

BEFORE THE HEARINGS PANEL

IN THE MATTER

the Resource Management Act
1991

AND

IN THE MATTER

of Proposed Plan Change 9 to
the Operative Hamilton City
District Plan

**STATEMENT OF EVIDENCE BY
PHOEBE ANDREWS ON BEHALF OF
SUBMITTER 457 - DAVID AND
BARBARA YZENDOORN**

(SUBMISSION 457.2)

**Session 1: Historic Heritage Areas, Significant Natural Areas, and Notable Trees
Monday 22 May to Wednesday 7 June 2023.**

DATED 3rd DAY OF MAY 2023

PART 1: INTRODUCTION

Qualifications and experience

1. My name is Phoebe Andrews.
2. I am a Senior Ecologist at Wildland Consultants Ltd. I have been employed as a consultant ecologist at Wildlands since January 2019.
3. I hold a Bachelor of Applied Science, double majoring in Biodiversity Management and Animal Management from the Unitec Institute of Technology (2019).
4. I have been in my current role as a Senior Ecologist at Wildlands since April 2022. I am an experienced generalist ecologist working in terrestrial ecology with a particular focus on flora.
5. I have considerable experience in the preparation of ecological impact assessments and the preparation of ecological management plans to address potential adverse ecological effects.

Involvement in the project

6. I have been asked to prepare ecological evidence on behalf of Submitter 457 (Barbara and David Yzendoorn) who have sought changes to Schedule 9C of the Hamilton City Council's Plan Change 9 via their submissions. Specifically, I will be representing Barbara and David for Submission 457 (the Submission) as it relates to the Significant Natural Area (SNA) identified at 29 Petersburg Drive, Rototuna, Hamilton.
7. I was involved in the original site assessment and am the lead author of the assessment of ecological effects for the proposed development at this site (Appendix 1), which was prepared in February 2021.

Expert witness code of conduct

8. Whilst this is a Council hearing, I confirm that I have read the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note and that I agree to comply with the code. My evidence in this statement is within my area of expertise, except where I state that I am relying upon the specified evidence of another person. I have not omitted to consider material facts known to me that might alter or detract from the opinions which I express.

Role undertaken on behalf of David and Barbara Yzendoorn

9. I have been engaged by David and Barbara Yzendoorn to provide evidence on the classification of vegetation at the site using the Significant Natural Areas assessment criteria, and the potential ecological effects of their proposed development.

Scope of evidence

10. This evidence covers the following:

- I. A summary of the vegetation and habitat types and associated ecological values at 29 Petersburg Drive as per the Assessment of Ecological Effects undertaken by Wildland Consultants in February 2021¹;
- II. An assessment of the vegetation and habitat types at 29 Petersburg Drive against the Waikato Regional Council criteria for describing Significant Natural Areas;
- III. A summary of the Assessment of Ecological Effects undertaken by Wildland Consultants in February 2021² for the proposed development;
- IV. Comment on the review of this assessment undertaken by Ms Georgia Cummings (Tonkin + Taylor Ltd) in June 2021³; and,
- V. Comment on the Hamilton City Council s42A report prepared by Mr Gareth Moran.

PART 2: ASSESSMENT

Summary of vegetation and habitat types at 29 Petersburg Drive

11. I was the lead author in the Assessment of Ecological Effects for the development at 29 Petersburg Drive.
12. I surveyed the site for the original assessment on 2 December 2020. During this visit, I walked around the site and viewed vegetation in difficult to reach areas from vantage points to map and describe the vegetation and habitats and assess their ecological values.
13. My former colleague, Dr Jamie McKay, also visited the site on 4 May 2022 to confirm that habitats had not changed significantly since the Assessment of Ecological Effects was prepared in February 2021.
14. Two terrestrial habitat types are present:
 - a. Planted indigenous vegetation.
 - b. Exotic grassland.

Planted indigenous vegetation

15. The planted indigenous vegetation at the site includes a range of young indigenous pioneer species and later successional forest species. The planting is dominated by tī kōuka (*Cordyline australis*), mānuka (*Leptospermum scoparium*), and māhoe

¹ Wildland Consultants 2021: *Assessment of ecological effects of a proposed development at 29 Petersburg Drive, Hamilton*. Wildland Consultants Ltd Contract Report 5652 prepared for David and Barbara Yzendoorn.

² Wildland Consultants 2021: *Assessment of ecological effects of a proposed development at 29 Petersburg Drive, Hamilton*. Wildland Consultants Ltd Contract Report 5652 prepared for David and Barbara Yzendoorn.

³ Tonkin + Taylor 2021: *RE: 29 Petersburg Drive*. Email from Georgia Cummings (Terrestrial Ecologist, Tonkin + Taylor) to Gillian Cockerell (Principal Planner, Hamilton City Council) dated 29 June 2021.

(*Melicytus ramiflorus*), with occasional kahikatea (*Dacrycarpus dacrydioides*), tītoki (*Alectryon excelsus*), kānuka (*Kunzea robusta*), karamū (*Coprosma robusta*), and kōwhai (*Sophora chathamica*). Planted ground-tier species include harakeke (*Phormium tenax*), giant astelia (*Astelia grandis*), pūrei (*Carex virgata*), and rautahi (*Carex germinata*) along the water margins. Kiokio (*Parablechnum novae-zelandiae*), and shaking brake (*Pteris tremula*) occur naturally within the planted areas. Exotic vines, including blackberry (*Rubus fruticosus*) and bindweed (*Calystegia sepium* × *C. silvatica*), are beginning to establish. Māhoe, tī kōuka, karamu, and kānuka are actively regenerating within and around the planted area. Kānuka occurring on the adjacent property along uphill boundary of the site, is the main source of the latter regeneration.

16. The planted indigenous vegetation is of moderate ecological value as despite being of an early successional stage it provides buffering to the stream and potential habitat for indigenous fauna.
17. This vegetation is not likely to support arboreal gecko species. However, it is likely to provide habitat for indigenous copper skinks (*Oligosoma aeneum*, At Risk – Declining), which have been recorded nearby.
18. There are no trees present that could support roosting habitat for long-tailed bats (*Chalinolobus tuberculatus*; Threatened – Nationally Critical). However, the Department of Conservation bat distribution database (version dated 2 July 2020) contains recent records of long-tailed bats from Witehira Way, c.200 metres north of the property. The site is within the home range of long-tailed bats and it is likely that bats forage around the property.

Exotic grassland

19. The exotic grassland comprises typical urban species, including Yorkshire fog (*Holcus lanatus*), sweet vernal (*Anthoxanthum odoratum*), ryegrass (*Lolium perenne*), browntop (*Agrostis capillaris*), narrow-leaved plantain (*Plantago lanceolata*), wild carrot (*Daucus carota*), and dandelion (*Taraxacum officinale*). Seedlings of blackberry, gorse (*Ulex europaeus*), and Montpellier broom (*Genista monspessulana*) are also establishing within the grassland. Some of the grassland area is also regularly mown.
20. The grassland area is of negligible ecological value as it is dominated by exotic species and provides very limited habitat values for indigenous fauna.

Assessment of the vegetation and habitat types against the SNA criteria

21. Based on the assessment prepared in February 2022, I have undertaken an assessment (Table 1) of the two described vegetation/habitat types against the criteria for determining significance of indigenous biodiversity 11A.
22. The planted indigenous shrubland meets criteria 3 of the SNA criteria on the basis that it likely (although not confirmed) provides habitat for At Risk lizards and Threatened bats, and criteria 11 in the context of the wider landscape as it is part of an important ecological corridor (this network of riparian habitats act as a flight corridor for indigenous bats, and buffer the Te Awa O Katapaki Stream, which discharges into the Waikato River).

Table 1. Assessment of vegetation/habitat types at 29 Petersburg Drive against the criteria for determining significance of indigenous biodiversity.

Criteria	Description	Vegetation/Habitat Type	
		Planted indigenous shrubland	Exotic grassland
1	It is indigenous vegetation or habitat for indigenous fauna that has been specially set aside by statute or covenant for protection and preservation unless the site can be shown to meet none of criteria 3-11.	Not met	Not met
2	It is indigenous vegetation or habitat recommended for protection by the Nature Heritage Fund, or Nga Whenua Rahui committees, or the Queen Elizabeth the Second National Trust Board of Directors, unless the site can be shown to meet none of criteria 3-11.	Not met	Not met
3	It is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are: classed as threatened, at risk, or data deficient; or endemic to the Waikato region.	Although not confirmed, the planted indigenous shrubland is considered likely to provide habitat for indigenous copper skink. Long tailed bats may also forage in this area.	Not met
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.	Not met. While this vegetation type is dominated by indigenous species, it is not the original vegetation, or representative of a natural vegetation type.	Not met
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.	Not met	Not met
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; hydro electric power lakes (excluding Lake Taupo); water storage for irrigation; or water supply storage; unless in those instances they meet the criteria in Whaley et al. (1995).	Not met	Not met
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.	Not met	Not met

Criteria	Description	Vegetation/Habitat Type	
		Planted indigenous shrubland	Exotic grassland
8	It is aquatic habitat (excluding artificial water bodies, except for those created for the maintenance and enhancement of biodiversity or as mitigation as part a consented activity) that is a portion of a stream, river, lake, wetland, intertidal mudflat or estuary, and their margins, that is critical to the self-sustainability of an indigenous species within a catchment of the Waikato region and which contains healthy, representative populations of that species. 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 pathways.	Not met	Not met
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 use (e.g. stock, discharges, erosion), can maintain its ecological sustainability over time.	Not met	Not met
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.	Not met	Not met
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.	Met – This vegetation forms part of an important ecological corridor for long-tailed bats, and is likely to be used by indigenous birds and At-Risk species of lizards (copper skink).	Not met. Does not contribute buffer or linkage services, or form part of the corridor.
Outcome		Significant	Not Significant

Summary of the assessment of potential adverse effects for the proposed development as per Wildlands (2021)

23. Regardless of the classification of the planted indigenous vegetation as SNA, the potential adverse ecological effects (before mitigation) of the loss of some of this vegetation are expected to be low to moderate.

24. The potential adverse ecological effects of the removal of indigenous vegetation and on indigenous fauna can be addressed by:
- c. Replacement planting.
 - d. Enhancement of retained vegetation.
 - e. Fauna management.
25. Provided these measures are appropriately implemented, the overall level of effect is considered to be very low.

Comment on the Tonkin and Taylor review of the Assessment of Ecological Effects

26. Ms Georgia Cummings reviewed the Assessment of Ecological Effects for the proposed development and concluded that the recommended measures to address potential adverse ecological effects are adequate. Her conclusion is due to the following reasons:
- a. *"The vegetation being removed comprises relatively young plantings; no mature or naturally established vegetation is being removed.*
 - b. *Based on the vegetation description in the ecology assessment the existing planting is degraded by incursions of a number of different weeds.*
 - c. *As such, the existing planting has limited habitat value for terrestrial fauna and the removal of a small area (230 m²) at the top of the slope is unlikely to have a notable adverse impact on terrestrial or aquatic values.*
 - d. *Hence, I consider the replacement planting of 156 m² in combination with the proposed enhancement of the retained plantings (535 m²) is adequate in this instance."*
27. Ms Cummings states that the remaining planted indigenous vegetation and any additional planted vegetation should be protected with a covenant. She also states that it essential that the details of how the proposed planting and enhancement of retained vegetation will be undertaken are outlined in the conditions to allow her to have confidence that the proposed methods will provide the desired results.
28. The classification of the planted indigenous vegetation as SNA does not change the magnitude or level of the ecological effects of the proposed development, and as such Ms Cummings assessment is still considered relevant.

Comment on the Hamilton City Council s42A report

29. In his s42A report for the consent application, Mr Moran concludes that the proposal will not generate more than minor ecological effects. This is based on the advice received from Ms Cummings and the implementation of her recommendations being included as consent conditions.

Comment on the impact of the SNA status on the Assessment of Effects

30. The assessment of the significance of the vegetation/habitat types at 29 Petersburg Drive is in line with the original assessment of values undertaken in February 2021, and remain unchanged. As such, regardless of the classification of SNA, the original assessment of effects is still considered appropriate from an ecological perspective.
31. As agreed upon by Ms Cummings, provided these measures are appropriately implemented, the overall level of effect of the development (which includes the removal of c.230 m² of planted indigenous shrubland) is considered to be very low.

Phoebe Andrews

3 May 2023

**APPENDIX 1: Assessment of ecological effects for a proposed development at
29 Petersburg Drive, Hamilton**

ASSESSMENT OF ECOLOGICAL EFFECTS FOR A PROPOSED DEVELOPMENT AT 29 PETERSBURG DRIVE, HAMILTON



 providing
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ASSESSMENT OF ECOLOGICAL EFFECTS OF A PROPOSED DEVELOPMENT AT 29 PETERSBURG DRIVE, HAMILTON



Mown lawn at 29 Petersburg Drive. 2 December 2020

Contract Report No. R5652

February 2021

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Reviewed and approved for release by:



Nick Goldwater
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1. INTRODUCTION

Bilmoria Consulting Ltd, on behalf of Yzendoorn Developments Ltd, has lodged a resource consent application under the Hamilton City Operative District Plan to construct a duplex residential dwelling at 29 Petersburg Drive, Hamilton. The proposed development encroaches on the ten-metre riparian zone and therefore requires resource consent. Wildland Consultants Ltd prepared an Assessment of Ecological Effects for the development in November 2017¹.

In September 2020, the client received a request for further information from Hamilton City Council under Section 92 of the Resource Management Act 1991 (s29 request), as outlined below:

- *Providing information to clearly show and quantify the extent of vegetation removal in the (RGHA in reference to Rule 22.5.4(e) of the ODP, and addressing how the relevant objectives and policies of Natural Hazard section are being met.*
- *Providing details on the measures undertaken to ensure the plant regrowth occurring in the gully system is protected and enhanced.*
- *Providing revisions to:*
 - a) *Quantum and extent of each habitat type to be lost; and*
 - b) *Potential ecological effects of the development from both a terrestrial and aquatic viewpoint.*
- *Assessing potential effects of enabling works and construction on bats, lizards and birds which are protected under the Wildlife Act 1953, and detailing proposed measures to avoid, remedy or mitigate those effects particularly during enabling works, if required.*
- *Assessing potential long-term effects of the project on bats, lizards and birds, and detailing proposed measures to avoid, remedy or mitigate those effects, if required.*
- *Providing commentary on the potential effects of the development in terms of Policy 21.2 of the Hamilton City Council Operative District Plan (ODP), considering the site lies directly adjacent to Significant Natural Area No. 3 identified within Schedule 9c of Appendix 9 and Planning Map 8B of the ODP.*

Since Wildlands completed an Assessment of Ecological Effects in 2017, the development plans have been altered, removing the need to alter the waterways at the site. Bilimoria Consultants Ltd has requested that Wildland Consultants Ltd provide a revised ecological assessment of the property to address this S92 request.

This report provides an assessment of the ecological effects of the new proposed development, and includes:

¹ Wildland Consultants 2017. Assessment of Ecological Values at Petersburg Drive, Rototuna, Hamilton. Wildland Consultants Ltd Contract Report 4472 prepared for Bilmoria Consulting Ltd. 35 pp.

- Maps and descriptions of the vegetation and habitat types present;
- An assessment of the ecological values of vegetation and habitat types;
- Descriptions of the magnitude and extent of potential ecological effects resulting from the proposed vegetation clearance and construction works; and
- Opportunities to avoid, minimise, or mitigate potential adverse ecological effects.

2. ECOLOGICAL CONTEXT

2.1 Vegetation

The site is located in the suburb of Flagstaff within the Hamilton Ecological District, which has only 1.6% of indigenous vegetation remaining (Leathwick *et al.* 1995). Historically, the entire local area would have been covered with indigenous lowland forest, with areas of swamp forest and peat wetlands on flatter poorly-drained land. The lowland forests would have been podocarp broadleaved forest characterised by tawa (*Beilschmiedia tawa*), mangeao (*Litsea calicaris*), kohekohe (*Dysoxylum spectabile*), rewarewa (*Knightia excelsa*), pukatea (*Laurelia novae-zelandiae*), rimu (*Dacrydium cupressinum*), matai (*Prumnopitys taxifolia*), kahikatea (*Dacrycarpus dacrydioides*), and totara (*Podocarpus totara*). Matai would have been dominant on fertile well-drained soils. Alongside streams and rivers, these species would have intermingled with kowhai (*Sophora microphylla*) and mānatu (ribbonwood; *Plagianthus regius*).

Swamp forests were dominated by kahikatea, with an understorey of pukatea, tawa, māhoe (*Melicactus ramiflorus*), and tītoki (*Alectryon excelsus*), with tī kōuka (*Cordyline australis*) and pōkākā (*Elaeocarpus hookerianus*) on the margins.

Wetland vegetation would have included harakeke (*Phormium tenax*), mānuka (*Leptospermum scoparium*), sedges (e.g. *Carex* spp., *Cyperus ustulatus*), mānatu, pōkākā, and tī kōuka along with lianes such as kohia (*Passiflora tetrandra*), kaihua (*Parsonsia* spp.), and *Fuchsia perscandens* (Clarkson *et al.* 2002; Clarkson *et al.* 2007; Champion 1997).

Wetlands associated with stream margins would have included stands of kahikatea, mānuka, and flax with emergent raupō (*Typha orientalis*), spike rush (*Eleocharis spachelata*), twig rush (*Machaerina* sp.), and clubrush (*Schoenoplectus tabernaemontani*), charophytes, and a range of other emergent aquatic macrophytes, including *Myriophyllum robustum*.

In the process of land clearance for farming, all forest at the site within the local area been cleared, and areas of peat have been drained. Subsequent subdivision has involved some further loss of indigenous vegetation and urban development has dramatically increased the number of exotic species in the landscape (Clarkson *et al.* 2002). Locally there has also been some replanting of indigenous species along the banks of the Te Awa O Katapaki Stream.

2.2 Geology

The Waikato basin soils on alluvial terraces and rolling and hilly lands consist of deep, silty and well-drained weathered brown volcanic ash, derived from Pleistocene pumiceous alluvium and conglomerate. The soils of the alluvial plains are characterised by a mixture of free-draining allophanic levee soils, slower-draining gleyed swale soils, organic raised-bog soils with mixed recent soils, gley soils, and pumice alluvium soils on the floodplain terraces beside the rivers. (McEwen 1987).

Gullies were formed by the erosion of the Waikato basin plain and river terraces by springs and seepages. Their soils are characterised by free-draining scarp soils interrupted by seepages, with organic soils in the gully floor, and some gleyed soils in the tributary gullies, (McEwen 1987, Collier *et al.* 2010).

2.3 Local context

The site is located between Rotokauri Road and Avalon Drive and is part of the major gully system of Te Awa O Katapaki Stream. Immediately downstream and adjacent to the site is the southern limit of an identified Significant Natural Area (SNA). The stream discharges to the northwest into the Waikato River and has an important role in stormwater management for the Rototuna area, and is also part of a green open space corridor. The area is currently surrounded by recent residential development after a long history of farming.

The 29 Petersburg Drive site comprises a c.1,800 m² lot, including about 800 m² of vegetated riparian margin, at the confluence of two branches of the Te Awa o Katapaki Stream. The site comprises mown grass and rank grass with plantings of indigenous woody species buffering the stream.

3. METHODS

3.1 Vegetation and habitat survey

The site was surveyed on 2 December 2020, during which all vegetation and habitat types were identified and mapped. The current ecological values of these vegetation and habitat types were also assessed. All vascular plant species observed were recorded and are presented in Appendix 1. Vegetation and habitat types were digitised onto aerial imagery using ArcGis10.7.

3.2 Fauna survey

Targeted fauna surveys were beyond the scope of this report, however the suitability of the vegetation at the site to provide habitat for key indigenous fauna species was assessed and all fauna species observed at the site were recorded. Fauna species for which habitat values were specifically considered include (but are not limited to):

- Long-tailed bat (*Chalinolobus tuberculatus*).
- Forest gecko (*Mokopirirakau granulatus*).
- Elegant gecko (*Naultinus elegans*).

- Copper skink (*Oligosoma aeneum*).
- Ornate skink (*O. ornatum*).

3.3 EIANZ guidelines for use in New Zealand

The Environment Institute of Australia and New Zealand (EIANZ) guidelines for undertaking assessments of ecological effects in New Zealand (Roper-Lindsay *et al.* 2018) have been referred to when preparing this report. The ecological values of affected vegetation and habitats, and the magnitude and extent of the potential adverse ecological effects associated with the proposed duplex development have been evaluated using the methods described in the EIANZ guidelines. Professional opinion and expertise have been applied throughout the assessment to ensure that the results are ecologically robust.

4. VEGETATION AND HABITATS

4.1 Overview

Three main terrestrial vegetation types were recorded at the site (Figure 1):

- Planted indigenous vegetation
- Rank grass
- Mown lawn

These vegetation types are described below and are illustrated in Figure 1. Site photographs are provided in Appendix 1.

4.2 Terrestrial habitats

4.2.1 Planted indigenous vegetation (Vegetation Type 1, c.765 m²)

The planted areas at the site include a range of young indigenous pioneer species and later successional forest species. The planting is dominated by tī kōuka, mānuka, māhoe, and harakeke, with occasional kahikatea, tītoki (*Alectryon excelsus*), kānuka (*Kunzea robusta*), karamu (*Coprosma robusta*), and kōwhai. Planted ground-tier species include harakeke, giant astelia (*Astelia grandis*), pūrei (*Carex virgata*), and rautahi (*Carex germinata*) along the water margins. Kiokio (*Parablechnum novae-zelandiae*), and shaking brake (*Pteris tremula*) occur naturally within the planted areas. Exotic vines, including blackberry (*Rubus fruticosus*) and bindweed (*Calystegia sepium* × *C. silvatica*), are beginning to establish.

Māhoe, tī kōuka, karamu, and kānuka are actively regenerating within and around the planted area. Kānuka occurring on the adjacent property along uphill boundary of the site, is the main source of the latter regeneration.



4.2.2 Exotic grassland (Vegetation Type 2, c.258 m²)

The exotic grassland comprises typical urban species, including Yorkshire fog (*Holcus lanatus*), sweet vernal (*Anthoxanthum odoratum*), ryegrass (*Lolium perenne*), browntop (*Agrostis capillaris*), narrow-leaved plantain (*Plantago lanceolata*), wild carrot (*Daucus carota*), and dandelion (*Taraxacum officinale*). Seedlings of blackberry, gorse (*Ulex europaeus*), and Montpellier broom (*Genista monspessulana*) are also establishing within the grassland.

4.2.3 Mown lawn (Vegetation Type 3, c.408 m²)

The mown lawn lies adjacent to the road berms and extends as far as the planted areas or rank grass area. It is of similar species composition as the rank grass, although it is maintained through regular mowing.

4.3 Aquatic habitats

The stream edges have been armoured using rock-filled gabion baskets and occasional banks of sediment have built up along some edges. The stream is only shaded along the edge by adjacent plantings. However, the upstream reaches of both Te Awa O Katapaki Stream and the small tributary which flows through the site are well-shaded with grey willow (*Salix cinerea*) and other exotic and indigenous species, including kānuka, tree ferns (*Cyathea* and *Dicksonia* species), māhoe, and tree fuchsia (*Fuchsia excorticata*). The stormwater easement banks within the site are covered with planted indigenous woody vegetation (Section 4.2.1).

The stormwater easement supports a number of aquatic macrophytes, including parrot's feather (*Myriophyllum aquaticum*), willow weed (*Persicaria* sp.), watercress (*Nasturtium officinale*), starwort (*Callitriche stagnalis*), and algae. The water is opaque and brown, mainly due to peat staining in the catchment, although there is also some waterfowl disturbance. The water of the tributary and main stream is similar.

5. FLORA

Twenty-three indigenous and 26 exotic plant species were recorded during the survey (Appendix 2). Two indigenous species (kānuka and mānuka) have recently had their threat classification raised by de Lange *et al.* (2018). Kānuka is now classified as 'Threatened-Nationally Vulnerable' and mānuka is classified as 'At Risk-Declining'. This is a precautionary measure due to the threat that myrtle rust (*Austropuccinia australis*) poses to species in the myrtle family. No other indigenous species recorded are classified as nationally or regionally threatened.

Pest plant species such as blackberry, bindweed, and pampas (*Cortaderia selloana*) are beginning to establish on the indigenous planting and stream edges. Other pest plants such as gorse, Japanese honeysuckle (*Lonicera japonica*), Chinese privet (*Ligustrum sinense*), and hawthorn (*Crataegus monogyna*) are beginning to invade from the neighbouring properties (Appendix 2).

6. FAUNA

6.1 Avifauna

Targeted bird surveys were beyond the scope of this report; however, incidental bird observations were recorded. Three indigenous and five exotic bird species were recorded at the site. None of the bird species recorded is classified as ‘Threatened’ or ‘At Risk’ as per Robertson *et al.* (2017).

Indigenous species recorded at the site include:

- white-faced heron (*Ardea novaehollandiae*)
- pūkeko (*Porphyrio melanotus*)
- welcome swallow (*Hirundo neoxena neoxena*)

Exotic species recorded at the site include:

- house sparrow (*Passer domesticus*)
- chaffinch (*Fringilla coelebs*)
- song thrush (*Turdus philomelos*)
- mallard (*Anas platyrhynchos*)
- blackbird (*Turdus merula*)

Other indigenous and exotic birds are also likely to use the vegetation at the property for nesting and foraging.

6.2 Aquatic fauna

A fish survey was beyond the scope of this report; however, there are 25 fish surveys recorded in the New Zealand Freshwater Fish Database (NIWA 2020) in Te Awa O Katapaki Stream. These records are dated 2020-2009 and 1984, and utilised a range of electrofishing and trapping methods.

The fish species recorded during these surveys are listed in Table 1 below. Threat classifications for fish and invertebrates are taken from Dunn *et al.* (2017) and Grainger *et al.* (2018) respectively. The likelihood of each species being found during any survey of this waterway is based primarily on how frequently they are recorded in the local and wider area, number of individuals found in each survey, altitude, and distance inland.

Table 1: Freshwater fish and invertebrate species recorded in Te Awa O Katapaki Stream (NIWA 2020).

Scientific Name	Common Name	Threat Classification	Likelihood
<i>Anguilla australis</i>	Shortfin eel	Not Threatened	High
<i>Retropinna retropinna</i>	Common smelt	Not Threatened	Medium
<i>Gambusia affinis</i>	Gambusia	Introduced	Medium
<i>Gobiomorphus cotidianus</i>	Common bully	Not Threatened	Low
<i>Galaxias maculatus</i>	Inanga	At Risk - Declining	Low
<i>Ameiurus nebulosus</i>	Catfish	Introduced	Low
<i>Galaxias argenteus</i>	Giant kokopu	At Risk - Declining	Low
<i>Anguilla dieffenbachii</i>	Longfin eel	At Risk - Declining	Low
<i>Oncorhynchus mykiss</i>	Rainbow trout	Introduced	Low

Prior to the catchment's urbanisation, the macroinvertebrate community index (MCI) values in Te Awa O Katapaki Stream were quite high for a lowland, soft-bottomed stream (Hicks *et al.* 2001). The high diversity of macroinvertebrates indicated good water quality.

6.3 Long-tailed bats

The Department of Conservation bat distribution database (version dated 2 July 2020) contains recent records of long-tailed bats from Witehira Way, c.200 metres north of the property. The site is within the home range of long-tailed bats (O'Donnell 2001) and it is likely that bats forage around the property.

6.4 Herpetofauna

No lizard species were observed at the site. The Department of Conservation Herpetofauna database records one species of indigenous lizard (copper skink; *Oligosoma aeneum*) and one species of exotic lizard (plague skink; *Lampropholis delicata*) introduced from Australia (Table 2), and two Australian frog species within the wider Hamilton area (within 10 kilometres) over the last 50 years.

The site does not contain the type of habitat that is likely to support arboreal gecko species. However, the vegetation present along the extent of the gully on adjacent properties is likely to provide habitat for indigenous copper skinks, which have been recorded nearby. As such, the rank grassland along the stream banks and the planted riparian vegetation at the site may provide habitat for copper skink. Exotic green and golden bell frog (*Litoria aurea*) and southern bell frog (*L. raniformis*) have also been recorded nearby and may be present in the pond.

Table 2: Herpetofauna species that have been recorded within 10 km² of 29 Petersburg Drive, Flagstaff (Opus 2014, van Winkel 2013). Threat classifications are from Hitchmough *et al.* (2016).

Scientific Name	Common Name	Threat Classification
<i>Lampropholis delicata</i>	Plague skink	Introduced and naturalised Unwanted Organism ¹
<i>Oligosoma aeneum</i>	Copper skink	Not Threatened
<i>Litoria aurea</i>	green and golden bell frog	Introduced and naturalised
<i>Litoria raniformis</i>	southern bell frog	Introduced and naturalised

6.5 Introduced pest mammals

Signs of rabbit (*Oryctolagus cuniculus*) were recorded during the site visit on 2 December 2020. Other pest animals likely to be present at the site include possums (*Trichosurus vulpecula*), ship rats (*Rattus rattus*), Norway rats (*R. norvegicus*), mice (*Mus musculus*), and hedgehogs (*Erinaceus europaeus*). Mustelids (stoats, *Mustela erminea*; ferrets, *M. furo*; and weasels, *M. nivalis vulgaris*) may also use the site occasionally.

7. ECOLOGICAL VALUES

7.1 Terrestrial and riparian values

The proposed clearance footprint of 673 m² is located on the edge of indigenous plantings buffering a permanent stream. Most of the vegetation in the clearance footprint is exotic grassland and mown lawn (423 m²) with the removal of approximately c.230 m² of indigenous riparian vegetation being proposed leaving 535 m².

The riparian vegetation provides important ecological services for freshwater ecosystems, including shading, nutrient absorption and filtration, reducing stormwater run-off, and mitigating the effects of flooding. The canopy and ground-tier vegetation also provides potential habitat for indigenous ground dwelling skinks, birds (mostly waterfowl), and invertebrate species. The site provides potential foraging habitat for long-tailed bats given its proximity to a major watercourse.

Overall, the vegetation has limited structural diversity and a low diversity of indigenous plant species. Nesting habitat for terrestrial birds is limited and there are no trees present that could support roosting habitat for long-tailed bats. The mown areas of grassland have negligible ecological values for indigenous fauna or flora. The watercourses are also utilised by pūkeko (*Porphyrio melanotus*) and white-faced heron (*Ardea novaehollandiae*).

¹ Ministry of Agriculture and Fisheries (MAF) Biosecurity New Zealand (7 July 2010), under the Biosecurity Act 1993.

Taking into account the potential for indigenous ground-dwelling skinks to be present and the riparian values of the vegetation, the overall ecological values of the site are considered to be 'moderate' (Table 3).

Table 3: Ecological value assessment for affected ecological feature (as per the Roper-Lindsay *et al.* 2018).

Ecological Values	Attributes to be considered	Assigned Value
Vegetation and habitats in proposed clearance	<u>Representativeness</u> Vegetation mostly consists of exotic grassland. Riparian vegetation is dominated by young regenerating indigenous woody species, lacking forest tiers. Some indigenous sedges and ferns naturally establishing.	Moderate
	<u>Rarity/distinctiveness</u> Two threatened flora species were observed; however, the site provides potential habitat for species of indigenous skinks and foraging habitat for long-tailed bats.	Moderate
	<u>Diversity & Pattern</u> Modified environment lacking species diversity. May provide habitat, or habitat-linkages for indigenous fauna.	Low
	<u>Ecological Context</u> Part of a larger ecological feature providing linkages for indigenous fauna to move across the wider landscape. Small area of indigenous vegetation buffers permanent stream. Provides some ecological benefits to the stream through shading and input of organic matter.	High
	Overall Ecological Value	Moderate

7.2 Aquatic values

The permanent stream at the site is likely to provide habitat for indigenous fish species, although the likelihood of indigenous fish classified as 'At Risk' or 'Threatened' per Dunn *et al.* (2018) being present is low. Acknowledging that permanent streams provide abiotic functions such as drainage and filtration, and maintenance of hydrological regimes within catchments, the value of the stream is considered to be 'moderate' (Table 4).

Table 4: Ecological value assessment for affected ecological feature (as per the Roper-Lindsay et al. 2018).

Ecological feature	Attributes to be considered	Assigned Value
Aquatic Values (Permanent Stream)	<u>Representativeness</u> Permanent stream has been modified through historic grazing and urbanization.	Low
	<u>Rarity/distinctiveness</u> Provides potential habitat for indigenous fish species which have been identified in the catchment, however the likelihood of 'At Risk' or 'Threatened' species occurring in the stream is low.	Moderate
	<u>Diversity & Pattern</u> The stream contains moderate to good riparian buffering and a diversity of in-stream habitats. The corresponding diversity is likely to be moderate.	Moderate
	<u>Ecological Context</u> Part of a larger catchment connected to the Waikato River	High
	Overall Ecological Value	Moderate

7.3 Summary

The vegetation present within the proposed works area mostly consists of exotic grassland with indigenous vegetation along the riparian margin. The vegetation provides potential habitat for indigenous birds and skinks, and potential foraging habitat for long-tailed bats. The stream has moderate ecological value as it is part of a wider stream ecosystem and provides potential habitat for indigenous fish and macroinvertebrates. The indigenous vegetation along the riparian margins provides moderate ecological values, as the young woody vegetation buffers the stream but only provides minimal shading.

8. POTENTIAL ADVERSE ECOLOGICAL EFFECTS

8.1 Overview

Clearance of approximately c.230 m² of riparian vegetation and 423 m² of exotic grassland and mown exotic grassland will be required for the proposed development. Potential adverse effects of the proposed development can be summarised as:

- Loss of vegetation
- Loss of indigenous fauna habitats
- Injury and/or mortality of indigenous birds and lizards
- Stream sedimentation
- Stormwater run-off and contamination of receiving environments

Each of these effects is described in detail below. The magnitude of each effect has been defined as outlined in the EIANZ guidelines. The level of the effects has been classified.

A summary table (Table 5) is provided at the end of this section to illustrate the time frame, magnitude, value of the affected ecological feature, and overall level of each of these effects.

8.2 Loss of vegetation

A total of *c.*230 m² of planted indigenous vegetation and *c.*423 m² of exotic vegetation will be cleared to facilitate the proposed development. As the vegetation at the site provides little shade to the stream and is relatively young, the proposed clearance will represent a minor shift to the existing baseline condition of the site. As such, the magnitude of this effect is considered to be ‘moderate’ in the local context of the site.

8.3 Loss of indigenous fauna habitats

Proposed works at the site will result in the permanent loss of habitat for indigenous birds and lizards. With the retention of most of the riparian vegetation at the site (*c.*535 m² of 764 m²), foraging and nesting habitat will still be available on the property following the completion of the development. As such, displaced birds are likely to return to the site following construction. If indigenous lizards are present, the proposed vegetation clearance will result in a reduction in the available habitat for these species. However, given the small size of the clearance area and the retention of most of the indigenous riparian habitat, the magnitude of effect is likely to be ‘low’.

8.4 Injury and/or mortality of indigenous birds

The bird species that occur at the site are highly mobile and the noise and movement associated with the vegetation removal and construction of the dwelling is likely to deter them from the site before they are harmed. However, if active indigenous bird nests are present in the affected vegetation at the time of removal, the adult birds, chicks, and/or eggs may be harmed or destroyed. Any harm to individual birds is likely to have a negligible effect on the overall population of these species, and the magnitude of this effect is expected to be ‘low’.

8.5 Injury and/or mortality of indigenous lizards

There is the risk that lizards may be injured or killed during the clearance works. Any such harm is likely to represent the loss of a moderate proportion of a possible population of indigenous skinks, and the magnitude of this effect is considered to be at least ‘moderate’.

8.6 Disturbance of long-tailed bats

No potential roosting habitat for long-tailed bats will be lost through development of the site. Additional light and noise associated with the construction of a new duplex dwelling may discourage bats from using riparian habitats at the property and this is discussed in more detail below, particularly in relation to the recent Environment Court hearing for the Amberfield subdivision.

The Amberfield subdivision application proposes to put a large number of dwellings in a rural area that is known to provide high-quality habitat for long-tailed bats. The initial design of the proposed subdivision would have resulted in the loss of foraging and commuting habitat through increased light levels. The recent interim Environment Court Decision for the subdivision states that an acceptable upper light limit for bats is 0.3 lux and that light levels should be less than 0.1 lux to protect high quality bat habitat. The decision now requires that light spill should be attenuated to 0.1 lux within three metres of the boundary of the Bat Protection Area. Lights in public areas are to have a temperature of 2,700 Kelvins and those in residential areas are to have a temperature of 3,000 Kelvins.

Unlike the Amberfield subdivision, the proposed duplex development at 29 Petersburg Drive is to be located in a residential area alongside a section of a gully that likely provides at best moderate foraging habitat for bats. The positive bat detection in 2019 (Section 6.3) was on Witehira Way where the riparian vegetation is characterised by mature trees, rather than the young indigenous plantings and open grassed areas at 29 Petersburg Drive. In addition to the existing dwellings on both sides of the gully, it is noted that there are several streetlights on Petersburg Drive that cause light spill into the gully, including one that is less than 10 metres from the edge of the stream. Based on a brief search of street lighting design it seems that LED streetlights produce 16-20 lux immediately below the light and the light level is still potentially greater than 1.0 over 20 metres from the streetlight. It is not known what lighting temperature the streetlights are.

The impacts of noise on long-tailed bats are less well-understood and noise thresholds for the protection of long-tailed bats have not been developed. There is evidence that increases in overnight traffic volumes lead to decreases in bat activity (Borkin *et al.* 2019); however, it is not known whether it is noise or light that has the greater impact on bat activity. It is considered unlikely that the two new dwellings will lead to a significant increase in noise levels compared to the current situation.

The existing light and noise environment and the low-stature vegetation mean that the section of gully adjacent to 29 Petersburg Drive is unlikely to be core bat habitat. It is therefore considered unlikely that the additional dwellings will have a negative impact on long-tailed bats in either the short or long-term. The magnitude of effect on long-tailed bats is considered to be 'low'. Despite this, measures to minimise light spill into the stream will be adopted and these are outlined in Section 10.4.2.

8.7 Stream sedimentation

Carrying out earthworks within the riparian margin has the potential to result in sediment discharge into the stream environment. The discharge of sediment from earthworks has the potential to result in a major alteration of receiving stream habitats. In the absence of mitigation, the magnitude of the effect on streams is therefore 'high'.

8.8 Stormwater run-off and contamination of receiving environments

Proposed development will increase the area of impermeable surfaces at the property. Surface run-off from impermeable ground can greatly increase the volume and rate of stormwater flow. After heavy rainfall events, large volumes of fast-moving water flows into gullies and streams, creating a scouring effect that is harmful to aquatic fauna and can result in streambank erosion and sedimentation. Roofs, roads, and driveways are the main contributors to surface run-off.

In the context of the wider catchment, the effect of increased stormwater run-off will result in a minor shift away from existing baseline conditions. While the change arising may be discernible, the underlying character, composition and attributes of the receiving environments will remain similar. As such, the magnitude of this effect is considered to be 'low'.

8.9 Cumulative effects

The adverse ecological effects of the proposed development on the current ecological values at 29 Petersburg Drive are low. However, it is important to note that the cumulative effects of developments of this type on a broader scale are likely to have a much larger impact on the surrounding ecology.

Individual developments that encroach into the riparian buffer zone, as proposed at 29 Petersburg Drive, may have low to moderate ecological effects when assessed on a case-by-case basis. When these effects are considered together, however, the overall adverse effects of many small developments can cause significant habitat loss across the wider landscape.

8.10 Summary

Overall, the level of ecological effects of the proposed development at 29 Petersburg Drive on current ecological values is expected to be low to moderate (Table 5).

Table 5: Summary of the potential adverse ecological effects of the proposed development at 29 Petersburg Drive.

Potential Adverse Effect	Ecological Feature Affected	Timescale of effect	Ecological Value	Magnitude of effect	Level of Effect ¹
Loss of riparian vegetation and terrestrial habitats	Terrestrial/riparian values, aquatic values, indigenous fauna	Permanent	Moderate	Moderate	Moderate
Injury and/or mortality of indigenous birds	Indigenous fauna	Temporary	Moderate	Low	Low
Injury and/or mortality of indigenous lizards	Indigenous fauna	Temporary	Moderate	Moderate	Low
Disturbance of long-tailed bats	Indigenous fauna	Temporary	Moderate	Low	Low
Stream sedimentation	Aquatic values	Temporary	High	High	Very High
Contamination of receiving environments	Aquatic values	Temporary	High	Low	Low

¹ Based on a combination of assigned ecological value and magnitude, as per Table 10 of the EIANZ (2018) guidelines. This level of effects is based on no ecological management being carried out.

9. OTHER RELEVANT LEGISLATION

9.1 Waikato Riverbank and Gully Hazard Area (WRGHA) of the ODP

The proposed development site is located within the Waikato Riverbank and Gully Hazard Area (WRGHA) and is subject to the following policies:

‘Policy 22.2.1l: New use and development which is vulnerable to the adverse effects of land instability shall avoid the Waikato Riverbank and Gully Hazard Area, where the adverse effects and risks have not been minimised to an acceptable or tolerable level.’

‘Policy 22.2.1m: New use and development which is resilient to the adverse effects of land instability shall be provided for in the Waikato Riverbank and Gully Hazard Area.’

The site is not considered to be ‘unstable’. Construction of the duplex residential dwelling, along with additional enhancement planting and the protection and enhancement of the remaining riparian buffer will provide good coverage of the land, reducing soil loss in the long-term, especially as trees are more effective at reducing soil loss than exotic grass. Soil loss and stormwater runoff are to be managed with an approved sediment and erosion control plan (Section 10.4), which will reduce the risks to the wider catchment.

9.2 Policy 21.2 of the Hamilton City Council Operative District Plan (ODP)

The proposed development is located directly adjacent to a Significant Natural Area (SNA: No. 3). Policy 21.2.1f of the Hamilton City Council Operative District Plan (ODP) requires that the connectivity between the SNA and wider gully system is not lost or disrupted and that the connectivity and protective buffering capacity of indigenous ecosystems is not lost.

'Policy 21.2.1f: The loss or disruption of corridors or connections provided by the Waikato River corridor and gully systems which link indigenous ecosystems and habitat fragments shall be avoided.'

'Policy 21.2.1g: The connectivity and protective buffering of indigenous ecosystems provided by the Waikato River Corridor and gully system shall be maintained'.

The proposed development of the site into a duplex residential dwelling will not result in the connection between the gully system and SNA being lost. The buffering capacity provided by the gully system to the SNA will be disrupted initially during construction, with the removal of some riparian vegetation. However, the buffering capacity will be enhanced in the long-term, with enhancement planting proposed and the protection and enhancement of the remaining riparian vegetation upon completion of the work (Section 10.1).

9.3 Wildlife Act 1953

All indigenous lizards and birds and some indigenous invertebrates are protected under the Wildlife Act (1953), irrespective of the level of effects on indigenous fauna described above. A permit under the Wildlife Act must be obtained from the Department of Conservation before any indigenous lizards, bats, or birds and/or their habitats can be disturbed, handled, translocated or killed.

If indigenous lizards are present within the project footprint then a Wildlife Act Authority (WAA) must be applied for and approved by the Department of Conservation before activities affecting fauna may commence (Section 10.3.1). This will require the submission of a species-specific management plan along with the appropriate application form.

10. OPPORTUNITIES TO AVOID, REMEDY OR MITIGATE POTENTIAL ADVERSE EFFECTS

10.1 Overview

Vegetation clearance within the riparian zone has been minimised through the planning and placement of the duplex, although it cannot be avoided completely. As the overall adverse ecological effects of the riparian margin works are expected to range from low to high, measures to reduce ecological impact should be implemented, including:

- Enhancement planting

- Enhancement of retained vegetation
- Fauna management
- Stormwater and sediment management

10.2 Enhancement planting

Planting indigenous species will provide compensation for the proposed loss of riparian vegetation. It is recommended that an open area (156 m²) to the south of the proposed riparian vegetation clearance is replanted following the completion of work, using shrub and tree species, such as kānuka, koromiko (*Veronica stricta*), kahikatea, tōtara, mānuka, and tī kōuka.

All plants should be appropriately eco-sourced from the Hamilton Ecological District. Regular maintenance and pest plant control will be required to ensure that the plants establish successfully. Planted and retained (see below) vegetation should be protected in perpetuity through a covenant. Enhancement planting should be guided by an Ecological Management Plan (EMP).

10.3 Enhancement of retained vegetation

Alongside providing new plantings (Section 10.2) to replace the lost vegetation, it is proposed to further mitigate the ecological impacts by protecting and enhancing the remaining vegetation. Pest plant control is recommended throughout the remaining riparian vegetation together with infill planting where required. Pest plant control and infill planting should be guided by an EMP.

10.4 Fauna management

10.4.1 Birds

If possible, the removal of any of the larger trees or shrubs at the site should occur outside of the bird breeding season (August-February inclusive). This will reduce disturbance to resident birds. If trees or shrubs that may contain indigenous bird nests must be removed within the bird breeding season (for example, to coincide with lizard management), they should be inspected for signs of nesting before felling occurs. Trees that contain indigenous bird nests should only be felled once the chicks have fledged.

10.4.1 Lizards

All indigenous lizards are protected by the Wildlife Act (1953). Given the proposed works will involve the disturbance and clearance of groundcover vegetation, a preliminary lizard survey should be undertaken in the works area. If indigenous lizards are detected during this survey, lizard management will be required before clearance activities can proceed. This will include the preparation of a Lizard Management Plan (LMP), which is a document that determines how to best manage lizards at the site, and is a requirement for gaining a Wildlife Authority Act from the Department of Conservation. If indigenous lizards are not detected, the works could proceed without the need for lizard management, pending approval by the Department of Conservation.

10.4.2 Long-tailed bats

The following measures are proposed to reduce potential impacts on long-tailed bats by minimising light spill into the gully:

1. Adopt bat sensitive lighting design:
 - a. All external light fittings will be directed away from the gully and be fitted with bulbs that have minimal light spill
 - b. All external light fittings will be triggered by movement sensors to minimise the duration of potential light impact
 - c. Light fittings and bulbs used will be selected according to recommendations from international literature and consultation with the Bat Recovery Group and the Department of Conservation
2. Plant large-grade and fast-growing indigenous tree species along the driveway edge to provide screening as the trees mature. Suitable species include lacebark (*Hoheria populnea*) and wineberry (*Aristotelia serrata*).

10.5 Stormwater and sediment management

A sediment and erosion control plan must be approved by council before earthworks take place. Sediment and erosion control methods must follow current best practice guidelines (e.g. WRC Technical Publication TR 2009/02¹).

10.6 Summary

Table 6 provides a summary of the level of potential adverse effects based on the above mitigation and compensation actions being carried out in full.

¹ <https://www.waikatoregion.govt.nz/services/publications/tr200902/>

Table 6: Summary of adverse effects following mitigation actions.

Potential Effect	Ecological Feature Affected	Ecological Value	Timescale of effect	Magnitude of effect	Initial Level of Effect	Measure to Address Effect	Final Level of Effect
Loss of riparian vegetation and terrestrial habitats	Terrestrial/riparian values, aquatic values, indigenous fauna	Moderate	Permanent	Moderate	Moderate	Enhancement of remaining riparian vegetation and enhancement planting	Low
Injury and/or mortality of indigenous birds	Indigenous fauna	Moderate	Temporary (Construction phase)	Low	Low	Removal of vegetation outside breeding season and bird nest survey prior to works	Very Low
Injury to and/or mortality of indigenous lizards	Indigenous fauna	Moderate	Temporary	Moderate	Moderate	Lizard Management Plan (LMP)	Low
Disturbance to long-tailed bats through light spill	Indigenous fauna	Moderate	Temporary (5-15 years until screening trees mature)	Low	Low	Bat-friendly lighting design, screen planting	Very low
Stream sedimentation	Aquatic values	Temporary	Temporary	High	High	Sediment and erosion control	Very Low
Contamination of receiving environments	Aquatic values	Temporary	Temporary	Low	Low	Sediment and erosion control	Very Low

11. CONCLUSIONS

Yzendoorn Developments is seeking approval to develop a property to construct a duplex on 29 Petersburg Drive, Hamilton. Part of these works will require clearance of riparian vegetation on the eastern side of Te Awa O Katapaki. Vegetation within the development area mostly consists of exotic ground cover and planted indigenous woody vegetation.

Overall, the level of adverse ecological effects of the proposed riparian vegetation clearance range from low to high in the absence of mitigation. Fauna management (birds, lizards and long-tailed bats), bat-friendly lighting design, enhancement planting, enhancement of remaining riparian vegetation, and stormwater and sediment control should be carried out to address these adverse ecological effects.

If the measures described above are appropriately implemented then the overall level of effects of the proposed vegetation clearance are expected to be low to very low.

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VASCULAR PLANT SPECIES RECORDED AT 29 PETERSBURG DRIVE, FLAGSTAFF

INDIGENOUS SPECIES

Gymnosperms

<i>Dacrycarpus dacrydioides</i>	kahikatea
<i>Podocarpus totara</i> var. <i>totara</i>	tōtara

Monocot. trees and shrubs

<i>Cordyline australis</i>	tī kōuka, cabbage tree
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Dicot. trees and shrubs

<i>Alectryon excelsus</i> subsp. <i>excelsus</i>	tītoki
<i>Aristotelia serrata</i>	makomako, wineberry
<i>Carpodetus serratus</i>	putaputawētā
<i>Coprosma robusta</i>	karamū, kāramuramu
<i>Hoheria sexstylosa</i>	houhere, lacebark
<i>Kunzea robusta</i>	kānuka
<i>Leptospermum scoparium</i> agg.	mānuka
<i>Melicytus ramiflorus</i> subsp. <i>ramiflorus</i>	māhoe
<i>Myrsine australis</i>	māpou, matipou, māpau
<i>Sophora chathamica</i>	kōwhai

Ferns

<i>Asplenium bulbiferum</i>	mouku, hen and chicken fern
<i>Cyathea dealbata</i>	ponga, silver fern
<i>Doodia australis</i>	pukupuku
<i>Parablechnum novae-zelandiae</i>	kiokio
<i>Pteris tremula</i>	turawera, shaking brake

Sedges

<i>Carex geminata</i> agg.	rautahi
<i>Carex virgata</i>	pūrei

Monocot. herbs (other than orchids, grasses, sedges, and rushes)

<i>Astelia grandis</i>	mauri
<i>Phormium tenax</i>	harakeke, flax

Dicot. herbs (other than composites)

<i>Haloragis erecta</i> subsp. <i>erecta</i>	toatoa
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NATURALISED AND EXOTIC SPECIES

Dicot. trees and shrubs

<i>Crataegus monogyna</i>	hawthorn
<i>Erica lusitanica</i>	Spanish heath
<i>Genista monspessulana</i>	Montpellier broom
<i>Ligustrum sinense</i>	Chinese privet
<i>Magnolia stellata</i>	star magnolia
<i>Quercus</i> sp.	oak
<i>Rubus fruticosus</i>	blackberry

Dicot. lianes

<i>Calystegia sepium</i> × <i>C. silvatica</i>	
<i>Lonicera japonica</i>	Japanese honeysuckle

Grasses

<i>Agrostis capillaris</i>	browntop
<i>Anthoxanthum odoratum</i>	sweet vernal
<i>Cortaderia selloana</i>	pampas
<i>Dactylis glomerata</i>	cocksfoot
<i>Festuca rubra</i> subsp. <i>commutata</i>	chewings fescue
<i>Holcus lanatus</i>	Yorkshire fog
<i>Lolium perenne</i>	rye grass

Composite herbs

<i>Bellis perennis</i>	lawn daisy
<i>Cirsium vulgare</i>	Scotch thistle
<i>Leontodon taraxacoides</i>	hawkbit
<i>Taraxacum officinale</i>	dandelion

Dicot. herbs (other than composites)

<i>Daucus carota</i>	wild carrot
<i>Galium aparine</i>	cleavers
<i>Lotus pedunculatus</i>	lotus
<i>Lycopus europaeus</i>	gypsywort
<i>Plantago lanceolata</i>	narrow-leaved plantain
<i>Ranunculus repens</i>	creeping buttercup



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