robertson

environmental

ECOLOGICAL ASSESSMENT & REPORTING SERVICES

Maitahi Residential Development - Off-Site Enabling (Bridge) Works

Ecological Impact Assessment

For CCKV Maitai Dev Co LP

December 2024

REPORT INFORMATION & QUALITY CONTROL

Prepared for:	CCKV Maitai Dev Co LP (Maitahi) C/- Mark Lile, Landmark Lile Ltd

Prepared by:	Dr Ben Robertson Principal Consultant Ecologist, Director
Reviewer / Approver:	Dr Barry Robertson Technical Advisor, Director

Document Name:	RobEnv_Maitahi RC_EcIA v1.0.pdf

Version History:	Version 0.1 — First Draft — 20 November 2024 Version 1.0 — Final — 11 December 2024

- **Ben Robertson** (Principal Consultant, Director) BSc (Hons), PhD, CEnvP
- **Barry Robertson** (Technical Advisor, Director) BSc, Dip Sci, PhD
- **Jodie Robertson** (Senior Consultant, GIS Tech) BSc, PG Dip, MSc
- **Julian Goulding** (Technical Officer, Skipper) BComm, Master 3000 Gross Tonnes

89 Halifax Street East
Nelson 7071
Phone: +64 27 823 8665
robertsonenvironmental.co.nz

Contents

List of Appendices

List of Tables

List of Figures

Glossary of acronyms

Acronym/Term	Description
EcIA	Ecological Impact Assessment
EIANZ	Environment Institute of Australia and New Zealand
EMP	Ecological Management Plan
TAR	Threatened or At Risk (species)
NZFFD	New Zealand Freshwater Fish Database
NCC	Nelson City Council
NRMP	Nelson Resource Management Plan
NES-F	National Environmental Standards for Freshwater
NPS-FM	National Policy Statement for Freshwater Management
NPS-IB	National Policy Statement for Indigenous Biodiversity
SNA	Significant Natural Area
RHA	Rapid Habitat Assessment
DOC	Department of Conservation

Glossary of defined terms

Acronym/Term	Description
Impact Management	Includes the full range of actions taken to address adverse effects on indigenous biodiversity and ecosystems. This includes: - Avoid - Remedy (remediate, restore, rehabilitate, reinstate) - Mitigate - Offset - Compensate
Project Area	Refers to the land being developed within the specified property boundary
The Project	Off-site enabling (bridge) works associated with Stage 1 of the Maitahi Residential Development
Zone of Influence (ZOI)	The area of habitats and species potentially affected by the biophysical changes resulting from the proposed Project.
Ecological Baseline	The existing state of ecological features within the Project Area, used as a reference point for assessment.
Riparian Vegetation	Vegetation growing along the margins of streams and rivers.
No Net Loss	A principle ensuring that biodiversity losses are balanced by equivalent gains through mitigation measures.
Rapid Habitat Assessment (RHA)	A method to evaluate the ecological condition of aquatic habitats based on habitat parameters.

Executive Summary

As part of the off-site enabling works for Stage 1 of the Maitahi Residential Development, CCKV Maitai Dev Co LP seeks resource consent to construct two new bridges adjacent to existing Gibbs and Jickells Bridges over the Maitai (Maitahi) River. Robertson Environmental Limited was engaged to assess the ecological values and potential effects of the Project on aquatic and terrestrial ecosystems, following the EIANZ Guidelines (2018).

Field investigations and desktop analyses reveal that both sites are located within a permanently flowing river system characterised by a coarse substratum (gravel, cobble, and boulder) and moderately degraded riparian vegetation. Despite the historic modifications, including existing bridges, the areas retain moderate to high ecological value, partly due to the potential presence of Threatened or At Risk native fish species.

Key findings and considerations include:

- The ecological impacts of the proposed bridge structures are expected to be limited due to their small areal footprint. At the Gibbs site, footings within the riverbed occupy approximately 4 m² and align with existing bridge structures to minimise disturbance. The Jickells site avoids instream encroachment, with footings confined to the riparian margin.
- Temporary construction-related impacts, such as sedimentation and habitat disturbance, will be mitigated through robust erosion and sediment control measures, low-flow timing for works, and fish salvage protocols.
- Restoration opportunities include replanting degraded riparian areas with native species to enhance shading, habitat connectivity, and bank stabilisation, thereby improving long-term ecological functionality.

Overall, it is assessed that the effects arising from the proposed activity will be confined to a localised area and limited to the construction phase, representing a short-term impact. Assuming the development (during detailed design) and implementation of appropriate ecological restoration and enhancement of riparian habitats, supported by an Ecological Management Plan (to be provided as a condition of consent), the operation of the Project is anticipated to have net positive ecological effects in the medium to long term.

1 Introduction

As part of the off-site enabling works for Stage 1 of the Maitahi Residential Development, CCKV Maitai Dev Co LP (the Applicant) seeks resource consent to construct and operate two new bridge structures alongside the existing Gibbs and Jickells Bridges over the Maitai (Maitahi) River, located within the Maitai (Maitahi) Valley, Nelson.

A preliminary overview of the Project by Fulton Hogan and associated concept design plans by Thelin Construction outline the approach and identifies the Project footprint including the extent of aquatic and terrestrial areas where modification works are proposed to occur.

In order to establish a baseline ecology state, and to understand design opportunities and constraints, an assessment of ecological values and potential effects is required.

1.1 Report Purpose & Scope

The following report is an Ecological Impact Assessment (EcIA) commissioned by Landmark Lile on behalf of the Applicant for the purpose of informing the Assessment of Environmental Effects (AEE) Report and associated resource consents for the construction and operation of two new bridge structures adjacent to the existing Gibbs and Jickells Bridges over the Maitahi River (the Project).

This report considers the actual and potential ecological effects associated with the construction and operation of the Project on the existing and likely future environment and recommends measure that may be implemented to avoid, remedy and/or mitigate these effects.

The key matters addressed in this EcIA Report are as follows:

(a) Identifying and describing the ecological context of the Project Area;

(b) Identifying and describing the actual and potential ecological effects of the Project;

(c) Recommending measures as appropriate to avoid, remedy or mitigate actual and potential ecological effects (including any conditions/management plan required); and

(d) Presenting an overall conclusion of the level of actual and potential ecological effects of the Project after recommended measures are implemented.

This report does not include an assessment of effects on māori cultural values, māori cultural concerns may encompass a wider range of values than those covered in the report. This assessment does not denote the ecological features of cultural value to manawhenua, and such assessments should only be made by manawhenua.

1.2 Project Overview

This report assesses the ecological effects of the Surveyed Area identified in Figure 1.1. The indicative footprint and drawings (Appendix X of the main AEE Report prepared by Landmark Lile) have been prepared for assessment purposes and are indicative only. The final design of the Project will be confirmed at detailed design stage.

1.2.1 Resource Consents Required

Resource consent is required for a discretionary activity overall under the the Nelson Resource Management Plan (NRMP) and the Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (NES-F). Reasons for consent, relevant to this report are set out in the main AEE Report prepared by Landmark Lile.

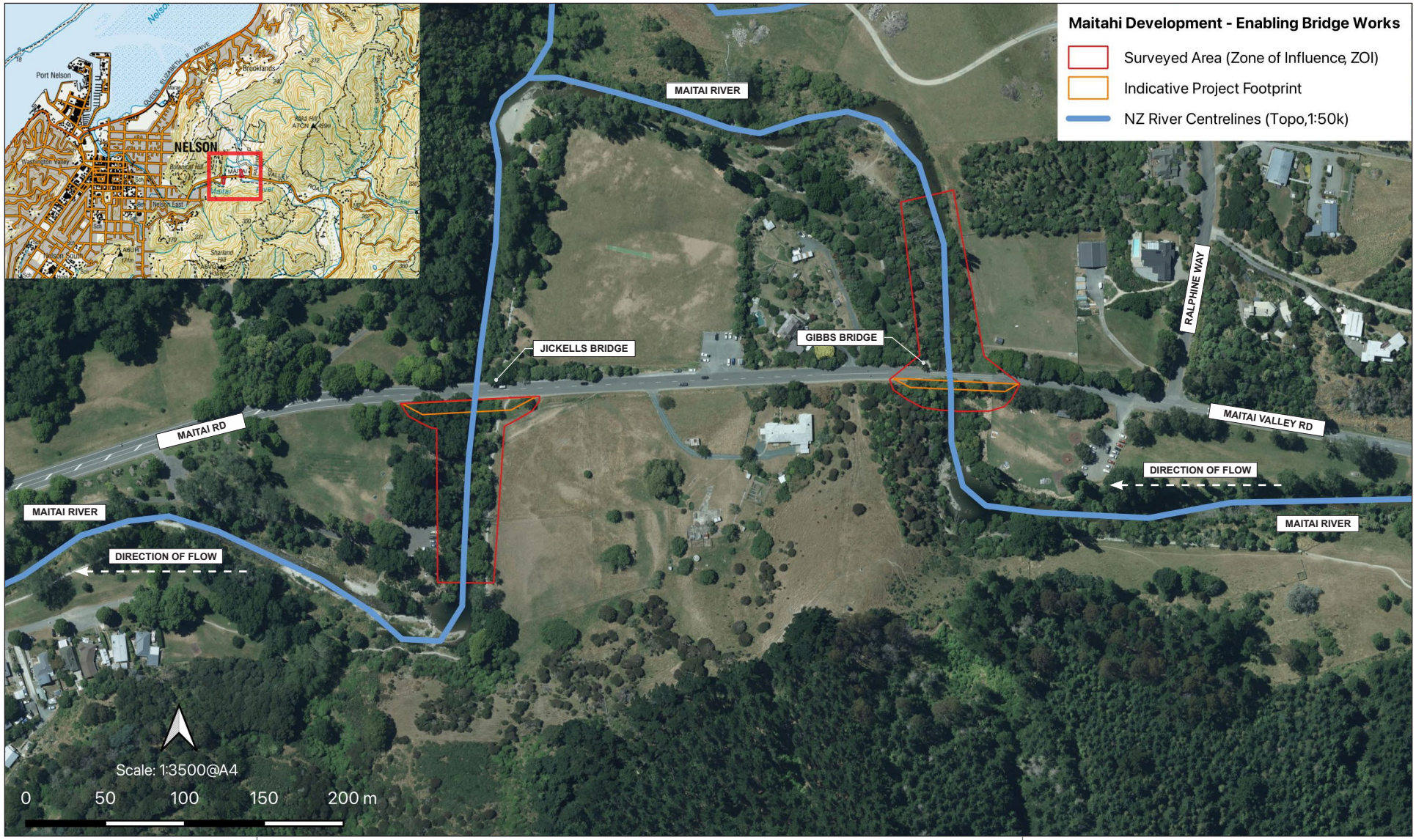

Figure 1.1 Indicative survey area (or Zone of Influence) overlaid with the Project Area based on concept design plans supplied to Robertson Enviro by Thelin Construction.

robertson environmental
ECOLOGICAL ASSESSMENT & REPORTING SERVICES

PROJECT: MAITAHI DEVELOPMENT ENABLING BRIDGE WORKS

Project Survey Area

| Date: 11 Dec 2024 | Revision: A | Aerial: LINZ 0.075 m (2022)
Plan map prepared for CCKV by Robertson Environmental Limited

Project Manager: Ben.Robertson@robertsonenviro.co.nz

1.3 Report Structure

The report is structured as follows:

- Executive Summary
- Section 1 – Introduction
- Section 2 – Assessment Methodology
- Section 3 – Ecological Description
- Section 4 – Project Features and Implementation

Sections 3 and 4 include:

a) Project overview in relation to ecology;

b) Identification and description of the existing ecological context in the environment (ecological baseline);

c) Project features in relation to ecology and a description of the construction works;

- Section 5 – Assessment of Effects on Ecological Values

Section 5 includes:

d) Description of the potential positive ecological effects of the Project;

e) Description of the potential adverse ecological effects of construction of the Project;

f) Description of the potential adverse ecological effects of operation of the Project;

- Section 6 – Impact Management
- Section 7 – Cumulative Effects
- Section 8 – Summary and Conclusion

Sections 6, 7 and 8 include:

g) Recommended measures to avoid, remedy or mitigate potential adverse ecological effects (including any conditions/management plan required);

h) Management of any residual effects after measures to avoid, remedy or mitigate have been implemented;

i) Cumulative effects description for the catchment;

j) Overall conclusion of the level of potential adverse ecological effects of the Project after recommended measures are implemented.

This report should be read alongside the AEE, which contains further details on the history and context of the Project. The AEE contains a detailed description of works proposed and the typical construction methodologies that will be used to implement this work. These have been reviewed by the author of this report and have been considered as part of this assessment of ecological effects. As such, they are not repeated here, unless a description of an activity is necessary to understand the potential effects, then it has been included in this report for clarity.

2 Assessment Methodology

The ecological assessment of the Project's effects was carried out following the EIANZ Guidelines (2018), which use ecological value ratings (such as Very High, High, Moderate, Low, and Negligible) to categorise subject habitats and their fauna. This assessment is based on a relative scale that indicates the level of intactness or modification/damage to a feature or system. The aim of this approach is to protect the highest value feature while also identifying degraded systems that may have potential for enhancement and restoration, either as part of the Project or through compensation/ offset proposals. This approach also allows for the prioritisation of features with greater value if unavoidable. See Appendix A for more detailed information.

2.1 Relevant Standards and Guidelines

The location of the Project Area falls within the jurisdictional boundary of Nelson City Council (NCC) and its operative Nelson Regional Management Plan (NRMP), and is part of the Bryant Ecological District and the Nelson Ecological Region. The Project Area occupies Open Space Recreation (Jickells Bridge) and Rural (Gibbs Bridge) zoned land under the NRMP.

A list of relevant legislation, policy, plans and strategies for this assessment are presented below:

- Resource Management Act 1991 and Wildlife Act 1953;
- National Policy Statement for Freshwater Management 2020 (NPS-FM as amended in February 2023);
- National Environmental Standards for Freshwater 2020 (NES-F as amended in December 2022);
- New Zealand Coastal Policy Statement 2010 (NZCPS);
- New Zealand Biodiversity Strategy DOC & MfE 2000;
- Protecting Our Places DOC & MfE 2007;
- Nelson Regional Management Plan (NRMP);
- Maitahi Bayview Structure Plan and Schedule X Provisions;
- The Nelson Tasman Land Development Manual 2020 (NTLDM);
- National Policy Statement for Indigenous Biodiversity 2023 (NPS-IB);
- New Zealand's Fish Passage Guidelines 2018; and
- EcIA Ecological Institute of Australia and New Zealand (EIANZ) guidelines for use in New Zealand: Terrestrial and freshwater ecosystems (Roper Lindsay et al. 2018).

2.2 EcIA Assessment

The assessment of ecological effects follows Ecological Impact Assessment guidelines (EcIA) produced by the Environment Institute of Australia and New Zealand (EIANZ, 2018). The EcIA approach is represented as follows and summarised in Appendix A:

1. Ecological Value
    - Desktop assessment and literature review;
    - Site investigation;
    - Data processing;
    - Ecological Value assessment (a) Representativeness, (b) Rarity, (c) Diversity and pattern, (d) Ecological context.
2. Level of Effect
    - Description of Project features and activities;
    - Identification and description of Project effects;

- Magnitude of Effects assessment based on (1) Type, (2) Extent, (3) Duration, (4) Frequency, (5) Probability and (6) Reversibility;
- Level of Effect assessment; systematic approach based on the outcome of Ecological Value and Magnitude of Effects assessments.

3. Mitigation
   - In line with No Net Loss principles and mitigation hierarchy;
   - Specific focus on Moderate or higher level of effects that can be avoided, minimised, remedied[1].
4. Residual Effects
   - Assessment of residual effects after measures to avoid, minimise and remedy have been applied;
   - Address residual effects through offset or compensation measures to achieve No Net Loss or Net Gain.

2.3 Project Area and Zone of Influence

The Project's Zone of Influence (ZOI) pertains to the habitats and species within and beyond the Project Area that may be affected by the biophysical changes resulting from the proposed Project and its associated activities, as defined in the EIANZ Guidelines. Throughout this report, ZOI is used to describe the effects of Project construction and operation on freshwater and terrestrial habitats and their associated native species, which may include indirect impacts on sensitive receiving environments and the potential presence of protected fauna and flora within or near the Project Area.

However, the ZOI of the Project can vary for different species and habitat types, depending on how they use their environment. For instance, mobile species like bats typically have a wider home range and more diverse habitat needs than threatened plant species and lizards, which may be confined to specific habitat types or small areas. These factors were accounted for during our review of relevant literature and site investigations to assess how the Project could impact different species. To reflect the likelihood of a species occurring or dispersing within the Project Area, different search distances were used depending on the species context. In the relevant sections of this report, the size of the search area is indicated alongside any species or habitat records identified. Additionally, ZOI is relevant to habitats, as changes in hydrology resulting from Project design could negatively impact wetlands that require permanent or intermittent inundation, while indirect effects on the receiving environment (such as sedimentation of waterbodies) could extend beyond the Project Area and affect other habitats.

2.4 Desktop Analysis

Existing biological databases and all published information on aquatic and terrestrial habitats and species that could be present within the ZOI of the Project Area were researched.

This phase also included preparation of site maps and plans to direct the field survey. The extent and differences in vegetation and habitat type within the site were delineated on geographic information systems (GIS) using topographical maps and aerial photography (LINZ rectified ~0.3 m per pixel resolution flown in 2018/19 - https://data.linz.govt.nz/layer/104165-tasman-03m-rural-aerial-photos-2018-2019/) prior to site visit. Information was derived from known data sets on landforms, soils, climate, and topography of the site. Preliminary vegetation communities and habitat types were identified and described through a combination of New Zealand Land Cover Database (LCDB5), and the use of aerial photographs. Significant Natural Area (SNA) information was ob-

[1] The Wildlife Act 1953 must be complied with, as such management measures must always be implemented to ensure that Project activities do not injure or kill native wildlife.

tained from the NRMP.

The national threat classification of species was derived from the appropriate threat classification list for each taxa[2] and their regional status was derived from the Draft Conservation Management Strategy for the Nelson/Marlborough Conservancy 1996-2006 (Department of Conservation 1996).

2.4.1 Vegetation and Rare Plants

Local plant species lists obtained from the New Zealand Plant Conservation Network website (http://www.nzpcn.org.nz/observation_site_search.aspx) and other sources (e.g. Courtney et al. 2003), were examined to identify any rare or uncommon plants in which to focus field surveys.

2.4.2 Terrestrial Macroinvertebrates

Macroinvertebrate lists obtained from various representative sources (e.g. Butler 2008) were examined to identify any rare or uncommon species in which to focus field surveys.

2.4.3 Lizards

A list of lizard species in the area, as noted in Department of Conservation's Amphibian and Reptile Distribution Scheme (ARDS) database, the National Amphibian and Reptile Database System (Herpetofauna), and van Winkle et al. (2018), was collated.

2.4.4 Birds

A list of bird species in the area, as noted in New Zealand Bird Atlas (Grid BY54 positioned over the Maitai Valley catchment area, August 2019-April 2024) and iNaturalist (5 km radius), was collated.

2.4.5 Bats

A review of bat records from the wider area on the Department of Conservation's bat distribution database (accessed Oct 2024) was undertaken.

2.4.6 Freshwater Fauna

Macroinvertebrate lists obtained from representative sources were examined to identify any rare or uncommon species in which to focus field surveys. A review of fish records from Maitai River catchment area on the New Zealand Freshwater Fish Database (NZFFD) was undertaken. We also considered data published on NCC's Freshwater Fish Sightings database of fish species observed within the adjacent Maitai River catchment.

2.5 Aquatic Ecology Assessment Methodology

2.5.1 Site investigations

Field surveys were completed during October 2024 for watercourses associated with the Project Area (see Figure 2.1 for watercourses and survey locations). Table 2.1 outlines the specific methodology employed to determine baseline conditions and ecological value. Representative sites were chosen based on accessibility and location within the Project Area. An overview of the freshwater field assessments and methodologies employed is as follows:

- Synoptic assessment of specific aquatic habitat types and the associated values was completed at the Project Area. All watercourses to be impacted both directly and indirectly were photographed, general notes on the stream and river including name, catchment, hydrological regime, channel morphology, cross-sectional features taken, and REC classification based on

[2] All Department of Conservation Threat Classification Documents are listed in the below webpage. When individual reports are referenced hereafter, they are referenced in-text. https://www.doc.govt.nz/about-us/science-publications/conservation-publications/nz-threat-classification-system

the River Environment Classification (REC[3]) (Snelder et al. 2004). The assessment of the waterbodies examined the key physical parameters including, but not limited to hydrological connectivity, thermal regulation, vegetation composition (both aquatic and marginal vegetation);

- Stream classification as per Storey and Wadhwa (2009) into ephemeral, intermittent and permanent hydroperiods[4];
- A habitat quality assessment was conducted along two discrete sections (each approximately 100 m in length) of the two main reaches of Maitai River located within the Project Area, using the Rapid Habitat Assessment (RHA) methods of Clapcott (2015). The rapid habitat assessment involves assigning 10 habitat parameters with a score from 1 to 10 (refer field sheet in Appendix B). The lowest scores indicate the greatest deviation from the condition expected with no, or minimal, human influence or impact (reference state). These individual parameter scores are then summed to determine an overall Habitat Quality Score: Excellent (>75), Good (51–75), Fair (26–50) or Poor (<26). The habitat parameters include measures of fine sediment cover, habitat diversity and abundance, and riparian width and shade. To bolster this assessment by identifying areas that may be vulnerable to degradation due to habitat modification, we also considered in narrative terms relevant parameters listed in Holmes et al. (2020). We also considered any structures likely to impede fish passage within the Project Area, following NIWA fish passage guidelines (Franklin et al. 2018).

It is noted the Stream Ecological Valuation (SEV) methodology (Storey et al. 2011) would be implemented at the detailed design stage for watercourses where the application of this method is suitable to further inform ecological condition and any required offset measures.

Table 2.1 Methodologies employed to determine baseline conditions and ecological value associated with stream reaches associated with the Project Area.

Watercourse Survey Reference (see Figure 2.1)	Water quality & in-stream fine sediment	RHA	Macroinvertebrate habitat available	Fish habitat available
Gibbs Survey Area	✓	✓	✓	✓
Jickells Survey Area	✓	✓	✓	✓

2.5.2 Assessing Aquatic Ecological Value

Several methods of assessing aquatic ecology were employed to determine the ecological significance of streams features linked to the Project Area. These methods were consistent with the guidelines provided by EIANZ. The assessment involved utilising various aspects of different methods (Table 2.1) to evaluate factors that impact the ecological sensitivity and importance of the receiving environment (refer to Section 2.2). A summary of each EcIA "Matter" and the cor-

[3] https://niwa.co.nz/freshwater/management-tools/river-environment-classification-0

[4] ***Permanent*** - requires evidence of continuous flow; ***Intermittent or ephemeral*** - stream reaches that cease to flow for periods of the year because the bed is periodically above the water table. This category is defined by those stream reaches that do not meet the definition of permanent river or stream and meet at least three of the following criteria: a) it has natural pools; b) it has a well-defined channel, such that the bed and banks can be distinguished; c) it contains surface water more than 48 hours after a rain event which results in stream flow; d) rooted terrestrial vegetation is not established across the entire cross-sectional width of the channel; e) organic debris resulting from flood can be seen on the floodplain; or f) there is evidence of substrate sorting process, including scour and deposition; ***Ephemeral*** - stream reaches with a bed above the water table at all times, with water only flowing during and shortly after rain events. This category is defined as those stream reaches that do not meet the definition of permanent river or stream or intermittent stream.

responding methods used to analyse them are presented in Table 2.2. The value categories used ranged from “Very High” to “Negligible.” Further information on different value categories concerning the methods used is available in Appendix A.

Table 2.2 Summary of how different methods of assessment have been applied to inform aquatic ecological value.

EcIA Matter	Habitat availability (macroinvertebrates and fish)	Potential macro-invertebrate community	Potential fish community
Matter 1 - Representativeness		✓	✓
Matter 2 - Rarity/distinctiveness	✓		✓
Matter 3 - Diversity and pattern	✓		
Matter 4 - Ecological context			✓

2.6 Terrestrial Ecology Assessment Methodology

2.6.1 Site investigations

2.6.1.1 Vegetation Communities and Habitats

Several site walkovers were carried out on October and November 2024 to survey and document the habitats within the Project ZOI. Additionally, an assessment was conducted to determine the potential of observed habitats to support indigenous fauna, including birds, lizards and macroinvertebrates.

During the habitat assessment, particular attention was paid to areas of significant ecological value, such as stream corridors and vegetated regions (including trees and scrub). This was achieved through the examination of aerial photographs and on-site investigations. To streamline the search process, existing species records from relevant literature and biodiversity databases were consulted, enabling a focused investigation of specific areas within the Project Area.

The mapping of indigenous vegetation communities was carried out using recent aerial photography, and the resulting data was incorporated into the Project’s Geographic Information System (GIS) database. The vegetation assessment involved documenting the dominant or characteristic species present, as well as evaluating the overall quality of the vegetation, including factors such as structure, maturity, presence of weeds, and signs of disturbance. Throughout this report, common plant names are predominantly used, while botanical names can be found in Appendix C. To provide visual representation, broadscale habitat maps illustrating the vegetation cover within the Project ZOI can be found in Section 3.1.

2.6.1.2 Terrestrial Biota

Vegetation and Rare Plants — The desktop delineated vegetation communities were ground-truthed in the field, where each identified community type was described on-site. Native and exotic vegetation was noted across the Project Area with a focus on the presence of indigenous species (Appendix C).

Macroinvertebrates — No surveys of terrestrial invertebrates were undertaken. Rather, we relied

on the vegetation community and habitat type descriptions obtained from the field investigations to identify areas of potential habitat for species likely to occur within the area, as well as published accounts of macroinvertebrates present within similar habitats nationally.

Herpetofauna — Field surveys for terrestrial lizards were not conducted. Rather, we relied on the vegetation community and habitat type descriptions obtained from the field investigations to identify areas of potential habitat for species likely to occur within the area, as well as published accounts of lizards present within nearby habitats.

Birds — A roaming inventory of birds sighted or heard was taken during the field survey. We also relied on the vegetation community and habitat type descriptions obtained from the field investigations to identify areas of potential habitat for species likely to occur within the area, as well as published accounts of birds present within nearby habitats.

Bats — Field surveys for terrestrial lizards were not conducted[5]. We also relied on the vegetation community and habitat type descriptions obtained from the field investigations to identify areas of potential habitat for species likely to occur within the area, as well as published accounts of birds present within nearby habitats.

2.7 Assessing Ecological Value

To evaluate the ecological value of terrestrial and aquatic habitat within the Project ZOI, various assessment methods were employed in accordance with the EIANZ guidelines. These methods were selected based on their ability to provide relevant information on the ecological significance and sensitivity of the receiving environment. The application of these methods varied depending on the specific ecological matter being addressed. A summary of each ecological matter and the corresponding method(s) used to assess it can be found in Table 2.3. The value categories assigned to the assessed habitats ranged from Very High to Negligible. For further details on the specific value categories associated with each method, refer to Appendix A.

Table 2.3 Summary of how different methods of assessment have been applied to inform terrestrial and aquatic ecological value.

EcIA Matter	Habitat quality and quantity (macroinvertebrates, fish, lizards and birds)	Presence of Threatened or At Risk (TAR) species or habitats
Matter 1 - Representativeness	✓	✓
Matter 2 - Rarity/distinctiveness	✓	✓
Matter 3 - Diversity and pattern	✓	
Matter 4 - Ecological context	✓	

When assessing the ecological value of species within areas that could potentially be affected by the Project, consideration was given to the threat classification of those species. The assigned value for the ecological importance of each species was determined based on the information provided in Appendix A, Table A.2. For instance, exotic species were assigned a value of Negligible

[5] In accordance with Dr Ben Robertson's comments in his PPC28 Statement of Evidence at [48], and following on-site discussions with ecologists from the Department of Conservation, it has been confirmed that there are no notable habitat features for bat species present within the wider Maitahi Project Area (extending to include the area assessed herein).

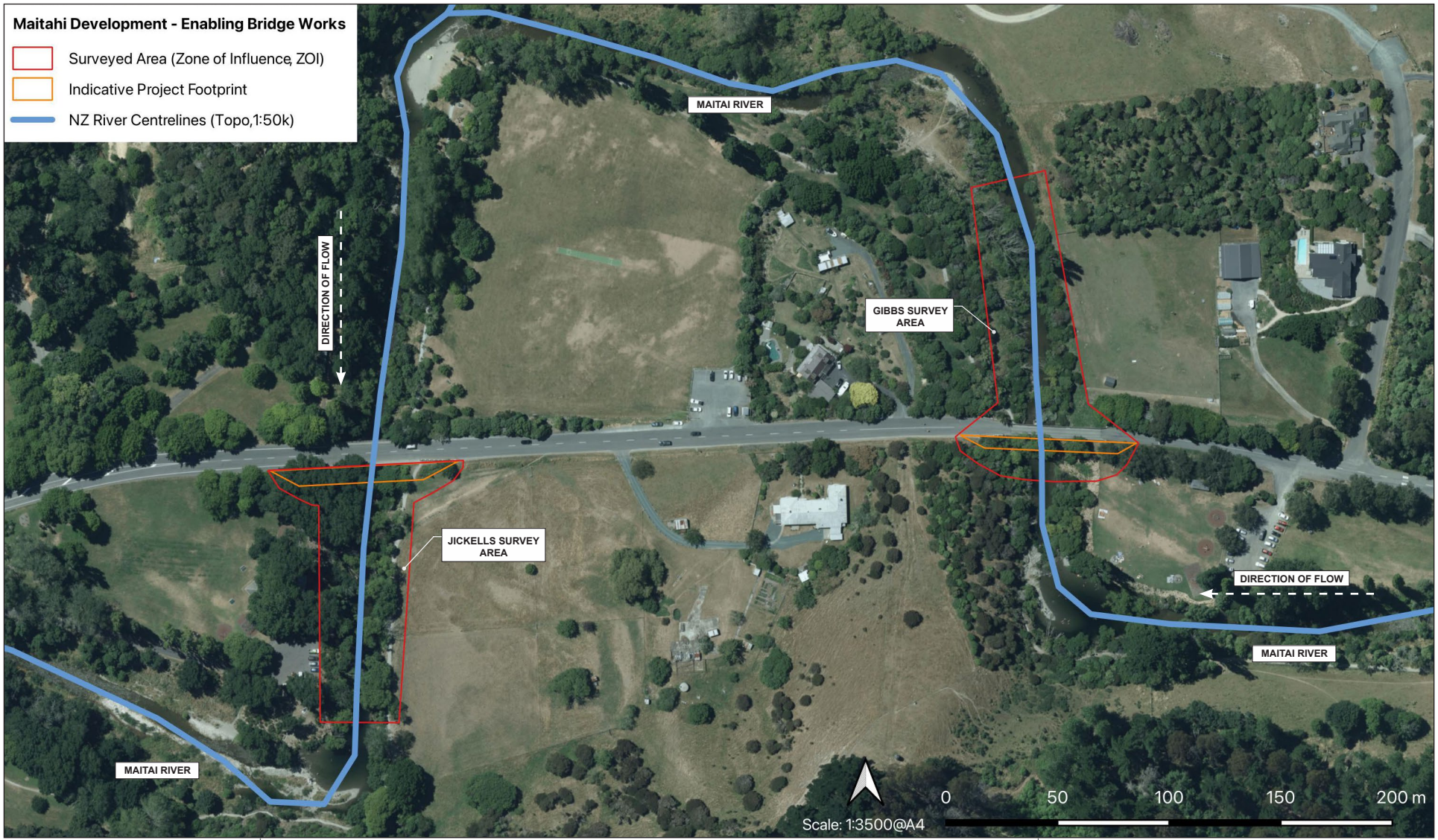

Figure 2.1. Project watercourse survey locations. Note that mapped reaches of the Maitai River meet the RMA (Part 1, Section 2) and NPS-FM/NES-F definition of a 'river'.

robertson environmental
ECOLOGICAL ASSESSMENT & REPORTING SERVICES

PROJECT: MAITAHI DEVELOPMENT ENABLING BRIDGE WORKS

Watercourse Survey Locations

| Date: 11 Dec 2024 | Revision: A | Aerial: LINZ 0.075 m (2022)
Plan map prepared for CCKV by Robertson Environmental Limited

Project Manager: Ben.Robertson@robertsonenviro.co.nz

ecological importance, while indigenous Threatened species (Nationally Critical/Endangered/Vulnerable) were assigned a value of Very high ecological importance.

2.8 Habitat Classification

Broad ecological or habitat zones in the study area were identified, and with the aid of a handheld Garmin GPSMAP 64sc WW unit (accuracy approx. ±5-10 m) broadly delineated. Each habitat was subjectively classified into one of several different qualitative habitat type descriptors according to unique features identified. Qualitative inspection of habitats was then conducted to note key flora and fauna for each zone. Upon completion of field work the broad habitat zones where then imported into a georeferenced aerial photo of the area using Garmin BaseCamp and ArcMap GIS software. Using colour aerial photos and Digital Surface Modelling (as appropriate) delineated habitat zones were adjusted accordingly, to more accurately reflect the likely tonal gradations of respective habitats, and a map of different habitats was produced. Representative field photographs of the different habitat types mapped, in addition to those presented within the main body of this report, are presented in Appendix D.

3 Ecological Description

3.1 Existing Environment (Ecological Baseline)

Refer to the AEE for a description of the existing and likely future environment for the Project.

This section presents the findings of the desktop analysis and site investigations for all of the habitats and species ('ecological features') present within the Project Area. Based on this information, an ecological value has been calculated for each ecological feature using the assessment method outlined in Section 2.2.

Key ecological features within the Project Area are listed below and described in the following sections. Figure 3.1 provides an overview of existing land use, vegetation cover and freshwater habitat features within the Project Area. An example of how habitat margins were delineated is provided in Figure 3.2. A summary of the approximate proportions of each habitat type mapped within the Project Area is presented in Table 3.1. A GIS-based broad scale habitat map of the Project Area is provided in Figure 3.3.

3.1.1 Historic Ecological Context

The Bryant Ecological District (47.03) encompasses the Maitai Valley catchment, surrounding coastal and lowland flats, hill country, and the Project Areas within the lower Maitai Valley. The district is sunny and sheltered, experiencing very warm summers and mild winters (TDC 2020).

The two Project Areas are situated on lowland flats, bisecting the Maitai River and its adjacent riparian margins: one area is located immediately downstream of Sunday Hole (on the upstream side of Gibbs Bridge), while the other lies within the reach between Dennies and Black Hole (on the downstream side of Jickells Bridge). These areas are positioned within the modified flood plains of the Maitai River. There are existing bridge structures at both locations. The riparian margins support a mix of regenerating (often planted) native and exotic vegetation.

The Maitai River has a catchment area exceeding 9,000 hectares and a mean annual flow of 2.35 cubic metres per second. The river rises in the Bryant Range behind Nelson City and the upper catchment has two branches draining conservation and water supply protection land. The North Branch is dammed just upstream of the confluence with the South Branch to form the main Nelson water supply storage reservoir. The mid catchment is an important recreational and production forest area, and the lower catchment runs through the heart of Nelson City, before flowing into Nelson Haven. While the upper reaches benefit from high water quality due to surrounding conservation lands, the lower reaches experience water quality decline due to agricultural, forestry, and urban runoff, resulting in reduced ecological values.

Geologically, the surface and near-surface rock types of the Project Areas are predominantly classified as Loose Sedimentary[6] (floodplain).

The terrestrial environment around the Project Areas is highly modified, with high levels of disturbance from human activity and pest plant and animal species. According to the Threatened Environment Classification (TEC) version 2012, the area includes:

- Category 1 (<10% indigenous cover left), where habitats are highly fragmented with significantly reduced indigenous biodiversity; and,

The historic land cover for these areas, as predicted by LENZ (Landcare Research Ltd, 2012), was a mixed rimu-broadleaf-beech forest type. According to the Ministry for the Environment pre-human wetland extent geospatial layer[7], the Site was not historically a wetland, although this layer is limited by a minimum resolution of 0.05 hectares and the exclusion of ephemeral wetlands.

[6] Very compact to weak (e.g. mudstones, sandstones, weak conglomerates and crushed argillite); Landcare Research NZ Limited 2009-2022.

[7] https://data.mfe.govt.nz/layer/52677-prediction-of-wetlands-before-humans-arrived/

Figure 3.1A. Gibbs Bridge Survey Area - looking downstream towards predominantly exotic grassland cover, access way, and cleared land contiguous with exisitng bridge and footings and modified river reaches and mixed native/exotic scrub/trees along riparian margins, within the Project Area, October 2024.

Figure 3.1B. Jickells Bridge Survey Area - looking downstream towards predominantly exotic grassland cover, access way, and cleared land contiguous with exisitng bridge and footings and modified river reaches and mixed native/exotic scrub/trees along riparian margins, within the Project Area, October 2024.

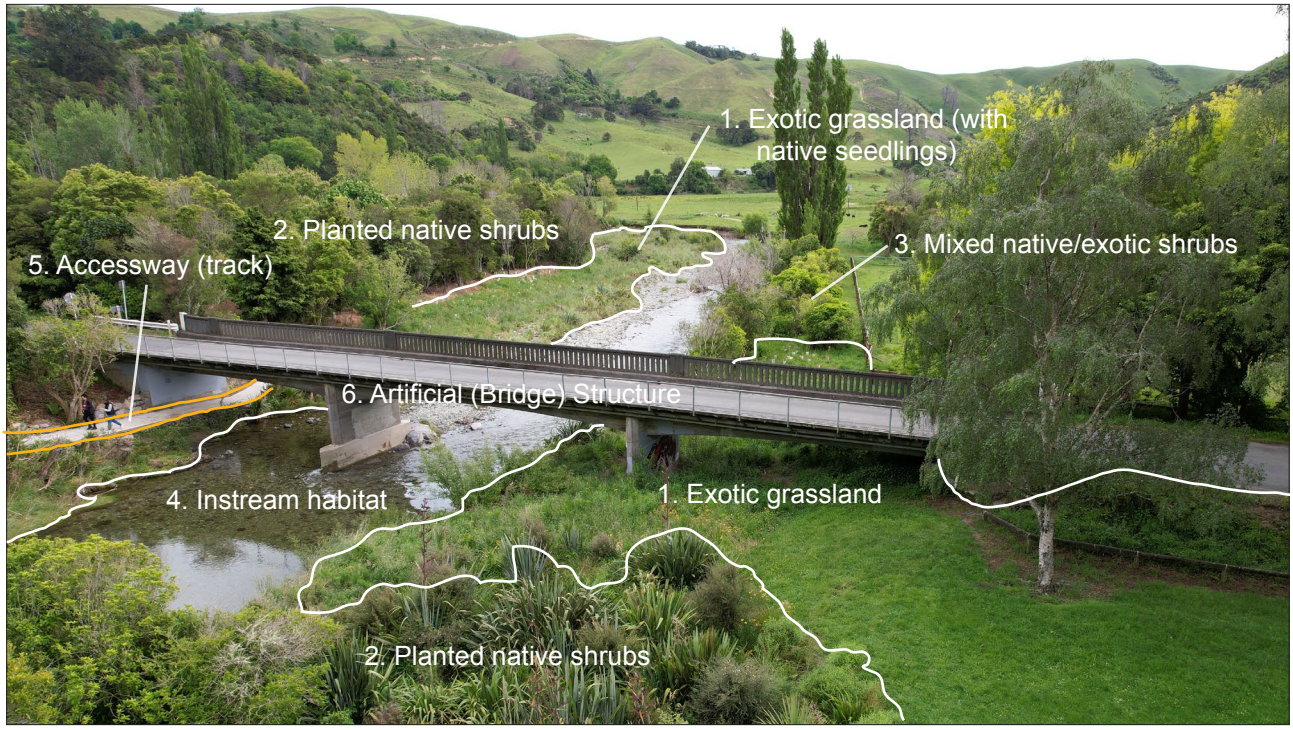

Figure 3.2. Example of the different habitats in the Project Area (Gibbs Bridge) and mapped during the field investigation. Habitat boundaries are indicative only and do not accurately reflect those presented in Figure 3.3.

Table 3.1 Summary of current broad scale aquatic and terrestrial habitat types present within the Project Area.

Dominant Habitat Feature		Project Area (ZOI)[a]			
		Gibbs Survey Area		Jickells Survey Area	
		ha	%		
1.	Regenerating mixed māhoe-exotic scrub	0.04 ha	6.7%	-	-
2.	Predominantly exotic scrub/trees with highly degraded understorey	-	-	0.17 ha	34%
3.	Planted native shrubs	0.08 ha	13.5%	-	-
4.	Rank or pasture grasses	0.10 ha	16.9%	0.08 ha	16%
5.	Rank or pasture grasses with planted native seedlings	0.12 ha	20.3%	-	-
6.	Accessways (no vegetation)	0.05 ha	8.4%	0.02 ha	4%
7.	Instream (wetted) habitat	0.20 ha	33.8%	0.23 ha	46%
	Total	0.59 ha	100%	0.50 ha	100%

[a] Reflects the total extent of the Project Area footprint as shown in Figure 3.3.

expert ecological services.

Figure 3.3. Broad scale (indicative) map of existing habitats within the Project Area based on the mapping of freshwater and vegetation features visible in aerial imagery, supported by ground-truthing to validate the visible features. General direction of in-stream water flow is from north to south across the property.

PROJECT: MAITAHI DEVELOPMENT ENABLING BRIDGE WORKS

Existing Habitat Occupying Project Area

| Date: 11 Dec 2024 | Revision: A | Aerial: UAV Oct 24, LINZ 0.075m (22)
Plan map prepared for CCKV by Robertson Environmental Limited

Project Manager: Ben.Robertson@robertsonenviro.co.nz

3.1.2 Aquatic Ecology

3.1.2.1 Instream and Riparian Habitat

At the time of field surveys conducted in October 2024, all river reaches within the Project Area were ground-truthed and assessed (Figure 2.1). Table 3.2 summarises a description of the hydrogeomorphic (flow, channel, and substrata) features for the surveyed sites.

Maitai River – Gibbs and Jickells Survey Areas

Both the Gibbs and Jickells Survey Areas are located within the permanently high-flowing Maitai River. These sites are characterised by a streambed dominated by coarse substrates, including gravel, cobble, and boulder material, which provide stable and diverse habitats for aquatic fauna. The channel morphology at both sites reflects natural meandering within the broader river system, with moderate incision and no significant historical modifications beyond existing bridge structures. Existing impacts from bridge structures are typically as follows:

- Positive Impacts:
    - The bridge structures provide localised shade, which helps moderate water temperatures and create microhabitats for aquatic species.
    - Flow variations around bridge footings, such as eddies and sheltered areas, enhance habitat complexity and may serve as refuges for aquatic organisms during high flows.
- Negative Impacts:
    - Footings encroach into the wetted streambed and margins, causing substrata compaction and disrupting natural sediment distribution.
    - Scouring around footings contributes to bank instability and increases sediment transport downstream.
    - Riparian vegetation adjacent to the bridges is degraded, with exotic grass species dominating and limited regeneration of native plants. This reduces shading continuity and overall riparian habitat quality.

At the Gibbs Survey Area, the channel width ranges from 8–15 metres, with depths of 10–50 cm under base flow conditions. Riparian margins consist of a mix of native (mostly planted) vegetation, interspersed with exotic species. Bank stabilisation is generally high, although some localised erosion is observed near the bridge structures. Notably, there is limited scour associated with the single bridge footing located within the middle of this reach (see Figure 3.1A), indicating minimal disturbance to the surrounding streambed and flow dynamics.

Downstream at the Jickells Survey Area (Figure 3.1B), the channel is slightly wider, ranging from 12–18 metres, with depths of 30–70 cm during base flow conditions. Riparian vegetation includes a dense cover of mixed native/exotic shrubs and trees, alongside exotic grassland. Similar to the Gibbs site, bridge-related impacts, including substrata compaction and riparian degradation, reduce overall habitat quality in the immediate vicinity of the structure.

Table 3.2 Description of hydrogeomorphic features for each of the locations assessed during site visit.

Watercourse / Site[a]	Hydrological regime	Channel morphology	Cross-sectional features	Dominant streambed substrata
Maitai River - Gibbs Survey Area	Permanent (high flow)	Incised (partially), alluvial, part of a wider meander	Terrace on left and right bank, occasional flood bench	Clean gravels, cobbles, and boulders (>75% of reach)

Maitai River - Jickells Survey Area	Permanent (high flow)	Incised (partially), alluvial, part of a wider meander	Terrace on left and right bank, occasional flood bench	Clean gravels, cobbles, and boulders (>75% of reach)

[a] As shown in Figure 2.1.

Water Quality Analysis

Table 3.3 summarises key water quality indicators for NCC monitoring sites within the Maitahi / Maitai FMU, with specific focus on human health risks, suspended sediments, and nutrient levels, as well as general observations on the ecological health of each waterway.

The Maitai River sites (Groom Road, Riverside, Sharland and the South Branch at Intake) consistently show good water quality across all measured parameters. These sites benefit from minimal anthropogenic impact, with E. coli levels consistently in Band A, high clarity, and low nutrient levels, including dissolved reactive phosphorus. The pristine conditions in the South Branch at Intake, in particular, reflect the protective influence of the surrounding upland forest environment.

Such results are anticipated to reflect existing water quality within both reaches of the Project Area.

Table 3.3 Summary of the LAWA water quality results for Maitahi / Maitai FMU monitoring sites in relation to relevant NPS-FM attribute bands[a].

	Human Health[b]	Suspended Sediment[c]	Nitrogen[d]		Phosphorus[e]	
River / Site	E.coli	Clarity	Ammoniacal Nitrogen	Nitrate Nitrogen	Dissolved Reactive Phosphorus	General Comment
Maitai at Groom Rd	Band A	Band A	Band A	Band A	Band A	Excellent water quality across all indicators; minimal land use impact.
Maitai at Riverside	Band A	Band A	Band A	Band A	Band A	High water quality; slightly lower phosphorus levels but still within acceptable limits.
Maitai South Branch at Intake	Band A	Band A	Band A	Band A	Band A	Pristine conditions, reflecting upland forest environment with no significant concerns.
Sharland at Maitai Confluence	Band A	Band A	Band A	Band A	Band B	Good overall water quality, though slightly elevated phosphorus levels suggest some ecological impact.

[a] NPS-FM (Appendix 2A) Band A: Best conditions, minimal impact; Band B: Moderate conditions, some impact.
[b] Human Health (E. coli): Represents the infection risk to swimmers based on E. coli concentrations.
[c] Clarity & Turbidity: Reflects suspended sediment impacts on water clarity and ecological health.
[d] Nitrogen: Indicates nutrient levels and their potential toxic and eutrophication effects.
[e] Phosphorus: Indicates nutrient levels and their potential toxic and eutrophication effects.

Rapid Habitat Assessment

Two (2) Rapid Habitat Assessment (RHA) surveys were conducted to evaluate the ecological condition of the river reaches within the Project Area, each covering a 100-metre reach upstream from the locations in Figure 2.1.

The Gibbs Survey Area and Jickells Survey Area scored 64 and 67 (Table 3.4), respectively, achieving overall 'Good' habitat quality under the Clapcott (2015) protocol. Both sites displayed low sediment deposition and moderate scores for invertebrate habitat diversity and abundance, suggesting sufficient but suboptimal conditions for aquatic invertebrates. Fish cover diversity and abundance scored similarly at both sites, reflecting reasonable instream habitat complexity.

Riparian scores were high for width and bank stability but moderate for vegetation cover at both sites. Riparian shade was higher at Jickells compared to Gibbs, where vegetation is predominantly planted and less established.

Both sites demonstrated stable hydrological and geomorphic conditions, with Jickells achieving a slightly higher score due to better riparian shade and thermal regulation. Opportunities for improvement include enhancing riparian vegetation to improve shading and bank protection and increasing invertebrate habitat quality at both sites.

Table 3.4 Rapid habitat assessment results summary based on Clapcott (2015) protocol — Overall Habitat Quality Score: Excellent (>75), Good (51–75), Fair (26–50) or Poor (<26). Representative photographs of the stream reaches surveyed are presented in Figure 3.1 and Appendix D.

Zone	Habitat Parameter	Watercourse / Site[a]	
		Gibbs Survey Area	Jickells Survey Area
Wetted area	Deposited sediment	9	9
	Invertebrate habitat diversity	4	4
	Invertebrate habitat abundance	5	5
	Fish cover diversity	7	7
	Fish cover abundance	7	7
Riparian area	Hydraulic heterogeneity	5	5
	Bank erosion	8	8
	Bank vegetation	5	5
	Riparian width	9	9
	Riparian shade	5	8
Habitat quality score (of 100)		**64**	**67**

[a] As shown in Figure 2.1.

Macroinvertebrate Community

Table 3.5 shows that the macroinvertebrate communities in the Maitai River have varying levels of ecological health, as indicated by the MCI and the percentage of EPT richness. The MCI values reflect the degree of organic pollution or nutrient enrichment in the streams, with higher bands indicating better water quality.

The Maitai River displays variability in ecological health across its sites as it flows downstream. The upstream site at Maitai South Branch shows good ecological health with a Band B MCI rating and a high EPT richness of 60%. However, the very likely degrading trend raises concerns about

future conditions. As the river progresses downstream to Maitai at Groom Road, the MCI rating drops to Band C, with EPT richness at 42%. The site's moderate ecological health is stable but shows no improving trend. Further downstream at Maitai at Riverside, the MCI remains at Band C, with EPT richness further decreasing to 29%. The likely degrading trend at this site suggests that the ecological health of the river could continue to decline.

Again, these results are anticipated to reflect the current macroinvertebrate conditions in both reaches of the Project Area, characterised by a mildly to moderately degraded community.

Table 3.5 Summary of macroinvertebrate condition at the Maitai River NCC State of Environment sites.

Site	MCI Band[a]	MCI 15-Year Trend	% EPT Richness (5-year median)[b]	General comment
Maitai at Groom Rd	Band C	-	42%	Moderate ecological health; EPT richness is fair, but MCI indicates room for improvement.
Maitai at Riverside	Band C	Likely degrading	29%	Moderate ecological condition with a concerning degrading trend in MCI.
Maitai South Branch at Intake	Band B	Very likely degrading	60%	Good ecological health, but the strong degrading trend in MCI raises concerns about future conditions.
Sharland at Maitai Confluence	Band B	Very likely improving	50%	Good ecological health, with a positive trend suggesting ongoing recovery or improvement.

[a] NPS-FM (Appendix 2A) Band B: Mild organic pollution, largely composed of sensitive taxa; Band C: Moderate organic pollution or nutrient enrichment, mixture of sensitive and insensitive taxa.
[b] % EPT Richness: Higher percentages indicate a greater presence of pollution-sensitive macroinvertebrate species, reflecting better water quality.

Fish Community

The NZFFD records for the wider Maitai River catchment[8] indicated the potential occurrence of 18 species, all of which are native. Potentially occurring species of conservation significance (TAR species) include:

- longfin eel (*Anguilla dieffenbachii*) — At Risk (Declining)
- bluegill bully (*Gobiomorphus hubbsi*) — At Risk (Declining)
- īnanga (*Galaxias maculatus*) — At Risk (Declining)
- koaro (*Galaxias brevipinnis*) — At Risk (Declining)
- lamprey (*Geotria australis*) — Nationally Vulnerable
- torrent fish (*Cheimarrichthys fosteri*) — At Risk (Declining)

Of the native freshwater fish species observed within the Maitai River catchment, several are diadromous, meaning they require access to both freshwater and marine environments to complete their life cycles. Therefore, maintaining access to both downstream and upstream habitats is cru-

[8] NZFFD Catchment Number 578.000.

cial for these species to support healthy regional populations.

It is noted that Project works may coincide with the spawning periods of īnanga, smelt, torrent fish and some of the bully species (bluegill and common). There may be torrent fish and bullies present, though torrent fish and bluegill bullies will be rare and likely only in the faster water which is not expected to be impacted by the works[9]. Inanga and smelt spawn in the lower catchment and thus would only be impacted if large quantities of sediment is generated and discharged downstream.

The ecological value of fish populations in the freshwater receiving environment is **Low** to **High** given the potential for TAR species to occupy or utilise the Project Area.

3.1.2.2 Ecological Value

The aquatic (freshwater) aspect of the Gibbs and Jickells Survey Areas within the Maitai River are assessed as having **Moderate** to **High** ecological value, attributed to their permanently high-flowing hydrology, coarse substratum (gravel, cobble, boulders), water quality, and the potential presence of TAR fish species. These features support diverse and stable aquatic habitats with low sediment deposition and suitable conditions for fish and invertebrate communities.

Riparian vegetation at both sites contributes to ecological value, with Gibbs featuring a more intact understorey compared to the Jickells Survey Area, where the understorey is largely absent. Despite this variation, both sites benefit from riparian shading and stabilisation, though further enhancement could improve habitat complexity and shading effectiveness.

3.1.4 Terrestrial Ecology (Flora)

3.1.4.1 Desktop Observations

The existing terrestrial habitats within the vicinity of the Project Area are predominantly heavily modified pasture grassland, residential dwellings, roads, with pockets of mixed native/exotic vegetation. Where natural habitats like native scrub/trees remain, within the wider landscape, the Nelson City Council has largely mapped and classified habitats as Significant Natural Areas (SNA). No SNAs are located directly within the Project Area; however, SNA 166 is situated within some 1000 meters. This SNA is valued for its indigenous vegetation, hosting TAR species such as kānuka (*Kunzea ericoides*) and matagouri (*Discaria toumatou*)[10]. As noted, it is important to consider the potential impacts on areas beyond the immediate Project Area, including SNA 166. Highly mobile indigenous fauna may inhabit areas extending beyond SNA boundaries, and earthworks within the catchment could affect downstream environments, such as coastal wetlands.

In addition, Nelson Haven is located approximately 2 km away from the Project and is within the direct receiving environment of the Project Area, connected via the Maitai River. The intertidal mudflats and coastal wetlands particularly eelgrass beds associated with Nelson Haven[11] can be particularly sensitive to sedimentation runoff caused by construction works.

3.1.4.2 Site Investigations

A total of two (2) broad terrestrial habitat types were mapped (Figure 3.3; Table 3.1):

---

[9] Tim Olley (Field Ecologist, Olleycology) pers. comm. via email on 23 October 2024 following his on-site visit with the Dr Ben Robertson and the wider Project team on 17 October 2024.

[10] Nelson City Council. (2009). Ecological Significance Assessment Report. Site No. 166. Technical report prepared by Micheal North.

[11] Stevens, L.M., Forrest, B.M. 2019. Broad scale intertidal habitat mapping of Nelson Haven. Salt Ecology Report 022 prepared for Nelson City Council. 42p.

- Indigenous Vegetation[12] with patchy canopy and degraded understorey.
- Non-indigenous vegetation or other;
  - » Predominantly exotic scrub/trees with highly degraded understorey.
  - » Planted native shrubs
  - » Rank or pasture grasses with very occasional native-exotic shrubs/trees.
  - » Rank or pasture grasses with planted native seedlings.
  - » Accessways (no vegetation).

There was no Indigenous Forest[13] recorded within the Project Area. Representative field photographs of each identified habitat type are presented in Appendix D.

Regenerating mixed māhoe-exotic scrub with patchy canopy and degraded understorey

A small patch of māhoe-dominant scrub was recorded within the Gibbs Survey Area, immediately downstream of the bridge on the true right. Understorey growth, both native and exotic, was largely absent due to the broken canopy (limiting suitable habitat for shade-tolerant species) and grazing pressure from pest mammals. Exotic species present included convolvulus, foxglove, and several introduced grasses. Fragmentation and edge effects were also evident.

This isolated habitat forms part of the naturally regenerating band of native kānuka shrubland occupying the lowland hillslopes of the wider Maitai / Kākā Hill Valley catchment. Notably, this area of native vegetation meets the definition of Indigenous Vegetation under the Nelson Resource Management Plan (NRMP).

Predominantly exotic scrub/trees with degraded understorey

The Jickells Survey Area features areas of mixed exotic vegetation, predominantly comprising scattered ash (*Fraxinus excelsior*) and sycamore (*Acer pseudoplatanus*), with occasional and rare native species present. The understorey consists primarily of exotic herbs and grasses or bare ground, reflecting significant degradation.

While this vegetation type is absent from the Gibbs Survey Area, it characterises the full 100-m stretch of the riparian corridor on both the true left and right of the river reach within the Jickells Survey Area.

Planted native shrubs

A relatively dense canopy of planted native shrubs is present within the Gibbs Survey Area, both upstream and downstream of the existing bridge. However, understorey growth is generally absent, likely due to canopy shading and other site-specific factors.

Rank or pasture grasses

A small proportion (<10%) of the terrestrial vegetation in the Project Area is characterised by rank and pasture exotic grassland. When present, this vegetation type consists predominantly of exotic grasses and herbs (e.g., narrow-leaved plantain (*Plantago lanceolata*), perennial ryegrass (*Lolium*

---

[12] As defined in the NRMP: '...*an area of naturally occurring vegetation where the area covered by plant species indigenous to the District is the same as or greater than the area covered by other plants*...'.

[13] Per NRMP definition: '...*an area of naturally occurring woody vegetation that:*
a) has a canopy predominantly formed by trees over 6 m high, and
b) has more than 80% closure of the canopy, and
c) comprises plant species indigenous to the District...'.

perenne), Kentucky bluegrass (*Poa pratensis*), Cocksfoot (*Dactylis glomerata*), Yorkshire fog (*Holcus lanatus*), white clover (*Trifolium repens*), birdsfoot trefoil (*Lotus corniculatus*), dock (*Rumex* spp.), and buttercup (*Ranunculus* spp.). Occasional large trees are present in this area.

Rank or pasture grasses with planted native seedlings

An area along the true left of the Gibbs Survey Area, downstream of the existing bridge, supports rank grassland interspersed with planted native seedlings. The rank grassland consists predominantly of exotic grasses and herbs, while the scattered native seedlings indicate restoration efforts within this section of the riparian corridor.

Accessways (no vegetation)

The remaining area consists of roading and mixed-use trails, which are devoid of vegetation. These accessways contribute to habitat fragmentation and offer no ecological value within the Project Area.

3.1.4.3 Plant Species Observed

Plant species encountered during the surveys are listed in Attachment C. Indigenous species present within the Project Area included:

- tōtara (*Podocarpus totara*) — Not Threatened
- kānuka (*Kunzea ericoides*) — Nationally Vulnerable
- kōwhai (*Sophora microphylla*) — Not Threatened
- māhoe, whitey wood (*Melicytus ramiflorus*) — Not Threatened
- akeake (*Dodonaea viscosa*) — Not Threatened
- patatē, seven-finger (*Schefflera digitata*) — Not Threatened
- taratara, lemonwood (*Pittosporum eugenioides*) — Not Threatened
- mikimiki (*Coprosma linariifolia)* — Not Threatened

A total of twenty (20) indigenous vascular taxa were recorded within the vegetation and habitat types associated with the Project Area. While the majority of these taxa have been planted, they are relatively common and typical of regenerating native vegetation in modified lowland flats and hill country of the Bryant Ecological District.

Notably, one species, kānuka (*Kunzea robusta*), is included in the New Zealand Threat Classification Lists, where it is classified as ‘Threatened - Nationally Vulnerable’ (de Lange et al. 2018) due to the threat posed by myrtle rust disease (Austropuccinia psidii).

3.1.4.5 Ecological Value

Table 3.9 summarises and further justifies the terrestrial habitat values in accordance with EIANZ guidelines. The Project Area is not designated as SNA and currently lacks the ecological values required for such classification. Within the area, secondary native shrubland habitats are considered of **High** ecological value. In contrast, areas dominated by exotic scrub and trees are assessed as having **Low** to **Moderate** ecological value. Exotic (pasture) grasslands and areas of accessway or bare ground are evaluated as having **Low** and **Very Low** ecological values, respectively.

3.1.5 Terrestrial Ecology (Fauna)

3.1.5.1 Bats

Desktop & On-site Observations

Department of Conservation's bat distribution database lists several records of pekapeka/long-tailed bat (*Chalinolobus tuberculatus*, Threatened – Nationally Critical) from various habitat types in the Bryant Ecological District over the past decade. According to Department of Conservation's bat distribution database records (accessed June 2023), this species has not been detected within 10 km of the Project Area, with the closest record some 13-14 km (Pelorus catchment) from the Project Area[14].

Pekapeka/long-tailed bats forage over farmland and urban areas favouring forest edge and riparian habitats where they feed on aquatic insects. Long-tailed bats can cover 50 km in a single night and have ranges extending up to 100 km^2. A study of pekapeka/long-tailed bats within the highly fragmented landscape of South Canterbury found they preferred roosting habitat that included indigenous forest, shrubland remnants and riparian zones (Sedgeley and O'Donnell 2004). Long-tailed bats usually find roosts in large old native canopy trees either beneath the bark or in cavities where they rest during the day and breed. They are also known to utilise mature exotic trees such as pine and macrocarpa.

No old growth and very limited large trees which supported cavities and/or epiphytes within which bats could roost were recorded within the Project Area. The area is unlikely to be important habitat for bats and although the Project Area may provide some intermittent habitat for bats these potential habitats were of relatively low value. On this basis formal bat surveys were not deemed necessary and were not conducted for the Project Area.

Ecological Value

There is limited habitat within the Project Area suitable for commuting, roosting, and foraging by pekapeka/long-tailed bats, with the closest known record located 13-14 km away to the east. While no targeted ABM surveys were conducted, their presence within or adjacent to the Project Area is considered unlikely. This assessment is based on a lack of positive records, the proximity of urban development, existing noise and light pollution, and limited adjacent foraging habitat and connectivity to known bat records/habitat.

3.1.5.2 Birds

Desktop Observations

All birds are protected under the Wildlife Act except those listed in Schedule 5 of the Act. The presence of Threatened species would be considered significant if identified within the Project Area.

Records of native bird species identified within approximately the Maitahi / Maitai FMU were assessed[15]. Table 3.6 identifies the listed TAR species that may occupy or utilise the Maitahi / Maitai FMU, detailing each species' habitat preferences and summarising their likelihood of presence within the area.

The NPS-IB[16] classifies certain bird species as 'specified highly mobile fauna'. Many of the native bird species listed in Table 3.6 are included in this classification.

---

[14] Distance is approximated from the centre of the Project Area to the location of the DOC record.

[15] As noted in New Zealand Bird Atlas (Grids BY54, BZ54, BZ55, BY55, BX55 positioned over the Maitahi / Maitai FMU, August 2019-Sept 2024) and iNaturalist (10 km radius).

[16] Appendix 2.

Table 3.6 TAR bird species with potential to occupy or utilise the Maitahi / Maitai FMU and therefore the Project Area.

Species	Common/Maori name	Threat Status[a]	Preferred ecosystem type(s)[b]	Likelihood of presence	Justification
Falco novaeseelandiae	New Zealand Falcon, Kārearea	Threatened - Nationally Vulnerable	Forests, Open Areas, Farmland	Moderate (Uplands, Lowlands)	May occur in both forested upper catchments and open lowland areas.
Anthus novaeseelandiae	New Zealand Pipit, Pīhoihoi	At Risk - Declining	Grasslands, Farmland, Coastal Areas	Moderate (Uplands, Lowlands)	More likely in open lowland areas; less common in dense riparian habitats.
Phalacrocorax sulcirostris	Little Black Shag, Kawau Tūī	At Risk - Naturally Uncommon	Freshwater Lakes, Rivers, Coastal Areas	Moderate (Uplands, Lowlands)	Likely found along rivers in both lowland and upper catchment areas.
Poodytes punctatus	New Zealand Fernbird, Mātātā	At Risk - Declining	Wetlands, Scrublands	Moderate (Uplands, Lowlands)	Likely in lowland scrublands, may occur in riparian zones.
Nestor meridionalis	New Zealand Kaka, Kākā	Threatened - Nationally Vulnerable	Forests	Moderate (Upper Catchments)	Prefers forested upper catchments, less likely in lowland areas.
Limosa lapponica	Bar-tailed Godwit, Kuaka	At Risk - Declining	Coastal and Estuarine Areas	Low	Coastal species, unlikely to occur in riparian or forested areas.
Chroicocephalus bulleri	Black-billed Gull, Tarāpuka	At Risk - Declining	Coastal and Freshwater Areas	Low (Lowlands)	Found in lowland wetland areas; unlikely in forested upper catchments.
Chlidonias albostriatus	Black-fronted Tern, Tarapirohe	Threatened - Nationally Endangered	Rivers, Braided Riverbeds	Low	Prefers braided river habitats, uncommon in forested or urban riparian areas.
Ardenna bulleri	Buller's Shearwater, Rako	At Risk - Declining	Marine Areas	Low	Marine species, no affinity for riparian or inland habitats.
Hydroprogne caspia	Caspian Tern, Taranui	Threatened - Nationally Vulnerable	Coastal and Estuarine Areas	Low	Coastal species, unlikely to be found in riparian or forested areas.
Anarhynchus bicinctus	Double-banded Plover, Pohowera	At Risk - Declining	Coastal Areas, Estuaries, Braided Rivers	Low	Typically coastal; unlikely to be found in riparian zones.
Anarhynchus frontalis	Wrybill, Ngutupare	Threatened - Nationally Increasing	Braided Rivers, Estuaries	Low	Prefers braided rivers and estuaries, unlikely in urban riparian zones.
Porphyrio hochstetteri	South Island Takahe, Takahē	Threatened - Nationally Vulnerable	Wetlands, Grasslands	Low	Prefers remote grasslands and wetlands; unlikely in urban riparian areas.
Eudyptula minor	Little Blue Penguin, Kororā	At Risk - Declining	Coastal Areas	Low	Coastal species, not typically found in riparian zones.

Charadrius bicinctus	Banded Dotterel, Pohowera	At Risk - Declining	Coastal Areas, Estuaries, Braided Rivers	Low	Prefers open coastal and riverbed habitats, not riparian zones.
Pachyptila turtur	Fairy Prion, Tītī Wainui	At Risk - Relict	Marine Areas	Low	Marine species, no association with riparian habitats.

[a] Robertson et al. (2021).

[b] NPS-IB; Appendix 2.

Site Observations

Formal bird surveys for wetland or forest birds were not completed within the Project Area, as limited habitat was present for TAR species. However, a roaming inventory of birds sighted or heard was taken during the field survey within the Project Area. Of those recorded (several fantail), none were classified as TAR species. The bird life observed during survey within the Project Area area generally reflects the modified state of the local environment.

Ecological Value

Habitat suitability for TAR species is considered to be low and they are likely to be at most infrequent visitors to the Project Area rather than resident. The ecological value of bird habitat within the Project Area is therefore considered to be **Low** to **Moderate**. The moderate rating reflects the albeit very low potential for TAR species (pīhoihoi / New Zealand pipit and kārearea / southern falcon) to occupy or utilise the area. Again, these species are not restricted to these habitats within the Project Area and likely utilise available, higher quality/less disturbed habitat across the wider lowland valley floor and hill country environment and adjacent coastal area.

3.1.5.3 Macroinvertebrates

The overall diversity of ground active macroinvertebrates is expected to be very low within the exotic grassland-dominated areas, but higher within the mapped indigenous vegetation (Appendix E).

Native shrubland (planted or otherwise) typically habours greater species richness and diversity than other forest types and land dominated by pasture or other monocultures. At the feeding guild level, present communities are likely to be dominated by detritivores and, to a lesser extent, scavengers, predators, parasitoids and phytophages given that on the day of the field survey organic aggregations of readily consumable leaf litter and woody debris (primary food source for detritivores) were present within native vegetated areas. Ecologically, detritivore-based communities are particularly important given their role in nutrient cycling by facilitating the decomposition of organic material.

Most native invertebrates are not legally protected under the Wildlife Act 1953. Protected invertebrates are listed in Schedule 7 of the Act and include a small number of large or threatened species, none of which are known to occur within the Project Area. Other likely present invertebrate species that are not listed as protected may nevertheless contribute to the identification of valuable habitats by their presence.

It is important to note that Nelson and Tasman Districts hold the most diverse range of giant *Powelliphanta* land snails nationally, with most species are classified as either At Risk or Threatened. *Powelliphanta* snails are prone to dehydration and so they cannot survive in dry conditions. For this reason, they are more common in moist high-altitude forest than in drier forests at lower altitudes (as in the present case). No *Powelliphanta* snails or shells were encountered during the present

survey, and it is considered unlikely that *Powelliphanta* snails will be inhabiting the habitats within the Project Area.

Ecological Value

The overall ecological value of inhabitant invertebrates is considered to be **Low** given the likely absence of TAR species.

3.1.5.4 Herpetofauna

Desktop Observations

Seven native lizard species are known to occur within 15 km of the Project Area, based on a review of the ARDS database, iNaturalist, Whitaker (2004), and van Winkle et al. (2018). These species and their habitat preferences are presented in Table 3.7.

Table 3.7 Herpetofauna records in the vicinity of the Project Area and their preferred habitat type.

Species	Common/ Maori name	Nearest record	Threat Status	Preferred Habitat Type	Likelihood of Presence
Mokopirirakau granulatus	Forest gecko	6.8 km SE	At Risk - Declining	Primarily arboreal including within swamps, scrubland and mature forest.	Low
Naultinus stellatus	Starred gecko	1.6 km SE	Threatened - Nationally Vulnerable	Arboreal including within swamps, scrubland and mature forest.	Low
Oligosoma kokowai	Northern spotted skink	2.9 km NW	At Risk - Relict	Prefers open areas such as boulder beaches, sand dunes, open coastal forest/ scrub, as well as grassland and shrubland.	Very Low
Oligosoma polychroma	Northern grass skink	0.6 km SE	Not Threatened	Wide ranging including rock, grassland, flaxland, shrubland and modified habitat.	Moderate
Oligosoma zelandicum	Glossy brown skink	13.4 km NE	At Risk - Declining	Coastal pebble banks, grassland, wetland, dense scrubland and mature forest.	Very Low
Woodworthia maculata	Raukawa gecko	3.4 km SW	Not Threatened	Wide ranging; saxicolous (rock dwelling) or arboreal.	Very Low
Woodworthia “Marlborough mini”	Marlborough mini gecko	3.4 km NW	At Risk - Declining	Saxicolous and terrestrial.	Very Low

Most native lizards require indigenous habitat or surrogate habitat adjacent to contiguous forest habitat area. Based on the desktop habitat assessment, there is likely to be a predominant absence of suitable habitat within the Project Area for most indigenous lizard species. The Not Threatened northern grass skink is however widespread and frequently recorded within highly modified habitats such as exotic scrub and rank grassland. The closest record is approximately 1 km from the Project

Area[17]. It is therefore highly likely to occur within and adjacent to the Project Area.

It is highly unlikely that native frog species would occur within the Project Area. The only frog species recorded within the >5 km of the Project Area was the Southern bull frog (Introduced and Naturalised). Based on lack of suitable habitat available and lack of suitable source population, native frogs have not been considered further for the Project.

Ecological Value

There is potential for the Not Threatened Northern grass skink to be present throughout the Project Area. It is unlikely that any other native lizard species are present. Northern grass skink are widespread and Not Threatened and the habitat value for native lizards is limited. As such, the ecological value of the habitat for lizards is considered to be **Low**.

3.1.6 Summary of Ecological Value

Table 3.8 summarises the ecological values of the ecological features (aquatic and terrestrial) present within the Project Area.

Table 3.8 Summary of ecological values for aquatic and terrestrial habitat and species within the Project Area.

Ecological Feature		Assigned Ecological Value
Aquatic Habitat		
Maitai River (Gibbs and Jickells Survey Area)		Moderate-High
Aquatic Fauna		
Fish	Maitai River (Gibbs and Jickells Survey Area)	Low-High
Terrestrial Habitat		
Secondary native shrubland (NS)		High
Exotic shrubs/trees (ES)		Low-Moderate
Exotic grassland (EG)		Low
Accessways or Bare Ground (NV)		Very Low
Terrestrial Fauna		
Bats		N/A
Native birds		Low-Moderate
Native Macroinvertebrates		Low

[17] Distance is approximated from the centre of the Project Area to the location of the DOC record.

Native herpetofauna	Low

4 Project Features & Implementation

4.1 Project Key Features

Key features associated with the construction of bridges for off-site enabling works as part of Stage 1 of the Maitahi Residential Development include:

- Two new bridges over the Maitai (Maitahi) River at Gibbs and Jickells Survey Areas to provide essential access.
- Bridge design considerations to minimise ecological impacts, including clear-span designs where possible to reduce in-stream disturbance and maintain hydrological connectivity.
- Footings and abutments located to limit encroachment into the wetted streambed and riparian margins, with erosion control measures to prevent sedimentation.
- Temporary construction accessways and platforms designed to avoid sensitive areas, with measures to mitigate disturbance and compacted zones rehabilitated post-construction.
- Riparian restoration planting along disturbed margins to stabilise banks, enhance shading, and improve habitat connectivity.
- Fish passage maintenance, ensuring the design and placement of bridge structures do not impede aquatic connectivity or species movement.
- Monitoring and adaptive management to track the effectiveness of ecological mitigation measures during and after construction.

Refer back to the main AEE report for a more detailed description of works to be authorised for the Project.

4.2 Project Implementation

The bridge construction for the Stage 1 Development of the Maitahi Residential Project, as part of the off-site enabling works, will be implemented in the following stages:

- Site Preparation:
    - Clearing and grading of designated construction areas for bridges, ensuring measures are in place to minimise sediment runoff and protect adjacent riparian zones.
    - Installation of temporary accessways and platforms to facilitate safe and efficient construction while avoiding ecologically sensitive areas.
- Bridge Construction:
    - Construction of bridge footings and abutments, with erosion and sediment control measures to protect water quality in the Maitai (Maitahi) River.
    - Assembly and installation of bridge spans, designed to maintain hydrological connectivity and minimise in-stream impacts.
- Riparian Rehabilitation:
    - Restoration of disturbed riparian margins with native planting, including species to provide bank stabilisation, shading, and habitat connectivity.
    - Removal of temporary accessways and rehabilitation of affected areas to their natural or improved state.
- Monitoring and Maintenance (if required):
    - Ongoing monitoring of ecological mitigation measures, including riparian planting success and water quality outcomes, with adaptive management to address unforeseen impacts.

4.3 Description of Construction Works

Refer to the main AEE report for a detailed description of construction works to be authorised for the Project. Key aspects relevant to the construction of two bridges within the Project Area are outlined below.

The Project Area lies within the low-lying valley floor of the Maitai River floodplain, with gently undulating terrain interspersed with exotic pasture and smaller areas of planted and regenerating native shrubland and exotic shrubland/treeland. The construction footprint for the two bridges crosses the floodplain and riparian zones of the Maitai River, requiring selective vegetation clearance and ground preparation to accommodate the proposed bridge structures.

Construction Footprint and Vegetation Clearance

- Gibbs Bridge Site: Vegetation clearance will focus on exotic pasture and limited patches of planted and regenerating native shrubs along the riparian zone.
- Jickells Bridge Site: Clearance of a small area of exotic shrubs/trees and grasses will be required along both the true left and right riparian corridors.

Earthworks and Drainage Management

Earthworks will include cut and fill activities to prepare stable foundations for bridge footings. Surface water during construction will be managed in accordance with the Nelson Tasman Erosion and Sediment Control Guidelines 2019 (or subsequent versions). A Provisional Erosion and Sediment Control Plan (ESCP) has been prepared and will be finalised by the contractor for approval by Nelson City Council prior to commencement of site works.

Sediment control measures will include:

- Silt fences and sediment traps along riparian margins to prevent runoff into the river.
- Stabilised entry and exit points for machinery to reduce sediment transport.
- Temporary bunding and diversion drains to manage overland flow during construction.

Temporary Instream Works and Mitigation

Temporary instream works are anticipated at both bridge sites and may involve the installation of cofferdams or diversion bunds or similar structures to isolate work areas and minimise disturbance to the active river channel. These works are likely to be scheduled to avoid sensitive ecological periods, such as fish spawning or migration seasons, and will comply with conditions set by regulatory authorities.

The final construction methodology for the bridges will be confirmed during the detailed design phase, ensuring all measures align with ecological and hydrological requirements for the aquatic environment.

5 Assessment of Effects on Ecological Values

5.1 Positive Effects

The construction of two bridges over the Maitai River within a lowland floodplain, where existing riparian values are relatively low, offers opportunities for significant ecological improvement through targeted riparian restoration efforts. While instream restoration is not deemed appropriate given the high-flow hydrology and existing bed stability of the Maitai River, the Project may involve enhancing riparian margins to deliver net ecological benefits. Opportunities include:

Riparian Habitat

- Riparian restoration and planting — Establishing continuous native vegetation along riparian margins to stabilise banks, reduce erosion, and improve shading. Targeted planting will also enhance biodiversity and provide habitat connectivity for terrestrial and semi-aquatic species.
- Improved bank stability — Utilising native species to stabilise banks near the bridge structures, reducing the risk of erosion and ensuring long-term riparian health.

Further benefits can be integrated during detailed design, including:

- Green infrastructure - Expanding native vegetation along roadsides and bridge approaches to create biodiversity corridors.
- Habitat connectivity - Linking riparian restoration areas to improve ecological function across the floodplain.
- Shading and thermal regulation - Enhancing riparian shade to reduce water temperatures, benefiting aquatic and riparian ecosystems.

5.2 Assessment of Construction Effects

The proposed construction of two bridges over the Maitai River within a lowland floodplain area has the potential to impact ecological features in and adjacent to the Project Area without appropriate impact management measures.

Appendix A provides detailed justifications for the ecological values and magnitude of effects assessments, following the EIANZ Guidelines. The effects assessment assumes that embedded mitigation measures will be effectively implemented during construction, as outlined below:

- **Erosion and Sediment Control**:

  A provisional Erosion and Sediment Control Plan (ESCP) has been prepared, describing measures to manage sedimentation from construction earthworks. It is assumed these measures will adequately mitigate sediment generation and prevent adverse ecological effects, including downstream impacts on the Maitai River and Nelson Haven.

- **Riparian Vegetation Impacts**:

  Bridge construction will require some removal of riparian vegetation, which will be offset by restoration efforts to enhance riparian margins. No high-value terrestrial habitats are known to exist within the immediate construction footprint, reducing the likelihood of significant terrestrial ecological impacts.

- **Wildlife Protection**:

  Requirements to prevent injury or mortality of native wildlife under the Wildlife Act 1953 are addressed separately in Section 6 Impact Management.

With these mitigation measures in place, the ecological effects of construction are anticipated to be minor and manageable, with opportunities for further positive outcomes through restoration and enhancement efforts during and post-construction.

5.2.1 Aquatic Ecology

Table 5.1 integrates specific ecological values described in Section 3 above, and lists the potential effects (direct and indirect) to the **aquatic habitats** and **fish** within the Project Area and their magnitude of effect. This is then used to calculate an overall level of effect to each ecological feature, prior to mitigation.

Table 5.1 Magnitude of effects and subsequent level of effect (without mitigation) of the Project on the aquatic ecology features present within the Project Area during the construction phase.

Ecological feature	Ecological Value	Effects Description	Magnitude of Effect	Justification of Magnitude	Level of Effect, Without Mitigation
Maitai River (Gibbs and Jickells Survey Areas) - Freshwater habitat riparian & instream	Moderate-High	Construction activities will include vegetation clearance along the riparian margins at both sites, with temporary instream works and one permanent footing extending into the wetted bed at Gibbs. Earthworks may lead to sedimentation or minor hydrological alterations.	Low	Temporary instream works will occur during low flow, minimising hydrological disruptions. Riparian vegetation at both sites is degraded, and the overall footprint is limited to previously modified areas.	Low
Maitai River (Gibbs and Jickells Survey Areas) - Native fish	Low-High	Temporary instream works may disturb aquatic habitat and pose a risk of fish injury or mortality during construction.	Moderate	Death/injury of native fish species is considered to be an unacceptable effect that is highly likely to occur during instream works.	Moderate

5.2.2 Terrestrial Ecology

Table 5.2 integrates specific ecological values described in Section 3 above, and lists the potential effects (direct and indirect) to the **terrestrial habitats** and **fauna** within the Project Area and their magnitude of effect. This is then used to calculate an overall level of effect to each ecological feature, prior to mitigation.

Table 5.2 Magnitude of effects and subsequent level of effect (without mitigation) of the Project on the terrestrial ecology features present within the Project Area during the construction phase.

Ecological feature	Ecological Value	Effects Description	Magnitude of Effect	Justification of Magnitude	Level of Effect, Without Mitigation
Terrestrial Habitats - Secondary native shrubland (NS), Exotic scrub (ES), Exotic grassland (EG) and cleared vegetation (CV)	Very Low to High[a]	Temporary loss of habitat/ecosystem and edge effects.	Negligible	The overall extent of (modified) habitat loss is limited at both a site and catchment scale. The vast majority of taller native shrubs/trees, including kānuka, will be retained by the Project. Post-construction native replanting of the Project Area (where practicable) will reestablish/enhance native habitat values and sequences within the Project Area and surrounds.	Very Low
Birds	Low to Moderate	Loss of foraging and breeding habitat through vegetation removal. Fragmentation of habitat.	Negligible	Retained habitat (native vegetation) within the Project Area and surrounding area will continue to provide habitat for native birds. Post-construction habitat creation and restoration (e.g. through native planting and stabilisation) efforts will enhance ecological value, increasing biodiversity, species richness, and an increased potential to support TAR bird species.	Low
Lizards	Low	Temporary loss of foraging and breeding habitat through vegetation removal. Fragmentation of habitat.	Negligible	Retained habitat (native vegetation) within the Project Area and surrounding area will continue to provide habitat for native lizards, including northern grass skink. Post-construction habitat creation and restoration (e.g. through native planting and stabilisation) efforts will enhance ecological value, increasing biodiversity, species richness, and an increased potential to support TAR lizard species.	Low

[a] The High rating reflects kānuka's Threatened status, and the importance of the native vegetation as habitat for indigenous fauna and for linking ecosystems within the Bryant Ecological District.

5.3 Assessment of Operational Effects

The Project Area is already disturbed and fragmented by the existing land use. The proposed bridges could potentially exacerbate these issues; however the magnitude of change is considered to be low for the species likely to be present, which are considered to be adapted to human modified environments.

The magnitude of operational effects on terrestrial and aquatic habitat and fauna has been assessed and are considered to be Low. As such the overall level of operational effect on the terrestrial and aquatic ecological features is **Low** to **Very Low** and so has not been considered any further.

A net gain in biodiversity values (through restoration and enhancement of riparian habitat) is anticipated to result from the proposed activity in the medium term.

6 Impact Management

6.1 Aquatic Ecology

6.1.1 Recommendations for Avoiding or Minimising Potential Adverse Effects

In accordance with the EIANZ guidelines measures to avoid, remedy or mitigate effects is focused on aquatic ecological features where the level of effect was assessed to be **Moderate**, **High** or **Very High**.

Schedule X and the initial assessment for the proposed Stage 1 Development highlighted the importance of preserving major stream corridors within the wider Project Area. A key priority was set on ensuring stream crossing structures, such as bridges or culverts, are designed as appropriate to accommodate expected flows and allow for the safe passage of aquatic fauna.

As outlined above, the permanent river reaches associated with the proposed bridges at Gibbs and Jickells have been subject to historical modifications, including the installation of the existing bridges. The new bridges have been designed to minimise both instream and riparian impacts. At the Gibbs site, the two permanent footings extending into the riverbed have been strategically positioned in line with an existing footing of the current bridge, occupying a total area of approximately 4 m². Fish passage and natural flow will be maintained, ensuring hydrological connectivity.

These limited impacts are considered negligible at both the site and catchment scales and are unlikely to require compensation or offsetting. However, if compensation or offsetting is deemed necessary, the Project Area is anticipated to have adequate capacity to achieve No-Net-Loss or, preferably, Net-Gain ecological outcomes.

Where avoidance was not achievable, mitigation measures have been applied to aquatic attributes assessed with a Moderate or higher level of effect, as detailed in Table 6.1.

Table 6.1 Aquatic ecology features requiring mitigation.

Ecological feature	Effects Description	Level of Effect, Without Mitigation	Mitigation Reference
Maitai River (Gibbs and Jickells Survey Areas) - Native fish	In-stream disturbance during construction (e.g. bridge installation, vegetation clearance), may impact on native fish within the subject impact reach. This activity may result in fish injury or death.	Moderate	a)

a) Fish injury or death

Instream works during the construction of the bridges at the Gibbs and Jickells Survey Areas, such as bridge installation, have the potential to impact native fish species, potentially resulting in fish injury or mortality. To minimise these risks, the following mitigation measures are proposed:

- Timing Restrictions - Instream works should be restricted to low-flow periods during summer and scheduled to avoid native fish migration periods (November to May). Flexibility in timing may be applied based on the recommendations of the Project ecologist.
- Fish Salvage and Relocation - A Fish Salvage and Relocation Plan should be implemented as a condition of consent to ensure the safe removal and relocation of fish from the works area prior to construction activities.

With the implementation of these measures, the overall level of effect on native fish is expected to

be reduced to **Low**.

6.2 Terrestrial Ecology

6.2.1 Recommendations for Avoiding or Minimising Potential Adverse Effects

There were no terrestrial ecological features identified where the level of effect (construction and operation) was assessed to be **Moderate** or higher. As such, and in accordance with the EIANZ guidelines, specific efforts to avoid, remedy or mitigate effects on these features is not required.

Notwithstanding, we suggest the following measures be implemented prior to and during the construction phase of the Project:

- Avoid direct effects to the habitat immediately outside of the Project Area. This should include careful selection of appropriate machinery to minimise disturbance.
- Where the proposed works remove indigenous vegetation it is recommended that care is taken to ensure stabilisation of exposed earthworks as soon as possible along the exposed edge, with suitable native tree and shrub species. In this regard, invasive weeds need to be managed along these edges. Avoid washing of organic material into watercourses, stockpile organic mulch away from watercourses, the output from chippers etc should not to be directed towards watercourses, and cleared vegetation on-site should only be stockpiled short-term and either mulched or disposed of off-site.
- Avoid removal of larger shrubs/trees where practicable.

The Wildlife Act 1953 must be complied with, as such management measures must still be implemented to ensure that Project activities do not injure or kill native wildlife. These are outlined below.

6.2.1.1 Lizard management

While the presence of lizards within the Project Area is considered unlikely, a precautionary approach is recommended to mitigate potential impacts. Pre-works checks should be conducted by an appropriately qualified and experienced herpetologist to confirm the absence or presence of native lizards. If lizards are encountered, they should be safely relocated to suitable adjacent habitat within the Project Area to minimise disturbance.

6.2.1.2 Bird management

To effectively manage potential threats of direct injury or mortality to native birds and their eggs, mitigation is recommended in the form of seasonal constraints for vegetation clearance activities within higher-quality, native-dominant areas. Native woody trees and large shrubs should ideally be removed outside the peak bird breeding season (August to February inclusive). However, the very low amount of vegetation removal required for the Project may negate the need for strict seasonal constraints, subject to confirmation by the Project ecologist.

6.3 Ecological Management Plan

To ensure appropriate mitigation of ecological impacts and guide restoration initiatives for aquatic and terrestrial features, the development and implementation of an Ecological Management Plan (EMP) is recommended as a condition of consent (once granted). The EMP will provide a structured approach to minimising adverse effects and enhancing ecological outcomes.

6.3.1 Mitigation Measures

- Erosion and Sediment Control: Incorporate measures such as silt fences and sediment traps to

prevent sedimentation impacts on aquatic habitats, with regular inspections, particularly after rainfall.

- Timing of Works: Schedule instream construction during low-flow periods and avoid sensitive seasons for native fish, such as spawning and migration periods.
- Habitat Protection: Clearly delineate and protect sensitive zones. Conduct fish salvage operations in alignment with conservation guidelines to minimise impacts on aquatic species.
- Pest Management: Address invasive species through targeted control measures during and after construction to prevent disruption to native ecosystems.

6.3.2 Restoration Initiatives

- Riparian Restoration: Rehabilitate degraded riparian margins with locally sourced native species to improve bank stability, enhance shading, and support biodiversity in the aquatic and terrestrial interface.
- Habitat Connectivity: Strengthen connectivity of fragmented habitats, particularly along riparian corridors, and adopt clear-span bridge designs to maintain hydrological and faunal movement.
- Water Quality Improvements: Install stormwater treatment features to filter construction-related pollutants and maintain downstream water quality.

6.3.3 Implementation and Monitoring

- Post-Construction Monitoring: Establish a monitoring program to evaluate the effectiveness of mitigation measures and restoration efforts, adjusting strategies as needed to achieve desired outcomes.
- Stakeholder Engagement: Collaborate with local iwi, community groups, and stakeholders to integrate cultural and community values into restoration plans.

6.3.4 Expected Benefits

- Preservation and enhancement of aquatic and terrestrial habitats.
- Improved ecological integrity and resilience of riparian ecosystems.
- Reduction in construction impacts and a net positive contribution to local biodiversity.

The proposed EMP will ensure that mitigation and restoration measures are effectively implemented, aligning with best practices and ecological objectives to protect and enhance the Maitai River and surrounding habitats.

7 Cumulative Effects

As per EIANZ guidelines, assessment of ecological effects of a project should consider cumulative impacts on the environment and not just the direct effects of the single project application. For the purposes of the Project it is considered that the proposed Project Area and the downstream receiving environment associated with the Maitai River and Nelson Haven are an appropriate spatial scale for consideration of cumulative effects, given this area provides habitat for mobile fauna species such as native birds and fish.

As the existing environment is highly modified, the specific Project impacts discussed within this report have been minimal and adverse effects have largely been avoided. Cumulative adverse effects are therefore anticipated to be no more than minor.

8 Summary & Conclusions

An estimate of habitat change resulting from the Project can be undertaken by importing the preliminary site design into a GIS environment. This allows a semi-quantitative estimate to be made of the habitat likely to be impacted. The areal footprint of the Project Area overlaid on a map of habitat types is shown above in Figure 3.3 with spatial proportions summarised in Table 3.1.

The construction of two new bridges over the Maitai River, with a limited areal footprint, has been designed to minimise ecological impacts while providing opportunities for restoration of degraded riparian areas. The bridge installations are focused on areas already subject to significant historical modification, including the presence of existing bridges and degraded riparian margins dominated by exotic species.

Potential impacts on ecological features are expected to be highly localised and short-term, primarily occurring during the construction phase. While vegetation clearance and earthworks may temporarily disturb riparian and instream habitats, the affected areas are limited to small sections of the riparian zone and one instream footing at the Gibbs site (c. 4 m^2). Importantly, no permanent loss of freshwater (instream or riparian) values is anticipated. The implementation of appropriate erosion and sediment control (ESC) and stormwater management measures will ensure that adverse effects on downstream freshwater ecosystems are avoided.

Overall, the limited impacts associated with the bridge construction are expected to be short-term and localised, confined to the construction phase. Assuming integration of mitigation measures and detailed design that incorporates ecological restoration and enhancement of riparian habitats, the Project has the potential to deliver significant net positive ecological outcomes in the medium to long term.

9 References

Baber, M., Christensen, M., Quinn, J., Markham, J., Ussher, G., and Signal-Ross, R. 2021. The use of modelling for terrestrial biodiversity offsets and compensation: a suggested way forward. Resource Management Journal, Resource Management Law Association (April 2021).

Butler, D.J. 2008. Tasman District Biodiversity Overview - Indigenous terrestrial vertebrates and invertebrates. Published by Tasman District Council. Design and Layout: Dry Crust Communications. ISBN 978-1-877445-06-4

Courtney, S.P., Bradshaw, D.H., Moore, S.H., and Atkinson, M.A. 2003. Living Heritage - Growing Native Plants in Nelson. Perpartment of Conservation Nelson-Marlborough Conservancy and Nelson City Council. 52p.

de Lange, P., Rolfe, J., Barkla, J., Courtney, S., Champion, P., Ford, K., and Ladley, K. 2018. Conservation status of New Zealand indigenous vascular plants, 2017. Wellington: Department of Conservation.

Dunn, N.R., Allibone, R.M., Closs, G.P., Crow, S.K., David, B.O., Goodman, J.M., Griffiths, M., Jack, D.C., Ling, N., Waters, J.M., and Rolfe, J.R. 2018. Conservation status of New Zealand freshwater fishes, 2017. New Zealand Threat Classification Series 24. Department of Conservation, Wellington. 11 p.

EIANZ. 2018. Ecological impact assessment (EcIA): EIANZ guidelines for use in New Zealand: Terrestrial and freshwater ecosystems. Melbourne: Environment Institute of Australia and New Zealand.

Grainger, N., Harding, J., Drinan, T., Collier, K., Smith, B., Death, R., . . . J., R. 2018. Conservation status of New Zealand freshwater invertebrates, 2018. Wellington: Department of Conservation.

Hitchmough, R.A., Barr, B., Knox, C., Lettink, M., Monks, J.M., Patterson, G.B., Reardon, J.T., van Winkel, D., Rolfe, J., and Michel, P. 2021. Conservation status of New Zealand reptiles, 2021. New Zealand Threat Classification Series 35. Department of Conservation, Wellington. 15 p.

Holmes, R., Clapcott, J., Haidekker, S., Hicks, A., Pingram, M., Hodson, R., Death, A., Fuller, I., Harding, J., Neale, M., Valois, A., and Franklin, P. 2020. National rapid river pressures assessment protocol for streams and rivers. Prepared for Hawke's Bay Regional Council/Envirolink. Cawthron Report No. 3543. 36 p. plus appendices.

Maseyk, F., Ussher, G., Kessels, G., Christensen, M., Brown, M. 2018. Biodiversity offsetting under the Resource Management Act. A guidance document. Prepared for the Biodiversity Working Group on behalf of the BioManagers Group.

National Environmental Monitoring Standards: Macroinvertebrates. Collection and Processing of Macroinvertebrate Samples from Rivers and Streams Version: 0.0.1 DRAFT Date of issue: November 2020. Note: The current suite of National Environmental Monitoring Standards (NEMS) documents, Best Practice Guidelines, Glossary and Quality Code Schema can be found at http://www.nems.org.nz.

Nelson, W., Neill, K., D'Archino, R., & Rolfe, J. 2019. Conservation status of New Zealand macroalgae, 2019. Wellington: Department of Conservation.

O'Donnell, C.F.J., Borkin, K.M., Christie, J., Davidson-Watts, I., Dennis, G., Pryde, M., Michel, P. 2023. Conservation status of bats in Aotearoa New Zealand, 2022. New Zealand Threat Classification Series 41. Department of Conservation, Wellington. 18 p.

Sedgeley, J.A., O'Donnell, C.F. 1999. Roost selection by the long-tailed bat, *Chalinolobus tuberculatus*, in temperate New Zealand rainforest and its implications for the conservation of bats in managed forests. Journal of Biological Conservation. Volume 88, Issue 2, May 1999, Pages 261-267.

Snelder, T.H., Biggs, B. and Weatherhead, M. 2004. New Zealand River Environment Classification User Guide. Ministry for the environment and NIWA. Publication number: ME 1026, ISBN 978047833495.

Storey, R.G., Neale, M.W., Rowe, D.K., Collier, K.J., Hatton, C., Joy, M.K., Maxted, J. R., Moore,

S., Parkyn, S.M., Phillips, N. and Quinn, J.M. (2011) Stream Ecological Valuation (SEV): a method for assessing the ecological function of Auckland streams. Auckland Council Technical Report 2011/009.

Storey, R., and Wadhwa, S. 2009. An Assessment of the Lengths of Permanent, Intermittent and Ephemeral Streams in the Auckland Region. Prepared by NIWA for Auckland Regional Council. Auckland Regional Council Technical Report 2009/028.

Tasman District Council. 2020. Ecological District Reports - Biodiversity Values of Significant Native Habitats - Report 03: Bryant Ecological District. 62p.

10 Limitations & Applicability

As with all one-off field ecological assessments, seasonal or temporal variation in the presence of mobile fauna means that the presence or absence of such fauna cannot be ascertained with great accuracy. The condition of habitat often becomes the surrogate for the presence or absence of fauna rather than observed condition on the day of the survey.

This assessment has been carried out in line with the proposal given to the Client by Robertson Environmental Limited. This is assumed in this assessment to be the development area being sought by this application. We note that this design may not be final. Depending on the scope of any future development and detailed design changes, further ecological assessments, including further quantitative assessments may be required.

Robertson Environmental's professional opinions are based on its professional judgement, experience, and training. These opinions are also based upon data derived from the field survey and analysis described in this document, with the support of relevant guidelines (EIANZ, 2018). It is possible that additional surveying, testing and analyses might produce different results and/or different opinions. Should additional information become available, this report should be updated accordingly. Robertson Environmental Limited has relied upon information provided by the Client to inform parts of this document, some of which has not been fully verified by Robertson Environmental Limited. This document may be transmitted, reproduced or disseminated only in its entirety.

Appendix A:

Summary of EcIA Assessment Methodology

The assessment of ecological effects follows Ecological Impact Assessment guidelines (EcIA) produced by the Environment Institute of Australia and New Zealand (EIANZ, 2018). The EcIA approach follows the steps outlined below:

Step 1: Assessment of ecological values

Ecological values are assigned based on the matters to be considered when assigning ecological value outlined in Table A.1, with corresponding criteria specific to terrestrial and freshwater habitats and species as set out in the EcIA guidelines (Table A.2).

Table A.1. Assignment of values to species, vegetation and habitats within the surveyed area (adapted from EIANZ, 2018).

Matter	Assessment matters considered; terrestrial and aquatic ecosystems
Representativeness	Criteria for representative vegetation and habitats: • Typical structure and composition • Indigenous species dominate • Expected species and tiers are present • Thresholds may need to be lowered where all examples of a type are strongly modified Criteria for representative species and species assemblages: • Species assemblages that are typical of the habitat • Indigenous species that occur in most of the guilds expected for the habitat type
Rarity/distinctiveness	Criteria for rare/distinctive vegetation and habitats: • Naturally uncommon, or induced scarcity • Amount of habitat or vegetation remaining • Distinctive ecological features • National priority for protection Criteria for rare/distinctive species or species assemblages: • Habitat supporting nationally Threatened or At Risk species, or locally uncommon species • Regional or national distribution limits of species or communities • Unusual species or assemblages • Endemism
Diversity and pattern	• Level of natural diversity, abundance and distribution • Biodiversity reflecting underlying diversity • Biogeographical considerations – pattern, complexity • Temporal considerations, considerations of life cycles, daily or seasonal cycles of habitat availability and utilisation
Ecological context	• Site history, and local environmental conditions which have influenced the development of habitats and communities • The essential characteristics that determine an ecosystem's integrity, form, functioning, and resilience (from "intrinsic value" as defined in RMA) • Size, shape and buffering • Condition and sensitivity to change • Contribution of the site to ecological networks, linkages, pathways and the protection and exchange of genetic material • Species role in ecosystem functioning – high level, key species identification, habitat as proxy

Table A.2. Criteria for assigning ecological value to terrestrial and freshwater habitats and species (modified from EIANZ 2018)

Value	Species Value requirements	Habitat Value requirements
Very High	Threatened - (Nationally Critical, Nationally Endangered, Nationally Vulnerable)	Area rates High for 3 or all of the four assessment matters listed in Table A.1. Likely to be nationally important and recognised as such.
High	Important for Nationally At Risk – species and may provide less suitable habitat for Nationally Threatened species	Area rates High for 2 of the assessment matters, Moderate and Low for the remainder, or Area rates High for 1 of the assessment matters, Moderate for the remainder. Likely to be regionally important and recognised as such.
Moderate	At Risk - (Recovering, Relict, Naturally Uncommon) Locally (Ecological District) uncommon or distinctive species	Area rates High for one matter, Moderate and Low for the remainder, or Area rates Moderate for 2 or more assessment matters Low or Very Low for the remainder. Likely to be important at the level of the Ecological District.
Low	Native - Not Threatened. Nationally and locally common indigenous species	Area rates Low or Very Low for majority of assessment matters and Moderate for one. Limited ecological value other than as local habitat for tolerant native species.
Very Low	Exotic species, including pests, species having recreational value	Area rates Very Low for 3 matters and Moderate, Low or Very Low for remainder.

Step 2: Magnitude of effect assessments

Step 2 of the EcIA guidelines requires an evaluation of the magnitude of effects on ecological values based on the extent of any area which is likely to be affected, intensity and duration of effect. The magnitude of the effect that the Project is expected to have on ecological values is evaluated as being either No effect, Negligible, Low, Moderate, High or Very High, based on the proposed works (footprint size, intensity and duration; see Table A.3).

Table A.3. Summary of the criteria for describing the magnitude of effect as outlined in EIANZ, 2018.

Magnitude of effect	Description
Very High	Total loss or major alteration of the existing baseline conditions; and/or Loss of high proportion of the known population or range
High	Major loss or alteration of existing baseline conditions; and/or Loss of high proportion of the known population or range
Moderate	Loss or alteration to existing baseline conditions; and/or Loss of a moderate proportion of the known population or range
Low	Minor shift away from existing baseline conditions; and/or Minor effect on the known population or range
Negligible	Very slight change from the existing baseline conditions; and/or Negligible effect on the known population or range

Step 3: Level of effects assessment in the absence of mitigation

Step 3 of the EcIA guidelines requires the overall level of effect to be determined using a matrix that is based on the ecological values and the magnitude of effects on these values in the absence of any efforts to avoid, remedy or mitigate for potential effects. Level of effect categories include No Effect, Very Low, Low, Moderate, Moderate/High, High and Very High. Table A.4 shows the EcIA matrix outlining criteria to describe the overall level of ecological effects.

Table A.4. Summary of the criteria for describing the overall level of ecological effects as outlined in EIANZ, 2018.

Effect Level		Ecological Value				
		Very High	High	Moderate	Low	Very Low
Magnitude of Impact	Positive	Net gain	Net gain	Net gain	Net gain	Net gain
	Very High	**Very high**	**Very high**	**High**	**Moderate**	Low
	High	**Very high**	**Very high**	**Moderate**	Low	Very low
	Moderate	**High**	**High**	**Moderate**	Low	Very low
	Low	**Moderate**	Low	Low	Very low	Very low
	Negligible	Low	Very low	Very low	Very low	Very low

Assessment also considered the temporal scale at which potential impacts were likely to occur:

- Permanent (>25 years);
- Long-term (15-25 years);
- Medium-term (5-15 years);
- Short-term (0-5 years); or,
- Temporary (during construction).

Step 4: Establish if mitigation is required

Results from the matrix in Table A.4 is used to determine the type of responses that may be required to mitigate potential direct and indirect impacts, considering the following EcIA guidelines:

- A 'Low' or 'Very Low' level of impact is not normally of concern, though design should take measures to minimise potential effects.
- A 'Moderate' to 'High' level of impact indicates a level of impact that qualifies careful assessment on a case-by-case basis. Such activities could be managed through avoidance (revised design) or appropriate mitigation. Where avoidance is not possible, no net loss of biodiversity values would be appropriate.
- A 'Very High' level of impact is are unlikely to be acceptable on ecological grounds alone and should be avoided. Where avoidance is not possible, a net gain in biodiversity values would be appropriate.

As discussed in this report, the Project would largely have only Low to Very Low ecology effects (in terms of Step 3 of the EcIA guidelines), even without taking into account mitigation measures. However, mitigation measures are proposed for specific attributes below to ensure a no-net-loss ecological outcome.

Appendix B:

Rapid Habitat Quality Assessment Field Sheet

Habitat parameter	Condition category										SCORE
1. Deposited sediment	*The percentage of the stream bed covered by fine sediment.*										**9**
	0	*5*	*10*	*15*	*20*	*30*	*40*	*50*	*60*	*≥ 75*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
2. Invertebrate habitat diversity	*The number of different substrate types such as boulders, cobbles, gravel, sand, wood, leaves, root mats, macrophytes, periphyton. Presence of interstitial space score higher.*										**4**
	≥ 5	*5*	*5*	*4*	*4*	*3*	*3*	*2*	*2*	*1*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
3. Invertebrate habitat abundance	*The percentage of substrate favourable for EPT colonisation, for example flowing water over gravel-cobbles clear of filamentous algae/macrophytes.*										**5**
	95	*75*	*70*	*60*	*50*	*40*	*30*	*25*	*15*	*5*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
4. Fish cover diversity	*The number of different substrate types such as woody debris, root mats, undercut banks, overhanging/encroaching vegetation, macrophytes, boulders, cobbles. Presence of substrates providing spatial complexity score higher.*										**7**
	≥ 5	*5*	*5*	*4*	*4*	*3*	*3*	*2*	*2*	*1*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
5. Fish cover abundance	*The percentage of fish cover available.*										**7**
	95	*75*	*60*	*50*	*40*	*30*	*20*	*10*	*5*	*0*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
6. Hydraulic heterogeneity	*The number of of hydraulic components such as pool, riffle, fast run, slow run, rapid, cascade/waterfall, turbulance, backwater. Presence of deep pools score higher.*										**5**
	≥ 5	*5*	*4*	*4*	*3*	*3*	*2*	*2*	*2*	*1*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
7. Bank erosion	*The percentage of the stream bank recently/actively eroding due to scouring at the water line, slumping of the bank or stock pugging.*										**8**
Left bank	*0*	*≤ 5*	*5*	*15*	*25*	*35*	*50*	*65*	*75*	*> 75*	
Right bank	*0*	*≤ 5*	*5*	*15*	*25*	*35*	*50*	*65*	*75*	*> 75*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
8. Bank vegetation	*The maturity, diversity and naturalness of bank vegetation.*										**5**
Left bank AND Right bank	*Mature native trees with diverse and intact understorey*		*Regenerating native or flaxes/sedges/tussock > dense exotic*			*Mature shrubs, sparse tree cover > young exotic, long grass*			*Heavily grazed or mown grass > bare/impervious ground.*		
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
9. Riparian width	*The width (m) of the riparian buffer constrained by vegetation, fence or other structure(s).*										**9**
Left bank	*≥ 30*	*15*	*10*	*7*	*5*	*4*	*3*	*2*	*1*	*0*	
Right bank	*≥ 30*	*15*	*10*	*7*	*5*	*4*	*3*	*2*	*1*	*0*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
10. Riparian shade	*The percentage of shading of the stream bed throughout the day due to vegetation, banks or other structure(s).*										**5**
	≥ 90	*80*	*70*	*60*	*50*	*40*	*25*	*15*	*10*	*≤ 5*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
TOTAL	(Sum of parameters 1-10)										**64**

Habitat parameter	Condition category										SCORE
1. Deposited sediment	*The percentage of the stream bed covered by fine sediment.*										**9**
	0	*5*	*10*	*15*	*20*	*30*	*40*	*50*	*60*	*≥ 75*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
2. Invertebrate habitat diversity	*The number of different substrate types such as boulders, cobbles, gravel, sand, wood, leaves, root mats, macrophytes, periphyton. Presence of interstitial space score higher.*										**4**
	≥ 5	*5*	*5*	*4*	*4*	*3*	*3*	*2*	*2*	*1*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
3. Invertebrate habitat abundance	*The percentage of substrate favourable for EPT colonisation, for example flowing water over gravel-cobbles clear of filamentous algae/macrophytes.*										**5**
	95	*75*	*70*	*60*	*50*	*40*	*30*	*25*	*15*	*5*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
4. Fish cover diversity	*The number of different substrate types such as woody debris, root mats, undercut banks, overhanging/encroaching vegetation, macrophytes, boulders, cobbles. Presence of substrates providing spatial complexity score higher.*										**7**
	≥ 5	*5*	*5*	*4*	*4*	*3*	*3*	*2*	*2*	*1*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
5. Fish cover abundance	*The percentage of fish cover available.*										**7**
	95	*75*	*60*	*50*	*40*	*30*	*20*	*10*	*5*	*0*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
6. Hydraulic heterogeneity	*The number of of hydraulic components such as pool, riffle, fast run, slow run, rapid, cascade/waterfall, turbulance, backwater. Presence of deep pools score higher.*										**5**
	≥ 5	*5*	*4*	*4*	*3*	*3*	*2*	*2*	*2*	*1*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
7. Bank erosion	*The percentage of the stream bank recently/actively eroding due to scouring at the water line, slumping of the bank or stock pugging.*										**8**
Left bank	*0*	*≤ 5*	*5*	*15*	*25*	*35*	*50*	*65*	*75*	*> 75*	
Right bank	*0*	*≤ 5*	*5*	*15*	*25*	*35*	*50*	*65*	*75*	*> 75*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
8. Bank vegetation	*The maturity, diversity and naturalness of bank vegetation.*										**5**
Left bank AND Right bank	*Mature native trees with diverse and intact understorey*		*Regenerating native or flaxes/sedges/tussock > dense exotic*			*Mature shrubs, sparse tree cover > young exotic, long grass*			*Heavily grazed or mown grass > bare/impervious ground.*		
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
9. Riparian width	*The width (m) of the riparian buffer constrained by vegetation, fence or other structure(s).*										**9**
Left bank	*≥ 30*	*15*	*10*	*7*	*5*	*4*	*3*	*2*	*1*	*0*	
Right bank	*≥ 30*	*15*	*10*	*7*	*5*	*4*	*3*	*2*	*1*	*0*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
10. Riparian shade	*The percentage of shading of the stream bed throughout the day due to vegetation, banks or other structure(s).*										**8**
	≥ 90	*80*	*70*	*60*	*50*	*40*	*25*	*15*	*10*	*≤ 5*	
SCORE	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**	
TOTAL	(Sum of parameters 1-10)										**67**

Appendix C:

Plant Species List

Species	NVS Code used on field sheets	Common name	Structural Class	Threat Status[1]	Food Type[2]
Kunzea ericoides	KUNzea	kānuka	Dicotyledonous Trees & Shrubs	Nationally Vulnerable	N, I
Sophora microphylla	SOPmic	kōwhai	Dicotyledonous Trees & Shrubs	Not Threatened	
Dodonaea viscosa	DODvis	akeake	Dicotyledonous Trees & Shrubs	Not Threatened	I
Plagianthus regius	PLAreg	mānatu, ribbonwood	Dicotyledonous Trees & Shrubs	Not Threatened	
Corynocarpus laevigatus	CORlae	karaka	Dicotyledonous Trees & Shrubs	Not Threatened	F, N, I
Melicytus ramiflorus	MELram	māhoe, whitey wood	Dicotyledonous Trees & Shrubs	Not Threatened	N, B, I
Pittosporum crassifolium	PITcra	karo	Dicotyledonous Trees & Shrubs	Not Threatened	F, I
Pittosporum tenuifolium	PITten	kōhūhū, black matipo	Dicotyledonous Trees & Shrubs	Not Threatened	F, I, B
Pittosporum eugenioides	PITeug	tarata, lemonwood	Dicotyledonous Trees & Shrubs	Not Threatened	F, I
Sophora microphylla	SOPmic	small-leaved kōwhai	Dicotyledonous Trees & Shrubs	Not Threatened	N, I, B
Coprosma linariifolia	COPlin	mikimiki	Dicotyledonous Trees & Shrubs	Not Threatened	F, I
Coprosma robusta	COProb	karamu	Dicotyledonous Trees & Shrubs	Not Threatened	F, I
Elaeocarpus dentatus	ELAden	hīnau	Dicotyledonous Trees & Shrubs	Not Threatened	F, I
Phormium tenax	PHOten	flax	Monocotyledonous Trees & Shrubs	Not Threatened	F, N, I
Fuscospora cliffortioides	FUScli	mountain beech	Dicotyledonous Trees & Shrubs	Not Threatened	
Schefflera digitata	SCHdig	patatē, seven-finger	Dicotyledonous Trees & Shrubs	Not Threatened	
Podocarpus totara	PODtot	tōtara	Dicotyledonous Trees & Shrubs	Not Threatened	
Muehlenbeckia australis	MUEaus	pōhuehue	Dicotyledonous Lianes/Related Trailing Plants	Not Threatened	F, I, B
Calystegia tuguriorum	CALtug	powhiwhi	Dicotyledonous Lianes/Related Trailing Plants	Not Threatened	
Cordyline australis	CORaus	tī kōuka, cabbage tree	Monocotyledonous Trees & Shrubs	Not Threatened	F, N, I

[1] de Lange et al. (2018).

[2] Type of food provided by native plant species for birds and lizards (F= Fruit/seeds, N=Nectar, B=Buds/foliage, I=Insects) (Courtney et al. 2003).

Species	NVS Code used on field sheets	Common name	Structural Class	Threat Status[1]
Agrostis stononifera	AGRsto	creeping bent	Dicotyledonous Herbs other than Composites	Exotic
Agrostis capillaris[p]	AGRcap	browntop	Dicotyledonous Herbs other than Composites	Exotic
Holcus lanatus	HOLlan	Yorkshire fog	Dicotyledonous Herbs other than Composites	Exotic
Lolium perenne[p]	LOLper	perennial ryegrass	Dicotyledonous Herbs other than Composites	Exotic
Rumex obtusifolius	RUMobt	broad-leaved dock	Dicotyledonous Herbs other than Composites	Exotic
Dactylis glomerata[p]	DACglo	cocksfoot	Dicotyledonous Herbs other than Composites	Exotic
Paspalum dilatatum[p]	PASdil	Paspalum	Dicotyledonous Herbs other than Composites	Exotic
Poa pratensis[p]	POApra	Kentucky bluegrass	Dicotyledonous Herbs other than Composites	Exotic
Plantago lanceolata[p]	PLAlan	narrow-leaved plantain	Dicotyledonous Herbs other than Composites	Exotic
Trifolium repens[p]	TRIrep	white clover	Dicotyledonous Herbs other than Composites	Exotic
Lotus corniculatus[p]	LOTcor	birdsfoot trefoil	Dicotyledonous Herbs other than Composites	Exotic
Juncus articulatus	JUNart	jointed rush	Rushes and Allied Plants	Exotic
Juncus effusus	JUNeff	soft rush	Rushes and Allied Plants	Exotic

[1] de Lange et al. (2018).
[p] Pasture species (Cosgrove et al. 2022).

Appendix D:

Field Photographs






Overview photos (looking downstream) of existing (modified) freshwater and riparian margin/terrace conditions within the Gibbs Survey Area, 5 November 2024.






Overview photos (looking downstream) of existing (modified) freshwater and riparian margin/terrace conditions within the Gibbs Survey Area, 5 November 2024.






Overview photos (looking downstream) of existing (modified) freshwater and riparian margin/terrace conditions within the Gibbs Survey Area, 5 November 2024.






Overview photos (looking downstream) of existing (modified) freshwater and riparian margin/terrace conditions within the Jickells Survey Area, 5 November 2024.






Overview photos (looking downstream) of existing (modified) freshwater and riparian margin/terrace conditions within the Jickells Survey Area, 5 November 2024.

Overview photos (looking downstream) of existing (modified) freshwater and riparian margin/terrace conditions within the Jickells Survey Area, 5 November 2024.

Appendix E:

Potential Terrestrial Macroinvertebrate Species

Summary of potential ground active terrestrial invertebrate communities based on previous sampling of New Zealand successional vegetation (Munro 1995; Butler 2008; Ward 2011, 2014). Taxa list is indicative and not exhaustive.		
Habitat Type	Taxa	What the species indicates in terms of habitat quality
Forest	Landhoppers	Heavily involved with decomposition, and indicate significant leaf litter and woody debris
	Pachycondyla sp. (ant)	
	Millipedes	
	Saphobius inflatipes (Scarab beetle)	
	Prolasius advenus (ant)	Common taxa in forests which have some type of disturbance
	Diapriidae (parasitoid wasps)	
Pine Forest	Harvestmen	General diversity but not overly specialised
	Darkling beetle	
	Parasitoid wasp (*Aucklandella* sp., *Sphictostethus* sp.)	
Riparian[1]	Slaters	General decomposition in disturbed areas
	Landhoppers	
	Rover beetles	Generalists, scavengers
	Relatively low numbers of beetles and wasps	Low general diversity
Pasture[1]	Cricket	Common in grass habitats
	Nylandaria sp. (ant)	Introduced ant, common in disturbed areas
	Relatively low numbers of beetles and wasps	Low general diversity
Tussock	Mites	Likely associated with grasses
	Cicindela tuberculata (tiger beetle)	Common in tussock / bare ground, usually found in open bare ground

[1] indicative broad habitat types present within the area surveyed in the present study.

References:

Butler, D.J. 2008. Tasman District Biodiversity Overview - Indigenous terrestrial vertebrates and invertebrates. Published by Tasman District Council. Design and Layout: Dry Crust Communications. ISBN 978-1-877445-06-4.

Munro, V.W. 1995. Terrestrial invertebrate communities: the effect of successional age, habitat structure and seasonality. Massey University Masters Thesis.

Ward, D.F. 2014. Terrestrial Invertebrate Identification and Interpretation from Ngaruroro River Habitats 2012. Landcare Research Short Report Prepared for Adam Forbes. 13p.

Ward, D.F. 2011. Terrestrial Invertebrate Identification and Interpretation from Karamu and Tukituki River Habitats 2011. Landcare Research Short Report Prepared for Adam Forbes. 15p.

www.robertsonenvironmental.co.nz