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Whenuapai Wastewater Servicing Scheme Package 1 – Notice of Requirement

Ecological Impact Assessment

Prepared for Watercare Services Ltd
Prepared by Beca Limited

4 September 2023

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Contents

Appendices

Revision History

Revision Nº	Prepared By	Description	Date
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Document Acceptance

Action	Name	Signed	Date
Prepared by	Kimberley D'Souza		4/09/2023
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Executive Summary

The Whenuapai Redhills: Package 1 Project is located between Tamiro Road, Brigham Creek Road (north), South-Western Motorway (west), Northside Drive (south) and Mamari Road (east). These works will provide a new wastewater pipeline and pumpstation to accommodate for the growth in the Whenuapai catchment.

Beca has been engaged by Watercare Services Limited (Watercare) to prepare an Ecological Impact Assessment to support the Notice of Requirement application submitted by Watercare in accordance with Sections 168 and 176A of the Resource Management Act (1991) (RMA). This application seeks a designation for the construction, operation, and maintenance of the proposed Project, which includes a gravity main, pump station, rising main, and associated infrastructure.

Ecological site investigations were undertaken by Tonkin & Taylor Ltd between January and February 2020, and in July 2020. In September 2020 a wetland specific site visit was undertaken to identify key terrestrial and freshwater ecological features across the site. This report *Tonkin & Taylor (2021) Plan Change Assessment of Ecological Effects – Spedding Block, Whenuapai* dated 3 September 2021; has been referred to, where appropriate, to avoid duplication of efforts.

The assessment of ecological effects made here are limited to matters that trigger a district plan consent requirement, under the Auckland Unitary Plan: Operative in Part (AUP:OP) as these are the only activities authorised by the proposed designations. As such, the potential adverse ecological effects assessed within this report are limited to district matters only and are identified as:

- Potential injury, mortality, and loss of habitat to native terrestrial fauna from vegetation removal in the open space zone
- Potential disturbance to native terrestrial fauna from noise and dust during earthworks.

Effects management proposed in this report to address these effects include:

- Bat management: tree risk roost assessment and a bat survey. Should bat activity detected, a Bat Management Plan should be prepared.
- Lizard management: an initial risk survey in areas proposed for clearance. Should native lizards be found, a Lizard Management Plan detailing the methodologies for rescue and relocation should be prepared.
- Bird management: where possible vegetation clearance should occur outside of the nesting season (September to January). If unavoidable, a survey for the presence of bird nest should be undertaken prior to clearance.

With the implementation of the mitigation measures listed above, the overall level of the ecological effects associated with these works is **Low**, with minimal residual adverse effects expected.

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1 Introduction

Beca has been engaged by Watercare Services Limited (Watercare) to prepare an Ecological Impact Assessment (EcIA) to support the Notice of Requirement (NoR) application submitted by Watercare in accordance with Sections 168 and 176A of the Resource Management Act (1991) (RMA). This application seeks to designate 90,180 m^2 of land for the construction, operation, and maintenance of the proposed Project, which includes a gravity main, pump station, rising main, and associated infrastructure[1].

The Whenuapai Redhills: Package 1 Project (the Project) is located between Tamiro Road, Brigham Creek Road (north), South-Western Motorway (west), Northside Drive (south) and Mamari Road (east). These works will provide a new wastewater pipeline and pumpstation to accommodate for the growth in the Whenuapai catchment.

1.1 Purpose and Scope

The purpose of this EcIA is to quantify the ecological values of the habitat and species within the proposed works footprint, and to determine the ecological impacts of the proposed works as they relate to the NoR.

The scope of this report includes the following:

- A desktop-based review of information held by Auckland Council and other publicly accessible reports, data, and information;
- A site visit identifying and classifying ecological features within and within proximity to the area of works;
- An assessment of the ecological values in the works area;
- An assessment of ecological effects and recommended mitigation prepared in general accordance with the EIANZ Ecological Impact Assessment Guidelines (Roper-Lindsay et al., 2018).

The ecological effects outlined within this report are limited to the district planning matters only and in relation the requirements of the NoR[2].

1.2 Project Description

The Project aims to provide wastewater servicing capacity for approximately 10,240 dwellings, or 30,720 people, in the Whenuapai catchment. This growth is projected to occur by 2041. The Project includes the following five key components (see Figure 1):

1. A **Pump Station** at a point where the Whenuapai and Redhills Catchments meet at 23-27 Brigham Creek Road, with an emergency overflow outfall to the Sinton Stream
2. A **Gravity Main Pipeline** (approximately 700m long and 375 – 475 mm in diameter) between Whenuapai Village Pump Station on Tamiro Road and the new pump station
3. A **Rising Main** (approximately 1.4km long and 500 mm in diameter) between the Pump Station and a proposed new break pressure chamber on Mamari Road (the boundary of Package 2).
4. A **Culvert** (approximately 63 m long including wing wall and rip rap) to provide access for the rising main across Sinton Stream.

[1] Refer to the designation drawings provided as Appendix A of the Whenuapai Wastewater Servicing Scheme Package 1 – Notice of Requirement Assessment of Effects Assessment of Effects on the Environment, Beca 2023.

[2] A separate Ecological Impact Assessment report has been prepared by Beca, which assess ecological effects associated with regional matters.

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5. A **Break Pressure Chamber** which connects to the Massey Connector rising main (proposed under Package 2).

The Project extends from the existing Whenuapai Village pump station site in Tamiro Road in the north, across Brigham Creek Road, to Spedding Road in the south. Refer to Beca Assessment of Environmental Effects (AEE)[3] for further specification of the relevant regulatory framework.

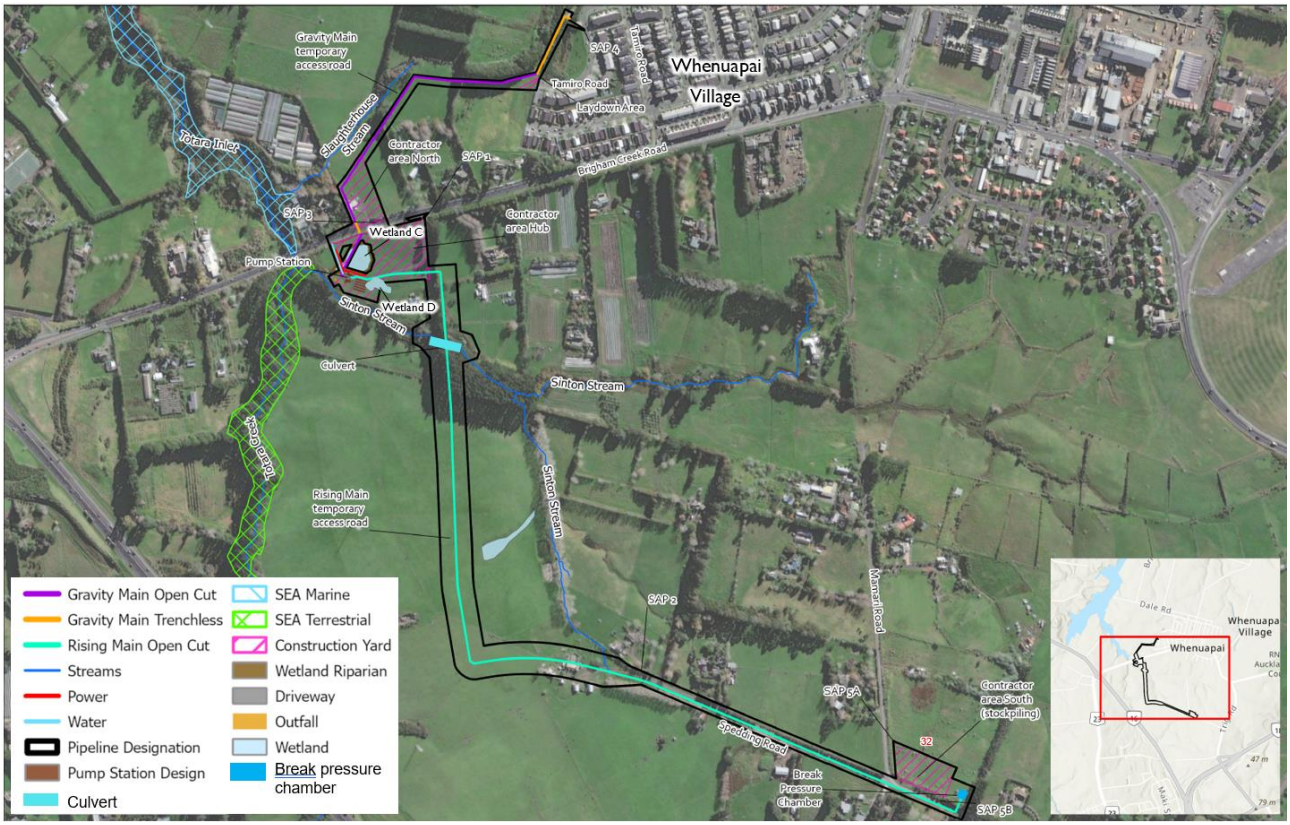

Figure 1. Package 1 – 'the Project' overview

1.2.1 Proposed Works Methodologies

The proposed works to construct the new pump station, gravity pipeline, and rising main will require works over a period of approximately 18-20 months. The gravity pipeline is intended to run underground for its full length. The rising main pipe will be primarily underground but will cross Sinton Stream via a culvert. Both pipelines will be installed predominantly by conventional open cut trenching to be opened and closed progressively, with trenchless methods used for a short section beneath Brigham Creek Road and near the existing Whenuapai Village pump station. The pump station will be predominately underground requiring excavation depths of approximately 9.5 m, constructed near Sinton Stream and two wetland areas. For use during construction, a temporary metalled hardstand area of approximately 5,000 m^2 will be installed near the pump station and wetlands. The construction of an emergency overflow outlet from the pump station wet well is required comprising an outlet of a new pipe, wingwall and rip rap on the bank of Sinton Stream.

[3] Whenuapai Wastewater Servicing Scheme Package 1 – Notice of Requirement Assessment of Effects Assessment of Effects on the Environment, Beca 2023.

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2 Site Location and Ecological Context

The Site (refer Figure 2) is located in the suburb of Whenuapai, Auckland on the northeast border of the North-Western motorway. It sits within the Tamaki Ecological District which was historically characterised by taraire and pūriri forest, but has been subject to extensive vegetation clearance and landform modification for urban use over time (McEwen, 1987). Prior to any development, the Site would have been covered by a mixture of Pūriri forest (WF7), and Kauri, Podocarp, broadleaved forest (WF11) (Singers & Rogers, 2014). Currently, the site and surrounding land is predominantly pastoral lifestyle blocks.

The Site is within a predominantly rural-residential agricultural area in a Future Urban zoned area. The Site is within a High Use Aquifer Management Area, subject to a high number of water takes/allocations (Auckland Council, n.d.). There are a series of streams in the vicinity of the site area which discharge downstream into the Tōtara Inlet and Brigham Creek (Sinton and Slaughterhouse Streams). These eventually discharge into an arm of the Waitematā Harbour. Tōtara Creek is classified as a terrestrial Significant Ecological Area (SEA_T_2034) and Brigham Creek as a marine Significant Ecological Area (SEA_M2_57b) (refer Figure 2 for location). The key ecological areas and features within the Project vicinity are detailed in Section 5.

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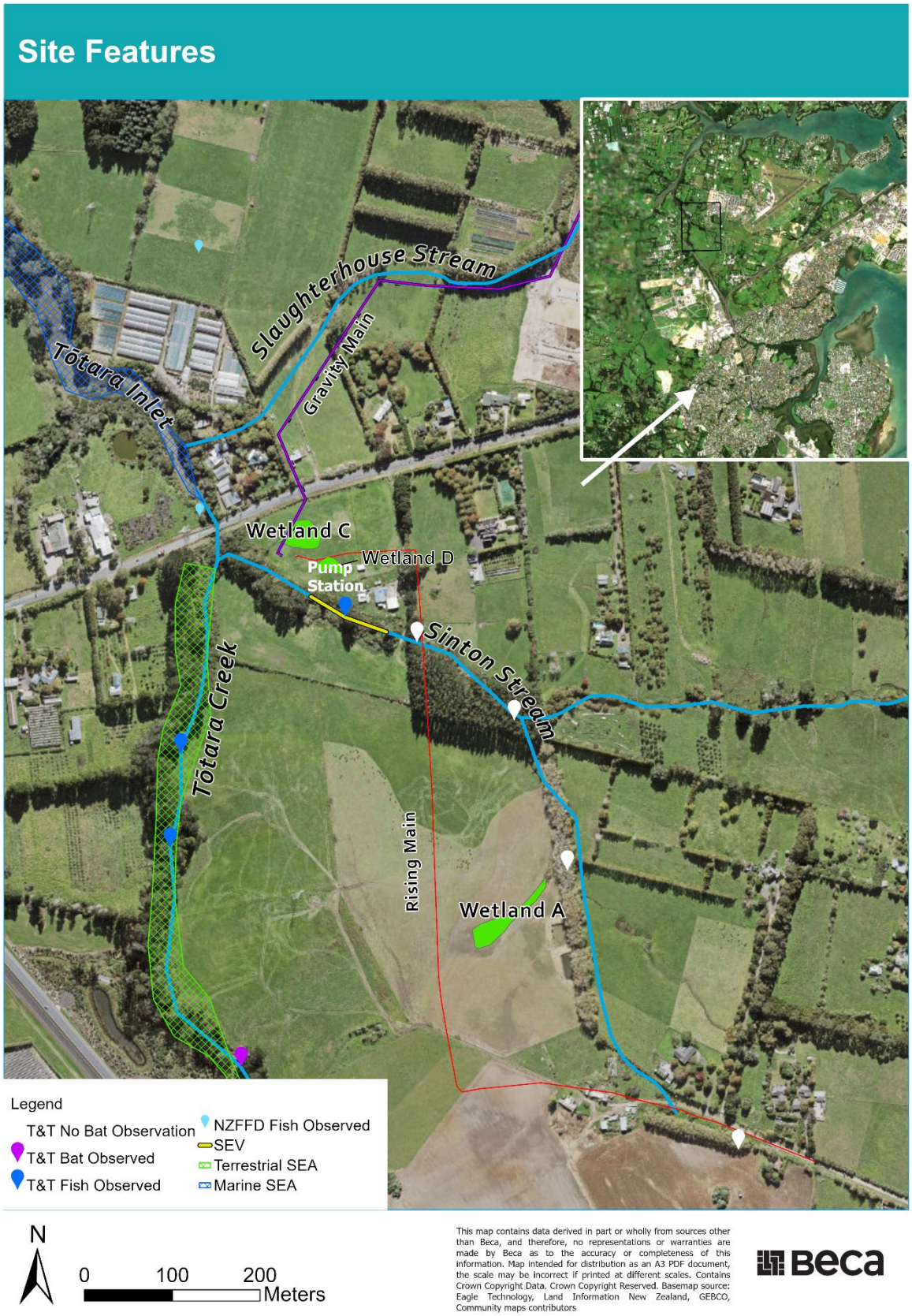

Figure 2: Site in relation to surrounding landscape features and fauna alongside gravity main, pumpstation, and rising main alignment.

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3 Methodology

This report has been informed by a desktop review of existing information, field investigations (undertaken by others) and a site walkover by Beca Ltd as outlined below.

3.1 Desktop Review

A desktop-based review was undertaken by Beca Ltd using ecological information from the following sources:

- Auckland Council GeoMaps data and geospatial layers including catchment and hydrology, ecosystems potential extent, SEAs;
- Previous Report: *Tonkin & Taylor Ltd, 2021. Plan Change Assessment of Ecological Effects – Spedding Block, Whenuapai.*
- New Zealand Freshwater Fish Database (NZFFD) (McDowall & Richardson, 1983); and
- Other publicly accessible reports or information.

3.2 Field Investigation

Comprehensive ecological field investigations were carried out by T&T between January and February 2020, and in July 2020, and along with a wetland specific site visit in September 2020. Data from this report has been used where appropriate and a brief description of methods are outlined below. Refer to (Tonkin & Taylor Ltd, 2021) for further details regarding the field investigation methods.

A site walkover by Beca Ltd was undertaken as part of the initial scoping on 28 February 2020 to view the Project location and identify any other ecological features of key importance.

3.2.1 Automatic Bat Monitoring

T&T deployed eight Department of Conservation (DOC) Automatic Bat Monitors (ABMs) across the site, targeting potential roosting trees and areas of likely bat foraging for a total of 20 nights in March 2020. This was to identify the presence of the long-tailed bat (*Chalinolobus tuberculatus*) with a conservation status of 'Nationally Critical'.

3.2.2 Vegetation assessment

Terrestrial habitat assessments were also completed following 'Rapid Ecological Assessment' methodology developed by Auckland Council (2012) to capture the species composition and ecological value of terrestrial vegetation at the site.

3.2.3 Freshwater surveys

Freshwater field investigations were undertaken to support the EcIA prepared for the regional consent. This included fish and macroinvertebrate sampling, stream ecological valuations (SEV), and wetland identification and delineation[4].

3.3 Assessment Methodology

A desktop assessment of ecological effects was undertaken in accordance with Ecological Impact Assessment (EcIA) EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems (Roper-Lindsay et al., 2018). The EIANZ guidelines set out a methodology to assign ecological value to species and ecosystems based on four assessment criteria which are consistent with significance assessment criteria set

[4] Whenuapai Wastewater Servicing Scheme Package 1: Ecological Impact Assessment. Beca, 2023.

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out in the Proposed National Policy Statement for Indigenous Biodiversity (2019) Appendix 1: Criteria for identifying significant indigenous vegetation and significant habitat of indigenous fauna. These are reproduced in this report as a series of tables in Appendix A. In summary:

- Particular attributes are considered when determining ecological value or importance. These relate to matters such as representativeness, the rarity and distinctiveness, diversity and patterns, and the broader ecological context;
- The value of terrestrial species is determined from the following factors; whether species are native or exotic, have threatened conservation status, and their abundance and commonality at the Project site;
- Ecological Values are scored based on an expert judgement, and qualitative and quantitative data collected. The freshwater features assessment has additionally been guided by an adaption to the EIANZ methodology to provide linkage to some of the common stream ecological value assessment methodology.

Once ecological values have been identified and valued, the severity of potential impacts is assessed by determining the change from baseline ecological values likely to occur as a result of the proposal/project. This provides a magnitude of effect as determined by the criteria set out in Appendix A.

Finally, once these two factors have been determined (the ecological value and the magnitude of effect), an overall level of effect on each of the identified ecological values is assessed.

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4 Ecological Features and Values

This section assesses the current ecological values for the sites described in Section 2 above. The key ecological values within the Project site which relate to the NoR requirements include vegetation and terrestrial fauna.

The focus of this EcIA relates to district plan matters only. Details of the other ecological features including watercourses, wetlands, and freshwater fauna are described in more detail in EcIA.[5]

4.1 National Policy Statement for Indigenous Biodiversity

The National Policy Statement for Indigenous Biodiversity (NPS-IB, 2023), which is newly gazetted and came into effect on 7th August 2023, seeks to maintain indigenous biodiversity across New Zealand so that there is at least no overall loss in indigenous biodiversity. The NPS-IB highlights the need for a cautionary approach to considering effects on indigenous biodiversity both within and beyond Significant Natural Areas (SNAs) and including areas supporting highly mobile fauna. Increased indigenous vegetation cover in urban and non-urban environments is promoted, as is information gathering and monitoring of indigenous biodiversity (Ministry for the Environment, 2023). At the same time, the NPS-IB recognises and allows for activities which contribute to New Zealand's social, economic, cultural, and environmental wellbeing.

At the date of the preparation of this report, the NPS-IB had not been incorporated into the AUP. However, many prevailing policy directions are contained in the AUP. A key area of difference is the AUP's reference to Significant Ecological Areas (SEAs), in contrast to the NPS-IB's process for determining Significant Natural Areas (SNAs).

The NPS-IB provides criteria for identifying SNAs in a matrix in Appendix 1 of the NPS-IB. These categories include representativeness, diversity and pattern, rarity and distinctiveness, and ecological context. An assessment for SNAs has not been undertaken within the Auckland region yet.

In the context of the project footprint, the riparian vegetation alongside Totara Creek has been identified as a terrestrial SEA (see Figure 2) in the AUP, where it meets the criteria for Threat Status and Rarity. The identified SEA is located adjacent to the project footprint and no clearance of habitat is currently proposed for this area.

Aside from the riparian vegetation, the remainder of the project footprint comprises of exotic and native grassy cover, exotic trees, scattered areas of native plants, and two low value wetlands (refer to the EcIA for the regional consent[6]). Additionally, land use is predominantly pastoral in this area.

As vegetation and habitat were surveyed as part of the scope of this report, there is adequate information available to apply an initial review by professional judgement to determine whether a feature may be an SNA (in accordance with Appendix 1:NPS-IB). The criteria met for this SEA (Threat Status and Rarity) outlined in the AUP (Chapter L: Schedule 3) has a similar set of sub-factors to the NPS-IB Rarity and Distinctiveness Criterion (Appendix 1: Section C). Both criteria stipulate that in order for the area to be considered as having significant ecological value it has to have rare/distinctive indigenous vegetation that is uncommon within the region/district and/or provide habitat for an indigenous species that is listed as Threatened or At Risk. For this reason, the SEA classified at Totara Creek is expected to meet the criteria for an SNA classification.

Therefore, the information available from the site visit indicates that the riparian vegetation along Totara Creek would meet the criteria for an SNA. However, as this area is located adjacent to the works area and

[5] Whenuapai Wastewater Servicing Scheme Package 1: Ecological Impact Assessment. Beca, 2023.

[6] Whenuapai Wastewater Servicing Scheme Package 1: Ecological Impact Assessment. Beca, 2023.

no clearance is proposed for this area, the loss of vegetation/habitat has not been further considered within this report. However, consideration has been given to the potential presence of long-tailed bats, which are classified as a highly mobile fauna species in Appendix 2 of the NPS-IB, and any potential effects on individuals during the construction phase of works (See Section 5).

4.2 Terrestrial Vegetation

Pasture grasses cover most of the terrestrial landscape, with exotic trees and shrubs forming shelter belts and riparian margins. Vegetation species along the riparian area of Sinton Stream are mostly exotic mature tree species with the presence of common native species with conservation status 'Not Threatened' (Table 1). Vegetation species alongside the riparian area of Slaughterhouse Stream include predominantly exotic mature trees. There is mixed native vegetation growing adjacent to existing Whenuapai Village Pump Station in the open space zone (Figure 3).

Table 1. Vegetation species observed within the Site.

Common Name	Scientific Name	Conservation Status	Location
-	*Eucalyptus spp.*	Exotic	Sinton Stream and Slaughterhouse Stream riparian area
Sugi Conifer	*Cryptomeria japonica*	Exotic	
Monterey Cypress	*Cupressus macrocarpa*	Exotic	
Pine	*Pinus radiata*	Exotic	Sinton Stream riparian area
Glossy Privet	*Ligustrum lucidum*	Exotic	
-	*Coprosma robusta*	Not Threatened	
Wheki	*Dicksonia squarrosa*	Not Threatened	
Ponga	*Alsophila dealbata*	Not Threatened	
Tauhinu	*Pomaderris amoena*	Not Threatened	
Red matipo	*Myrsine australis*	Not Threatened	
Black poplar	*Populus nigra*	Exotic	Slaughterhouse Stream riparian area
Weeping Willow	*Salix babylonica*	Exotic	
Mānuka	*Leptospermum scoparium var. scoparium*	Threatened – Nationally Vulnerable	Open space zone
tī kōuka/Cabbage Tree	*Cordyline australis*	Exotic	
Harakeke/Flax	*Phormium tenax*	Exotic	

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Figure 3. Mixed native vegetation looking south from pump station locality. Image taken during Beca site visit 3 December 2021.

Vegetation present at the Project site comprises a mix of indigenous and exotic species (moderate representativeness), common weedy species, and one native species with an 'At Risk – Declining' conservation status (moderate rarity/distinctiveness, low diversity and pattern). The vegetation present also forms a buffer from surrounding agricultural activities and an ecological corridor for freshwater fauna (moderate ecological context).

Overall, the vegetation in the open space zone and the riparian vegetation alongside both Sinton Stream and Slaughterhouse Stream is considered to have **Moderate** ecological value.

4.3 Terrestrial Fauna

4.3.1 Bats

An automatic bat survey was undertaken by Tonkin & Taylor Ltd (2021) to record long-tailed bat activity. Two general locations were assessed:

1. Sinton Stream - the riparian margin and shelter belt vegetation
2. Tōtara Creek corridor (SEA)

Long-tailed bat activity was recorded at two locations along the Tōtara Creek corridor, approximately 300 m from the works at the closest point (Figure 2). Whilst a high level of activity was not recorded during the survey, the long-tailed bat species have a conservation status of 'Threatened – national critical' and therefore the ecological value of any bats present is assessed as **Very High**.

4.3.2 Lizards

No records are present for native lizards within the site area on available databases. Incidental observations recorded in Tonkin & Taylor Ltd (2021) identified only the exotic plague skink (*Lampropholis delicata*) as

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present. However, there is potential for native copper skink (*Oligosoma aeneum*) and ornate skink (*Oligosoma ornatum*) (both At Risk – Declining) to be present within the areas where construction is planned due to presence of suitable habitat along riparian margins within rank pasture grasses, rotting vegetation, and leaf litter (Department of Conservation, n.d.; New Zealand Herpetological Society, n.d.). These species are also well known to inhabit modified and disturbed environments in urban Auckland environments.

Therefore, as no formal survey for lizards have been undertaken within the areas proposed for vegetation clearance, and as there is suitable lizard habitat present, a conservative approach has been applied and the ecological value is assessed as **High**.

4.3.3 Avifauna

Several common indigenous and exotic native birds species were observed within the site or have recorded observations within the vicinity as identified in Tonkin & Taylor Ltd (2021) during a site visit (Table 2). All birds observed are introduced species commonly found Not Threatened species.

Table 2: Birds observed during Tonkin & Taylor Ltd (2021) site visit. Conservation status assigned using (Robertson et al., 2016).

Common Name	Scientific Name	Conservation Status
Welcome shallow	*Hirundo neoxena*	Not Threatened
White-faced heron	*Egretta novaehollandiae*	Not Threatened
Skylark	*Alauda arvensis*	Introduced and Naturalised
Paradise shelduck	*Tadorna variegata*	Not Threatened
Swamp harrier	*Circus approximans*	Not Threatened
Pukeko	*Porphyrio melanotus*	Not Threatened
Sacred kingfisher	*Todiramphus sanctus*	Not Threatened
Silvereye	*Zosterops lateralis*	Not Threatened
Kereru	*Hemiphaga novaeseelandiae*	Not Threatened
Spur-winged plover	*Vanellus miles*	Not Threatened
Yellowhammer	*Emberiza citrinella*	Introduced and Naturalised

The ecological value of bird species present is assessed as **Low** due to the dominance of introduced and 'Not Threatened' species.

5 Assessment of Ecological Effects

This section considers the potential temporary and permanent operational effects of the Project. The assessment of ecological effects made here are limited to matters that trigger a district plan consent requirement (under the AUP:OP) as these are the only activities authorised by the proposed designations[7].

The potential ecological effects assessed in this report include:

- The effects of vegetation removal from the open space zone (at the Tamiro Road Stormwater Embankment) on the loss of foraging habitat and mortality or injury to bats and birds; and
- The effects of noise and dust from earthworks activities on terrestrial ecology.

[7] As stated previously, potential ecological effects associated with wetlands or streams (regional matters) are described in Section 6 of the Whenuapai Wastewater Servicing Scheme: Ecological Impact Assessment (Beca, 2023) which has been prepared to support regional consents for the project.

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5.1 Magnitude of Effects

5.1.1 Potential injury, mortality, and loss of habitat to native terrestrial fauna from vegetation removal in the open space zone

Within the open space zone, there is mixed native vegetation comprising of mānuka, cabbage tree, and flax and is located adjacent to existing Whenuapai Village Pump Station.

Bats

The clearance of vegetation within the open space zone may result in temporary disturbance to bats. Any mature trees with large diameters and cavities, flaking bark and split branches potentially offer bat roost habitat. These features are expected on species including mature mānuka and cabbage trees, which are known to provide roosting habitat for bats. Bat surveying detected no bat activity along Sinton Stream (which is in proximity to the open space zone), however, this was undertaken in 2021, and long tailed bats are known to frequent new roosting habitats regularly, so there is potential for them to temporarily reside here. Additionally, riparian margins provide movement corridors for bats.

Therefore, as there is potential for roosting habitat to be available within the vegetation in the open space zone, a conservation approach has been applied and as a result the magnitude of effect is assessed as **Moderate**, with an overall **High** level of adverse effect.

Avifauna

The clearance of vegetation within the open space zone may result in temporary disturbance to avifauna. Due to their highly mobile nature, it is likely that direct impacts on birds (mortality/injury) will be largely avoided as they are expected to disperse to nearby suitable habitats during the period of vegetation clearance. However, any nests present particularly in the taller mānuka trees may be damaged, and due to the length of the period of works there is risk of disturbance during the nesting season.

Given this, as well as considering the presence of only introduced and Not Threatened avifauna expected onsite, the magnitude of this effect is expected to be **Low**, with an overall **Very Low** level of adverse effect.

5.1.2 Potential disturbance to native terrestrial fauna from noise and dust during earthworks activities

Avifauna

Construction works is expected to result in periods of loud noise and the generation of dust which may disturb avifauna within proximity to the works area. Due to their highly mobile nature, adult birds disturbed by the noises are expected to disperse to nearby suitable environments during earthworks. As such, the magnitude of this effect is expected to be **Low**, with an overall **Very Low** level of adverse effect.

Bats

The generation of noise and dust during the earthworks has the potential to impact bats which rely on echolocation to navigate their environment and find prey. Loud noises during this time can interfere with their echolocation and impact their activity and survival. However, as long tailed bats are active at night, when earthworks are not expected to occur, the effects of this are limited.

Additionally, the surveying undertaken by T&T did record long tail bat activity at two locations along the Tōtara Creek corridor, approximately 300 m from the works at the closest point, albeit it was a low level of activity. Despite this, the vegetation within the corridor may provide adequate roosting habitat for bats, which are known to utilise riparian margins as movement corridors.

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Therefore, considering there is a likelihood of bats utilising the existing vegetation, however, as the construction works are not being undertaken during their peak activity times, the magnitude of effect is assessed as **Low**, with an overall **Moderate** level of adverse effect.

Herpetofauna

Earthworks is expected to result in the clearance of groundcover vegetation including long grasses which has the potential to provide habitat to native lizards. Native lizards are not generally highly mobile and tend to have smaller home ranges. This has the potential to result in indirect (disturbance) and direct (injury/mortality) effects to any native lizards residing within this vegetation. Therefore, a conservative approach has been applied and the magnitude of effect is assessed as **Moderate**, with an overall **Moderate** level of effect.

5.2 Summary of Ecological Effects

Table 3: Summary of potential unmitigated ecological effects during these works.

Impact	Ecological component	Ecological Value (habitat or species)	Magnitude of Effect	Current Level of Effect (unmitigated)
NoR Requirements				
Potential injury and/or mortality to native terrestrial fauna from vegetation clearance in the open space zone	Bats	Very High	Moderate	High
	Avifauna	Low	Low	Very Low
Potential disturbance associated with earthworks to native terrestrial fauna from noise and dust	Lizards	High	Moderate	Moderate
	Bats	Very High	Low	Moderate
	Avifauna	Low	Low	Very Low

6 Ecological Management Recommendations

The following section recommends ecological management actions to remedy or mitigate the potential effects outlined in Section 5 above.

6.1 Minimisation

6.1.1 Bat management

It is recommended that where there is vegetation removal of mature trees in riparian areas and in the open space zone that these are surveyed for suitable roosting features. Should suitable roosting features be identified, a survey for bats, using ABMs, should be undertaken at these locations to confirm the presence/absence of native bats. This surveying is recommended as the previous surveying was undertaken in 2021, and there is potential for change since that time.

Should no bats be identified vegetation clearance should commence immediately, however, should bat activity be detected a Bat Management Plan (BMP) should be prepared and submitted to Auckland Council. The BMP should outline appropriate protocols for tree-felling to avoid the injury or mortality of roosting long-tailed bats in accordance with the Wildlife Act 1953.

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6.1.2 Lizard management

Native lizards are protected under the Wildlife Act 1953 and the construction activities have the potential to impact native skink species. It is recommended that an initial risk survey for lizards is undertaken immediately prior to construction by a suitably qualified herpetologist confirm the presence/absence of lizards within the construction footprint prior to the commencement of works.

If native lizards are found to reside within the site, a Lizard Management Plan (LMP) will be required. Management will need to be developed and implemented by a DOC-permitted lizard ecologist (herpetologist), and prior to the start of works, adverse effects on native skinks present at the site will need to be mitigated by relocating them to protected, suitable habitat. Should lizard salvage and relocation be required, typical actions in accordance with Department of Conservation Wildlife Authority requirements. A lizard release site will need to be secured and should be under pest control both prior to and following relocation. The release site should also be monitored for lizard presence, abundance and habitat suitability outside of winter months.

All herpetology work should be carried out by a herpetologist who is experienced in lizard salvage and relocation operations and holds a current Wildlife Act Authority Permit to survey or undertake salvage and relocations.

6.1.3 Avifauna management

Vegetation clearance within the open space zone may result in the disturbance of birds, particularly if nesting is occurring. Direct impacts to birds are expected to be avoided as they are anticipated to disperse to other habitats during the period of vegetation clearance. However, it is possible that bird nests could be present in the riparian vegetation planned for clearing. Therefore, risk of possible disturbance or harm could be reduced by undertaking vegetation clearance outside of nesting season (for most species between September and February).

If this is not possible, it is recommended that a survey be undertaken for the presence of bird nest before clearance works begins by a suitably qualified ecologist in accordance with the Wildlife Act 1953.

6.2 Overall Level of Effect

A summary of the overall level of ecological effects following any related management measures is provided below in Table 4.

Table 4. Overall level of adverse effect following the implementation of ecological management.

Impact	Ecological component	Ecological Value	Effects Management	Revised magnitude of Effect	Overall Level of Effect (mitigated)
NoR Requirements					
Potential injury and/or mortality to native terrestrial fauna from vegetation clearance in the open space zone	Bats	Very High	Tree roost risk assessment, bat survey, Bat Management Plan	Low	Moderate
	Avifauna	Low	Avoid nesting season or undertake nest checks	Very Low	Very Low
Potential disturbance to native terrestrial fauna from noise and dust	Lizards	High	Initial risk survey for lizards, Lizard Management Plan	Low	Low
	Bats	Very High	Tree roost risk assessment, bat	Low	Moderate

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			survey, Bat Management Plan		
	Avifauna	Low	Avoid nesting season or undertake nest checks	Very Low	Very Low

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7 Conclusion

The construction activities required to complete this project includes the removal of vegetation in the open space zone and the generation of noise and dust from earthworks activities. As a result, this is expected to result in direct and indirect impacts on terrestrial ecology, in particular bats, avifauna, and lizards. Appropriate measures to address these adverse ecological effects have been detailed and are required to be implemented, this includes:

- Bat management: tree risk roost assessment and a bat survey. Should bat activity detected, a Bat Management Plan should be prepared.
- Lizard management: an initial risk survey in areas proposed for clearance. Should native lizards be found, a Lizard Management Plan detailing the methodologies for rescue and relocation should be prepared.
- Bird management: where possible vegetation clearance should occur outside of the nesting season (September to January). If unavoidable, a survey for the presence of bird nest should be undertake prior to clearance.

Following the implementation of these management measures, the overall level of effect of these activities are expected to be **Low**. This translates to the effects being discernible and the underlying character, composition, and attributes of the existing baseline condition will be similar to pre-development circumstances over a short to medium term time scale.

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8 References

Auckland Council. (n.d.). *Auckland Council Geomaps*. https://geomapspublic.aucklandcouncil.govt.nz/viewer/index.html

Clarkson, B. (2018). *Wetland Delineation Protocols. Contract Report: LC3354.*

Clarkson, B. R. (2014). *A vegetation tool for wetland delineation in New Zealand. Landcare Research Contract Report LC1793.* Manaaki Whenua – Landcare Research.

Department of Conservation. (n.d.). *Ornate Skink*. https://www.doc.govt.nz/nature/native-animals/reptiles-and-frogs/lizards/skinks/ornate-skink/

Fraser, S., Singleton, P., & Clarkson, B. (2018). *Hydric soils - field identification guide* (Issue June).

McDowall, R. M., & Richardson, J. (1983). *The New Zealand freshwater fish survey: a guide to input and output.* https://niwa.co.nz/freshwater-and-estuaries/nzffd/catchment-number-dictionary

McEwen, W. M. (1987). *Ecological Regions and Districts of New Zealand*. Department of Conservation.

Ministry for the Environment. (2021). *Wetland delineation hydrology tool for Aotearoa New Zealand*. Ministry for the Environment.

Ministry for the Environment. (2022). *Defining "natural wetlands" and "natural inland wetlands."* Ministry for the Environment.

New Zealand Herpetological Society. (n.d.). *Copper skink (Oligosoma aneneum)*. Retrieved July 28, 2022, from https://www.reptiles.org.nz/herpetofauna/native/oligosoma-aeneum

Robertson, H. A., Baird, K., Dowding, J. E., Elliott, G. P., Hitchmough, R. A., Miskelly, C. M., McArthur, N., O'Donnell, C. F. J., Sagar, P. M., Scofield, R. P., & Taylor, G. A. (2016). Conservation status of New Zealand birds 2016. *New Zealand Threat Classification Series 19*, 26 p.

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

Singers, N. J. D., & Rogers, G. M. (2014). A classification of New Zealand's terrestrial ecosystems. In *Science for Conservation 325*. Department of Conservation.

Tonkin & Taylor Ltd. (2021). *Plan Change Assessment of Ecological Effects - Spedding Block, Whenuapai*.

9 Limitations

This report has been prepared by Beca Ltd solely for Watercare. This report is prepared solely for the purpose of the assessment of potential ecological effects of the proposed works (Scope). The report has been prepared to support a resource consent application and may be used by the Client and others in subsequent processes to consider the application to which the assessment pertains. The contents of this report may not be used by the Client for any purpose other than in accordance with the stated Scope.

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Appendix A – Ecological Impact Assessment Guidelines

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Ecological Impact Assessment Guidelines

Assigning Ecological Value

The freshwater habitat features were assessed considering each of the attributes in Table A 1, and terrestrial habitat features were assessed considering attributes in Table A 2. Features of interest were subjectively given a rating on a scale of 'Very Low' to 'High' for each attribute and assigned a value in accordance with the description provided in Table A 3.

Table A 1. Attributes that may be considered when assigning ecological value to a freshwater site or area (adapted from Roper-Lindsay et al., 2018).

Value	Explanation	Characteristics
Very High	A reference quality watercourse in condition close to its pre-human condition with the expected assemblages of flora and fauna and no contributions of contaminants from human induced activities including agriculture. Negligible degradation e.g., stream within a native forest catchment	Benthic invertebrate community typically has high diversity, species richness and abundance. Benthic invertebrate community contains many taxa that are sensitive to organic enrichment and settled sediments. Benthic community typically with no single dominant species or group of species. MCI scores typically 120 or greater. EPT richness and proportion of overall benthic invertebrate community typically high. SEV scores high, typically >0.8. Fish communities typically diverse and abundant. Riparian vegetation typically with a well-established closed canopy. Stream channel and morphology natural. Stream banks natural typically with limited erosion. Habitat natural and unmodified.
High	A watercourse with high ecological or conservation value but which has been modified through loss of riparian vegetation, fish barriers, and stock access or similar, to the extent it is no longer reference quality. Slight to moderate degradation e.g., exotic forest or mixed forest/agriculture catchment.	Benthic invertebrate community typically has high diversity, species richness and abundance. Benthic invertebrate community contains many taxa that are sensitive to organic enrichment and settled sediments. Benthic community typically with no single dominant species or group of species. MCI scores typically 80-100 or greater. EPT richness and proportion of overall benthic invertebrate community typically moderate to high. SEV scores moderate to high, typically 0.6-0.8. Fish communities typically diverse and abundant. Riparian vegetation typically with a well-established closed canopy. No pest or invasive fish (excluding trout and salmon) species present. Stream channel and morphology natural. Stream banks natural typically with limited erosion. Habitat largely unmodified.
Moderate	A watercourse which contains fragments of its former values but has a high proportion of tolerant fauna, obvious water quality issues and/or sedimentation issues. Moderate to high	Benthic invertebrate community typically has low diversity, species richness and abundance.

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Value	Explanation	Characteristics
	degradation e.g., high-intensity agriculture catchment.	Benthic invertebrate community dominated by taxa that are not sensitive to organic enrichment and settled sediments. Benthic community typically with dominant species or group of species. MCI scores typically 40-80. EPT richness and proportion of overall benthic invertebrate community typically low. SEV scores moderate, typically 0.4-0.6. Fish communities typically moderate diversity of only 3-4 species. Pest or invasive fish species (excluding trout and salmon) may be present. Stream channel and morphology typically modified (e.g., channelised) Stream banks may be modified or managed and may be highly engineered and/or evidence of significant erosion. Riparian vegetation may have a well-established closed canopy. Habitat modified.
Low	A highly modified watercourse with poor diversity and abundance of aquatic fauna and significant water quality issues. Very high degradation e.g., modified urban stream	Benthic invertebrate community typically has low diversity, species richness and abundance. Benthic invertebrate community dominated by taxa that are not sensitive to organic enrichment and settled sediments. Benthic community typically with dominant species or group of species. MCI scores typically 60 or lower. EPT richness and proportion of overall benthic invertebrate community typically low or zero. SEV scores low to moderate, typically less than 0.4. Fish communities typically low diversity of only 1-2 species. Pest or invasive fish (excluding trout and salmon) species present. Stream channel and morphology typically modified (e.g. channelised). Stream banks often highly modified or managed and maybe highly engineered and/or evidence of significant erosion. Riparian vegetation typically without a well-established closed canopy. Habitat highly modified.

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Table A 2. Attributes to be considered when assigning ecological value or importance to a site or area of vegetation/ habitat/community (Roper-Lindsay et al., 2018).

Matters	Topics for which criteria are needed
Representativeness	Criteria for representative vegetation and aquatic 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 of 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, considerations of lifecycles, daily or seasonal cycles of habitat availability and utilization
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 (form "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 3. Rating system for assessing ecological value of a freshwater or terrestrial system (Roper-Lindsay et al. 2018).

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

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Species

The EIANZ provides a method for assigning value (Table A 4) to species for the purposes of assessing actual and potential effects of activities.

Table A 4. Criteria for assigning ecological values to species.

Ecological Value	Species
Very High	Threatened (Nationally Critical, Nationally Endangered, Nationally Vulnerable)
High	At Risk (Declining, Recovering, Relict, Naturally Uncommon)
Medium	Locally uncommon/rare, not nationally threatened or at risk
Low	Not threatened nationally, common locally

Assigning Magnitude of Impacts

The magnitude of impacts is determined by the scale (temporal and spatial) of potential impacts identified and the degree of ecological change that is expected to occur as a result of the proposed activity (Roper-Lindsay et al. 2018).

Based on the assessor's knowledge and experience, the magnitude of identified impacts on the ecological values within the project area and zone of influence were assessed and rated on a scale of 'Very High' to 'Negligible' based on the description provided in Table A 5.

Table A 5. Summary of the criteria for describing the magnitude of effect (Roper-Lindsay et al., 2018).

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

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).
- Temporary (during construction)

Assessing the Overall Level of Effec

The overall level of effect on each ecological feature identified within the zone of influence were determined by considering the and the Value of impacted ecological habitat and species, and the Magnitude of impacts identified above (Roper-Lindsay *et al*. 2018).

Results from the assessment of ecological value and the magnitude of identified impacts were used to determine the level or extent of the overall impacts on identified ecological features within the project area and zone of influence using the matrix below.

Table A 6.Matrix combining magnitude and value for determining the level of ecological impacts (Roper-Lindsay et al. 2018).

Effect Level		Ecological and/or Conservation Value				
		Very High	**High**	**Moderate**	**Lov**	
	Very High	Very High	Very High	High	Mo	Low
Magnitude	**High**	Very High	Very High	Moderate	Lov	Very Low
	Moderate	High	High	Moderate	Lov	Very Low
	Low	Moderate	Low	Low	Ver	Very Low
	Negligible	Low	Very Low	Very Low	Ver	Very Low
	Positive	Net Gain	Net Gain	Net Gain	Net	Net Ga

Results from the matrix were used to determine the type of responses that may be required to mitigate potential direct and indirect impacts within the project area and within the zone of influence, considering the following guidelines (Roper-Lindsay *et al*. 2018):

- 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 unlikely to be acceptable on ecological grounds alone and should be avoided. Where avoidance is not possible, a net gain in biodiversity values may be appropriate.