as a whole is relatively short flowing for approximately 1 km before entering the marine environment (offsite). Shading and riparian margins appear to be relatively poor onsite with only the wetland species providing the stream reach with shading. The stream appears to be relatively degraded and generally is expected to have poor ecological functions. Further onsite assessment will be required to confirm this.

3.3.1 Fish

A search of the NZFFD identified a diverse species richness throughout the wider Wainui Stream catchment with over 20 fish species present, of which 10 are noted as native. Of these, four are classified as At Risk - Declining, while the New Zealand Lamprey is classified as Threatened - Nationally Vulnerable. Given the various freshwater habitat types found throughout the site and the connectivity to high quality habitat environments, all of the species identified within the table below have the potential to either inhabit the site's watercourses or migrate through the site during certain life stages.

Table 2 List of all native species found within the wider Wainui Stream Catchment

Species	Common Name	Native/non-native	National Threat Status
<i>Anguilla australis</i>	shortfin eel	Native	Not Threatened
<i>Anguilla dieffenbachii</i>	longfin eel	Native	At Risk- Declining
<i>Galaxias argenteus</i>	giant kokopu	Native	At Risk- Declining
<i>Galaxias fasciatus</i>	banded kokopu	Native	Not Threatened
<i>Galaxias maculatus</i>	inanga	Native	At Risk- Declining
<i>Geotria australis</i>	lamprey	Native	Threatened - Nationally Vulnerable
<i>Gobiomorphus cotidianus</i>	common bully	Native	Not Threatened
<i>Gobiomorphus huttoni</i>	redfin bully	Native	At Risk- Declining
<i>Retropinna retropinna</i>	common smelt	Native	Not Threatened
<i>Gobiomorphus hubbsi</i>	bluegill bully	Native	At Risk- Declining

4.0 ECOLOGICAL SIGNIFICANCE

4.1 Significance Criteria

Section 11A of the Waikato Regional Policy Statement (2016) and the Proposed Waikato District Plan (Section D, Appendix 2) require the specific criteria to be used for determining the significance of indigenous biodiversity. Though it is not the intent of this report to provide an in-depth assessment of ecological significance, these criteria will form the basis for comments against any obvious or potential ecological significance or whether further assessments will be required. A complete list of significance criteria can be found in appendix C.

4.2 Terrestrial Vegetation

Vegetation across the site was of low / negligible ecological value overall with the vast majority of the site comprising open pasture. The highest value vegetation observed was the riparian plantings at the eastern end of the site. Against the abovementioned significance criteria, it is considered that this vegetation only qualifies for assessment against the following criteria, with the remainder not considered significant against any criteria.

3. It is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are:

- *classed as threatened or at risk, or*
- *endemic to the Waikato region, or*
- *at the limit of their natural range.*

Manuka and kanuka were present onsite and have recently been listed as At Risk - Declining and Threatened – Nationally vulnerable⁹ respectively as a result of the 2017 myrtle rust outbreak. This classification is important as an agent for long-term management of myrtle rust and its impacts. It is believed, however, that the intent of the re-classification is not to warrant the inclusion of all land hosting these species as ecologically significant based on this alone. As a result, and with no other vegetation observed onsite meeting these criteria. No ecological significance is suggested here.

9. It is an area of indigenous vegetation or habitat that is a healthy and representative example of its type because:

- *its structure, composition, and ecological processes are largely intact; and*
- *if protected from the adverse effects of plant and animal pests and of adjacent land and water use (e.g. stock, discharges, erosion, sediment disturbance), can maintain its ecological sustainability over time.*

Though in part riparian vegetation is healthy and representative of its type, the majority of the feature is a result of recent planting efforts, which typically falls outside of the intent of this criteria. Additionally, plantings would benefit and would likely maintain ecological sustainability over time should the area be protected from adverse effects. It is again however, considered that primary succession native

⁹ Department of Conservation – Conservation Status of New Zealand Indigenous Vascular Plants, 2017



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revegetation plantings are not the intent of this criteria and as such the riparian plantings are not considered ecologically significant in their current state. This does not however, dismiss the ecological function of this vegetation and the importance of retaining and maintaining it.

4.3 Fauna

Fauna habitat across the site was limited and where it occurred was of low to moderate quality in its ability to support native lizard, bat and bird species. Key habitat features included retained exotic and native vegetation, native plantings, raupo wetland and the exotic tree stand along the western boundary.

Based on the preliminary ecological assessment, the following ecological significance criteria are deemed to apply.

3. It is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are:

- *classed as threatened or at risk, or*
- *endemic to the Waikato region, or*
- *at the limit of their natural range.*

With bat presence recorded within 1km to the east of the site and within 3.5km to the south-west of the site, there is potential for key features (section 3.2.2) to support bats. An acoustic survey would give greater insight as to whether bats use this area in the first instance. If they are present, the results of these surveys may provide an understanding of the frequency and types of activity within the site and which areas of vegetation are utilised by bats. Patterns of activity would help to confirm presence of roosting bats or whether they are just foraging around the site. Whilst the quantification of bat numbers will not be able to be determined through acoustic surveys, activity levels can provide an evaluation of the importance of the site to bats. For the time being, the conclusion of potential significance can be made against this criterion.

6. It is wetland habitat for indigenous plant communities and/or indigenous fauna communities (excluding exotic rush/pasture communities) that has not been created and subsequently maintained for or in connection with:

- *waste treatment;*
- *wastewater renovation;*
- *hydroelectric power lakes (excluding Lake Taupō);*
- *water storage for irrigation; or*
- *water supply storage;*
- *unless in those instances they meet the criteria in Whaley et al. (1995).*

The raupo wetland situated internal to the assessment area has potential to support indigenous bird communities. Though no observations were made at the time of the site visit, further assessments would need to be undertaken including call play-backs to confirm or exclude such bird presence in the wetland. An assessment of potential significance can only be concluded until further assessments are undertaken.



4.4 Freshwater

3. *It is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are:*

- *classed as threatened or at risk, or*
- *endemic to the Waikato region, or*
- *at the limit of their natural range.*

The site presented habitat that may be suitable to all At Risk - declining fish species noted within table 1. Surveys will have to be undertaken to confirm the presence of these species and which habitats are being utilised.

6. *It is wetland habitat for indigenous plant communities and/or indigenous fauna communities (excluding exotic rush/pasture communities) that has not been created and subsequently maintained for or in connection with:*

- *waste treatment;*
- *wastewater renovation;*
- *hydroelectric power lakes (excluding Lake Taupō);*
- *water storage for irrigation; or*
- *water supply storage;*
- *unless in those instances they meet the criteria in Whaley et al. (1995).*

The site presents several wetlands that occur within the adjacent stream margins. While there are significant number of wetlands throughout the site, it is likely that the majority of these wetlands are a direct result of stock pugging. There is however the raupo wetland located in Catchment 2 which would likely provide habitat for native freshwater fauna, i.e. eels.

8. *It is aquatic habitat (excluding artificial waterbodies, except for those created for the maintenance and enhancement of biodiversity or as mitigation as part of a consented activity) that is within a stream, river, lake, groundwater system, wetland, intertidal mudflat or estuary, or any other part of the coastal marine area and their margins, that is critical to the self sustainability of an indigenous species within a catchment of the Waikato region, or within the coastal marine area. In this context "critical" means essential for a specific component of the life cycle and includes breeding and spawning grounds, juvenile nursery areas, important feeding areas and migratory and dispersal pathways of an indigenous species. This includes areas that maintain connectivity between habitats.*

All stream reaches and natural wetlands have the potential to provide habitat, spawning grounds, juvenile nursery areas and migratory pathways for native freshwater fish species that are currently At Risk or Threatened. A fish survey will need be carried out to confirm the distribution of species throughout the site.



5.0 OPPORTUNITIES & CONSTRAINTS

The successful rezoning of the site will present opportunities for residential development which in turn has the potential to create detrimental ecological impacts at the site. Specifically, there would be potential for negative impacts associated with vegetation removal, habitat alteration/removal and alteration of freshwater systems.

Constraints & Recommendations

The site provides ecological constraints to development as outlined below. Recommendations to avoid or minimise impacts are also made.

- Indigenous vegetation to be retained - Avoid the removal of existing indigenous riparian vegetation other than where absolutely necessary for the construction of road crossings. Crossing design should reflect this approach and be positioned where vegetation is most sparse.
- Trees to be retained - Retain the two rimu trees situated alongside Catchment 2. Incorporate the retention of these trees within any development design.
- Stream reach to be retained – All stream reaches within the site will need to be retained and will require incorporation into any development design.
- Wetlands to be retained – All native natural wetlands within the site will need to be retained and may result in a reduction of land available for development.
- The Ahiawa Stream – The Ahiawa stream is likely to be a significant migratory corridor for At Risk and Threatened native fish species. As such any access over this stream will need to be designed in a way that will not impact fish passage.
- Further assessment for bat habitat - Large exotic trees within the identified areas have potential to act as bat roosting sites. Further acoustic assessments will be required to determine the significance of these trees to bats, prior to any management recommendations being made.
- Retention of lizard foraging habitat - There is moderate quality lizard foraging habitat with many continuous edges of vegetation, namely the riparian and bankside plantings. This ties in with previous considerations to retain indigenous vegetation wherever possible.
- Further assessment of lizard habitat - Due to copper skinks being observed just north of the assessment area (approx. 60 metres), it is likely that there are native lizard populations onsite. Should further assessments confirm this presence, appropriate mitigation measures would be required to mitigate potential impacts on species protected under the Wildlife Act 1953. This would likely include relocation of animals and enhancement of retained habitat.



Opportunities

The site provides opportunities for enhancement and restoration of ecological features as outlined below.

- Restoration of all existing intermittent streams, permanent streams and wetland areas through pest plant control, pest animal control and native infill planting. This would see the development of an Ecological Management Plan (EMP) for the retention and improvement of existing ecological features onsite.
- Further protection of existing watercourses via 10-metre buffer planting around the edge of all intermittent streams, permanent streams, and wetland areas. This will further improve ecological value of the areas for similar reasons to those stated in the first opportunity above. If stock are not to be excluded from the proposed Lots as part of the consent process, these planting areas will require permanent, ungated stock-proof fencing installed outside the dripline of the new plantings.
- Completion of native revegetation along the bank situated at the eastern end of the site.
- An opportunity exists to daylight the main channel within catchment 2 (remove pipes and drains) and restore them to a more natural stream system via planting of riparian zones similar to that suggested in the second opportunity, as well as instream habitat creation.
- If bats are confirmed present onsite and, specifically, found to be utilising the predicted western riparian corridor, its enhancement along with the retention of mature exotic trees could improve this commuting route for bats.
- It is expected that a current lack of site-wide pest control is restricting the current lizard population onsite. The implementation of a pest management plan, as well as the revegetation mentioned in the first opportunity, will provide additional benefit by way of improving lizard habitat and protection from predators.

6.0 SUMMARY

This report provides an assessment of the ecological opportunities and constraints associated with the proposed zone change at 146 Te Hutewai Road, Raglan.

It is deemed there are ecological features onsite that have the potential to be significant and as such require further assessment and careful consideration to ensure the potential for detrimental ecological impacts is avoided or minimised. Key ecological constraints have been identified to ensure the avoidance or minimisation of any impacts can be considered throughout the re-zone process and eventually the potential development design for the site. Key opportunities have been identified, namely to explore the ability to not only protect existing ecological features but to enhance and extend them as part of the proposal.

At this stage of the process and given the above is considered, it is believed that the site presents no fatal ecological flaws that would prevent its consideration for re-zoning.



APPENDIX A

Report Limitations

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

- i) This Report/Document has been prepared for the particular purpose outlined in ENZL's proposal and no responsibility is accepted for the use of this Report/Document, in whole or in part, in other contexts or for any other purpose.
- ii) The scope and the period of ENZL's services are as described in ENZL's proposal, and are subject to restrictions and limitations. ENZL did not perform a complete assessment of all possible conditions or circumstances that may exist at the site referenced in the Report/Document. If a service is not expressly indicated, do not assume it has been provided. If a matter is not addressed, do not assume that any determination has been made by ENZL in regards to it.
- iii) Conditions may exist which were undetectable given the limited nature of the enquiry ENZL was retained to undertake with respect to the site. Variations in conditions may occur between investigatory locations, and there may be special conditions pertaining to the site which have not been revealed by the investigation and which have not therefore been taken into account in the Report/Document. Accordingly, if information in addition to that contained in this report is sought, additional studies and actions may be required.
- iv) The passage of time affects the information and assessment provided in this Report/Document. ENZL's opinions are based upon information that existed at the time of the production of the Report/Document. The Services provided allowed ENZL to form no more than an opinion of the actual conditions of the site at the time the site was visited and cannot be used to assess the effect of any subsequent changes in the quality of the site, or its surroundings, or any laws or regulations.
- v) Any assessments, designs and advice made in this Report/Document are based on the conditions indicated from published sources and the investigation described. No warranty is included, either express or implied, that the actual conditions will conform exactly to the assessments contained in this Report/Document.
- vi) Where data supplied by the client or other external sources, including previous site investigation data, have been used, it has been assumed that the information is correct unless otherwise stated. No responsibility is accepted by ENZL for incomplete or inaccurate data supplied by others.
- vii) The Client acknowledges that ENZL may have retained subconsultants affiliated with ENZL to provide Services for the benefit of ENZL. ENZL will be fully responsible to the Client for the Services and work done by all of its subconsultants and subcontractors. The Client agrees that it will only assert claims against and seek to recover losses, damages or other liabilities from ENZL and not ENZL's affiliated companies. To the maximum extent allowed by law, the Client acknowledges and agrees it will not have any legal recourse, and waives any expense, loss, claim, demand, or cause of action, against ENZL's affiliated companies, and their employees, officers and directors.
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APPENDIX B

Vegetation List

Scientific name	Common name
Native Plants	
<i>Arthropodium cirratum</i>	rengarenga
<i>Austroderia fulvida</i>	toetoe
<i>Coprosma arborea</i>	tree coprosma
<i>Coprosma robusta</i>	karamu
<i>Cordyline australis</i>	ti kouka
<i>Cyathea dealbata</i>	silver fern
<i>Cyathea medullaris</i>	mamaku
<i>Dacrycarpus dacrydioides</i>	kahikatea
<i>Dacrydium cupressinum</i>	rimu
<i>Dicksonia squarrosa</i>	wheki
<i>Dodonaea viscosa</i>	Akeake
<i>Freycinetia banksii</i>	kiekie
<i>Freycinetia banksii</i>	kiekie
<i>Geniostoma ligustrifolium</i>	Hangehange
<i>Haloragis erecta</i>	toatoa
<i>Hoheria populnea</i>	hohere
<i>Juncus sp.</i>	rush
<i>Kunzea robusta</i>	kanuka
<i>Leptecophylla juniperina</i>	prickly mingimingi
<i>Leptospermum scoparium var. incanum</i>	manuka
<i>Melicytus ramiflorus</i>	mahoe
<i>Myrsine australis</i>	māpou
<i>Parablechnum sp.</i>	kiokio
<i>Phormium tenax</i>	harakeke, flax
<i>Piper excelsum subsp. excelsum</i>	kawakawa
<i>Pittosporum crassifolium</i>	karo
<i>Podocarpus totara</i>	totara
<i>Pteridium esculentum</i>	bracken
<i>Typha orientalis</i>	raupō



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Scientific name	Common name
Exotic / Pest Plants	
<i>Acacia melanoxylon</i>	tasmanian blackwood
<i>Aristea ecklonii</i>	aristea
<i>Cortaderia selloana</i>	pampas
<i>Cupressus macrocarpa</i>	macrocarpa
<i>Eucalypt</i> sp.	gum
<i>Fatsia japonica</i>	paperplant
<i>Ficus</i> sp.	fig
<i>Jacobaea vulgaris</i>	ragwort
<i>Ligustrum lucidum</i>	tree privet
<i>Lycium ferocissimum</i>	boxthorn
<i>Paraserianthes lophantha</i>	wattle
<i>Phytolacca octandra</i>	inkweed
<i>Pinus</i> sp.	pine
<i>Populus nigra</i>	lombardy poplar
<i>Ricinus communis</i>	castor oil
<i>Rubus fruticosus</i>	blackberry
<i>Salix</i> sp.	willow
<i>Solanum mauritianum</i>	woolly
<i>Solanum nigrum</i>	black nightshade
<i>Ulex europaeus</i>	gorse
<i>Zantedeschia aethiopica</i>	arum lily



APPENDIX C

Waikato Regional Policy Statement (2016) and the Proposed Waikato District Plan (Section D, Appendix 2) Significance Criteria

Previous Assessed Site	
1.	It is indigenous vegetation or habitat for indigenous fauna that is currently, or is recommended to be, set aside by statute or covenant or by the Nature Heritage Fund, or Ngaa Whenua Raahui committees, or the Queen Elizabeth the Second National Trust Board of Directors, specifically for the protection of biodiversity, and meets at least one of criteria 3-11.
2.	In the Coastal Marine Area, it is indigenous vegetation or habitat for indigenous fauna that has reduced in extent or degraded due to historic or present anthropogenic activity to a level where the ecological sustainability of the ecosystem is threatened.
Ecological Values	
3.	It is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are: <ul style="list-style-type: none"> • classed as threatened or at risk, or • endemic to the Waikato region, or • at the limit of their natural range.
4.	It is indigenous vegetation, habitat or ecosystem 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.
5.	It is indigenous vegetation or habitat that is, and prior to human settlement was, nationally uncommon such as geothermal, chenier plain, or karst ecosystems, hydrothermal vents or cold seeps.
6.	It is wetland habitat for indigenous plant communities and/or indigenous fauna communities (excluding exotic rush/pasture communities) that has not been created and subsequently maintained for or in connection with: <ul style="list-style-type: none"> • waste treatment; • wastewater renovation; • hydroelectric power lakes (excluding Lake Taupō); • water storage for irrigation; or • water supply storage; • unless in those instances they meet the criteria in Whaley et al. (1995).
7.	It is an area of indigenous vegetation or naturally-occurring habitat that is large relative to other examples in the Waikato region of similar habitat types, and which contains all or almost all indigenous species typical of that habitat type. Note this criterion is not intended to select the largest example, only in the Waikato region of any habitat type.
8.	It is aquatic habitat (excluding artificial waterbodies, except for those created for the maintenance and enhancement of biodiversity or as mitigation as part of a consented activity) that is within a stream, river, lake, groundwater system, wetland, intertidal mudflat or estuary, or any other part of the coastal marine area and their margins, that is critical to the self sustainability of an indigenous species within a catchment of the Waikato region, or within the coastal marine area. In this context “critical” means essential for a specific component of the life cycle and includes breeding and spawning grounds, juvenile nursery areas, important feeding areas and migratory and dispersal pathways of an indigenous species. This includes areas that maintain connectivity between habitats.
9.	It is an area of indigenous vegetation or habitat that is a healthy and representative example of its type because: <ul style="list-style-type: none"> • its structure, composition, and ecological processes are largely intact; and • if protected from the adverse effects of plant and animal pests and of adjacent land and water use (e.g. stock, discharges, erosion, sediment disturbance), can maintain its ecological sustainability over time.
10.	It is an area of indigenous vegetation or habitat that forms part of an ecological sequence, that is either not common in the Waikato region or an ecological district, or is an exceptional, representative example of its type. Role in protecting ecologically-significant area.
Role in protecting ecologically significant area	
11.	It is an area of indigenous vegetation or habitat for indigenous species (which habitat is either naturally occurring or has been established as a mitigation measure) that forms, either on its own or in combination with other similar areas, an ecological buffer, linkage or corridor and which is necessary to protect any site identified as significant under criteria 1-10 from external adverse effects.



Attachment 2

**Ecology New Zealand Memorandum regarding bat surveys at 146 Te Hutewai Road,
dated December 2020**

MEMORANDUM

Attention: Bloxam, Burnett & Oliver (BBO)
C/- Aiden Kirkby-McLeod,
PO Box 9041, Hamilton 3240

Date: 22 December 2020

From: Jennifer Gollin and Marc Choromanski

Re: 1708139.2 – 146 Te Hutewai Rd Bat Survey Memorandum

1. INTRODUCTION

Ecology New Zealand Limited (ENZL) was commissioned on behalf of BBO to undertake a native bat survey at 146 Te Hutewai Road, Raglan. Specifically, this memorandum provides information on bio-acoustic survey methods and results for the survey undertaken in November 2020.

These works were carried out to establish the extent of utilisation of the site by local bat populations in preparation for a rezoning of the site to enable residential development. Where relevant, the results from this baseline survey will inform specific design considerations and management recommendations applicable to the impact of proposed future development on local bat populations. This survey has been undertaken as a response to a specific recommendation provided in the Ecological Opportunities and Constraints report for the project prepared by ENZL (Report No. 1708139.1-001.V1, September 2018) as outlined below;

"Further assessment for bat habitat - Large exotic trees within the identified areas have potential to act as bat roosting sites. Further acoustic assessments will be required to determine the significance of these trees to bats, prior to any management recommendations being made."

The bat management works described in this memorandum was overseen by ENZL Senior Ecologist, Marc Choromanski. Marc is recognised by the Department of Conservation (DOC) as a Level D Competent bat ecologist.

2. BACKGROUND

On the 30th of August 2018, ENZL ecologists carried out a site visit to assess ecological constraints and opportunities to provide information on the applicability and feasibility of the site for rezoning. Key features were identified across the site for native bats including potential roosting habitat within exotic vegetation, drinking and foraging opportunities across large, ponded areas, and foraging habitat across wetlands and linear vegetated riparian corridors. Long-tailed bats (*Chalinolobus tuberculatus* - 'Threatened – Nationally Critical'¹) have most recently been detected approximately 1km east of the site on the Rangitahi Peninsula, and historically bats have been detected approximately 3.5km to the south-west of the site within the Te Hutewai State Forest². The Te Hutewai State Forest is a significant tract of native forest and may provide a stronghold for native bats. Due to their ability to travel large distances in a single night, there is a moderate likelihood bats may be commuting from this forest and/or other pockets of suitable mature vegetation, along key landscape features such as gullies, streams and isolated bush pockets and intermittently utilising the site for commuting, foraging and potentially roosting activities.

3. METHODOLOGY

Automatic Bat Monitors (ABM; DOC model AR-4) were used to record ultrasonic echolocation calls emitted by bats in November 2020. ABMs record and store data passively and remotely and have the capacity to record both long-tailed (40kHz) and lesser short-tailed (28kHz) bat calls at a range of up to approximately 40m³. The ABMs were set to begin recording one hour before sunset and turn off one hour after sunrise.

ABMs were deployed at eight locations throughout the site targeting areas likely to be utilised by bats such as wetlands, streams, ponded areas and vegetated corridors (Figure 1). ABMs were deployed on site to record bat activity from the 13th of November to the 27th of November 2020. Long-tailed bat activity is influenced by overnight weather conditions such as temperature, rainfall, wind speed and moonlight⁴; therefore, weather data from the survey period was analysed to ensure conditions were suitable. Hourly weather data during the survey period was sourced from the nearest weather station available in New Zealand's National Climate Database (Whatawhata 2 Ews; 25162) and included temperature, rainfall, humidity and windspeed data. Valid survey nights were defined as having a minimum overnight temperature of 7°C, less than 5mm of rainfall during the night and low winds.

Raw ABM data was analysed using BatSearch Version 3.11; a software package designed by the DOC for use with the model AR-4 ABMs. Processed data was then entered into an ENZL bat processor which outputs data relating to mean bat passes and total passes for the site. The data was further analysed with regards to date and time of bat passes to determine the timing of activity across the site and the occurrence of feeding buzzes was also noted⁵.

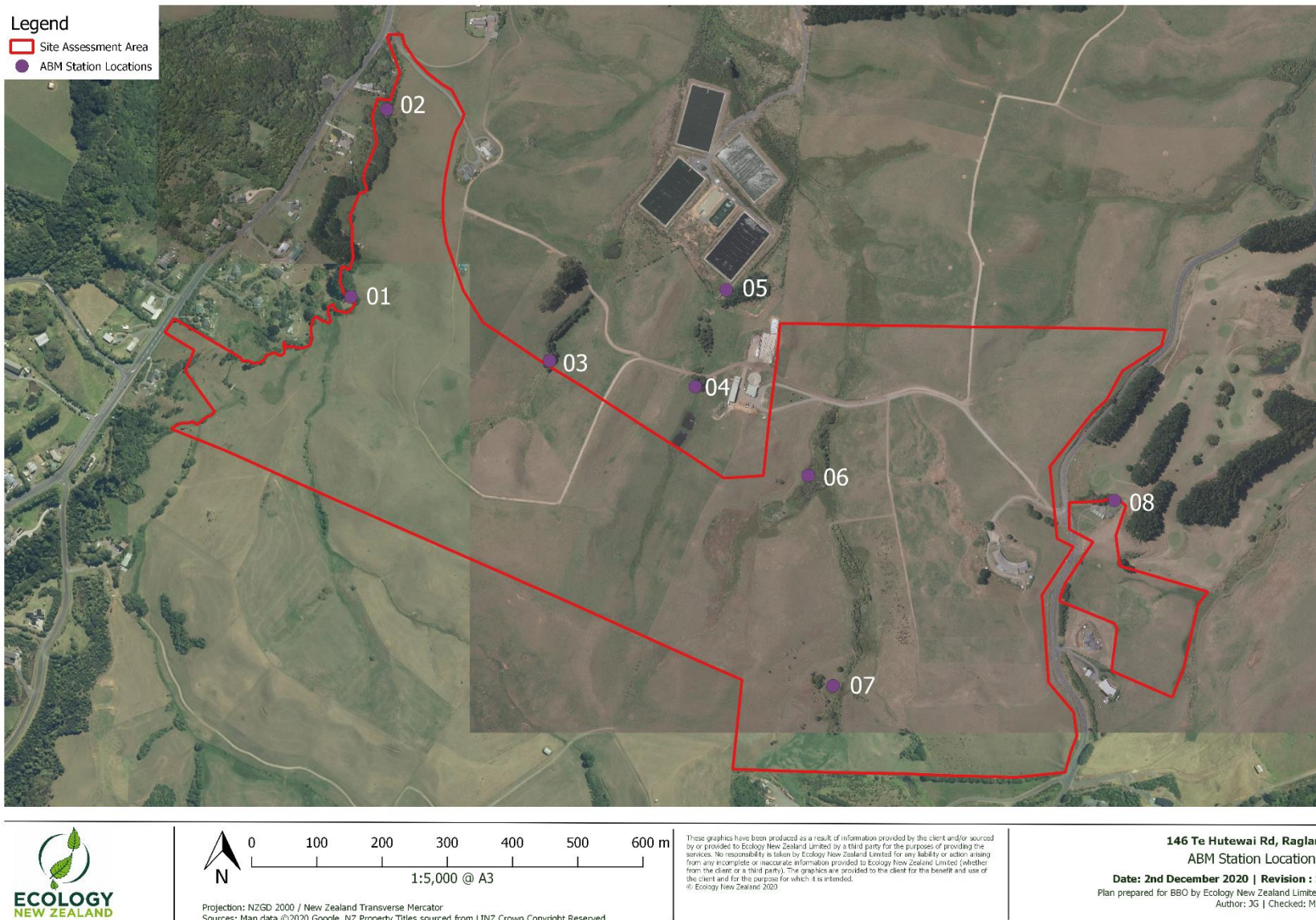
¹ O'Donnell CFJ, Borkin KM, Christie JE, Lloyd B, Parsons S, Hitchmough RA 2018. Conservation status of New Zealand bats, 2017. New Zealand Threat Classification Series 21.

² DOC national bat distribution database 2020

³ Department of Conservation, 2012. Bats: Counting away from roosts – automatic bat detectors

⁴ O'Donnell CFJ 2000. Influence of season, habitat, temperature and invertebrate availability on nocturnal activity of the New Zealand long-tailed bat (*Chalinolobus tuberculatus*). New Zealand Journal of Zoology, 27:3, 207-221.

⁵ When long-tailed bats capture flying insects, they increase the frequency of their echolocation 'clicks' as they home in on prey. This unique type of echolocation call can be identified on the spectrograms.



6

⁶ Figure **Error! Main Document Only.**: Location of ABM units at the site for November 2020 Survey.



Figure 1: ABM Station 01.

4. RESULTS

During the November survey, the ABMs were left on site for a total of 14 days. Over these 14 days, two nights had a minimum temperature below 7.0°C and one of the survey nights had more than 5mm of rainfall within 2 hours of sunset. This allowed for 11 valid survey nights for analysis over this survey period which is considered an appropriate length of time to gain a preliminary understanding of the bat activity on-site.

During the survey, no short-tailed bats were detected and only one long-tailed bat pass was recorded at ABM station 01 along the western boundary of the site (Figure 1). This bat pass was indicative of a bat flying near the edge of the ABMs acoustic reach and was recorded at 1:06am on the 16th of November 2020 (Figure 2). Activity was not recorded at any of the other ABM locations on-site and no activity was recorded within an hour of sunset or sunrise (Table 1). No feeding buzzes or any other social calls were recorded on-site (Table 1).

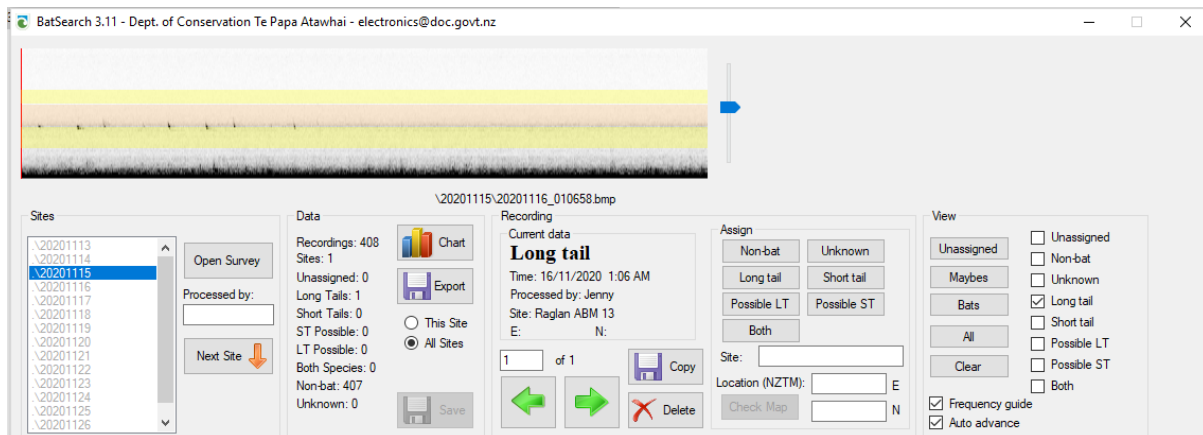


Figure 2: Faint/distant bat pass detected at ABM Station 01.

Table 1: Summary of bat activity recorded at ABM Stations on-site.

ABM Station Number	Total Passes	Mean Bat Passes per night over survey period	Feeding Buzzes	Activity within One Hour of Sunset	Activity within One Hour of Sunrise
01	1	0.09	0	X	X
02	0	0	0	X	X
03	0	0	0	X	X
04	0	0	0	X	X
05	0	0	0	X	X
06	0	0	0	X	X
07	0	0	0	X	X
08	0	0	0	X	X

5. DISCUSSION

The results of the November 2020 bat survey at 146 Te Hutewai Road detected long-tailed bats within the site; however, activity was very low and was restricted to a vegetated corridor on the sites western boundary (Figure 3). The bat pass that was detected did not occur within one hour of sunset or sunrise (indicative of roosting activity) and did not indicate feeding activity. The bat record likely represented intermittent commuting activity on site.

Long-tailed bats have been recorded previously within 1km of the site and the site does contain features that could be utilised by bats (e.g. streams, ponded areas and vegetated corridors). Surveying across multiple periods throughout the bat activity season could provide a more robust understanding of annual bat utilisation across the site; however, to date, utilisation appears very low during the long-tailed bat pre-parturition period.

With intermittent activity detected, intermittent roosting cannot be discounted where suitable bat roosting habitat exists (e.g. larger exotic trees with roosting features such as cracks, splits, flaking bark or hollow cavities). Mitigation by means of the implementation of industry standard vegetation removal protocol should be considered during any future restoration or development works which could lead to the felling trees onsite.

Should bats not be considered during future development design, enabled by the proposed rezoning, the key impact on bats could be an alteration in bat activity due to the avoidance of commuting routes across the site's western riparian corridor. Based on the current information, this impact could be considered low. Recommendations within ENZLs Opportunities and Constraints report (Report No. 1708139.1-001.V1, September 2018), should however still be considered for bats, with specific thought to practical design impacts (e.g. density and lighting) and enhancement along the sites western stream area.



Figure 3: Representative photo of riparian corridor along the western boundary of site.

6. CONCLUSION

Current survey data has revealed very low utilisation of the site by long-tailed bats. Bat activity was restricted to just a single pass which likely represented intermittent commuting along the site's western riparian corridor. As bats were detected utilising the site, practical mitigation for the impacts on local bat populations should be considered when proposing development of the site. Key recommendations within ENZLs Opportunities and Constraints report (Report No. 1708139.1-001.V1, September 2018), should be considered for bats where practical.

APPENDIX A

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