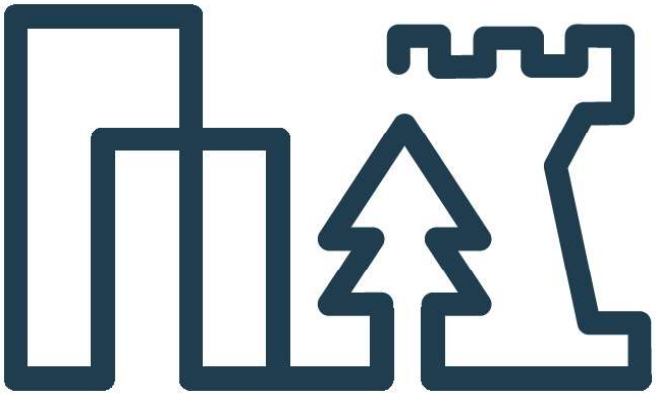
APPENDIX 7: ECOLOGY ASSESSMENT - ECIA



Ecological Impact Assessment

Te Karaka Flood Scheme Upgrade

Te Kaunihere o Te Tāirawhiti - Gisborne District Council

15 Fitzherbert Street, Gisborne

Prepared by:

SLR Consulting New Zealand Limited

SLR Project No.: 880.016774.00001

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1.4	9 April 2026	Harriet Hunter		Hariet Hunter
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Basis of Report

This report has been prepared by SLR Consulting New Zealand Limited (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Te Kaunihere o Te Tāirawhiti - Gisborne District Council (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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1.0 Introduction

1.1 Background

The Waipaoa River is a vital ecological corridor within the Gisborne region, supporting both urban and rural communities. Intensive agriculture and plantation forestry are characteristic of the surrounding land use which combined with the underlying geology is a major contributor of sediment to the river, resulting in reduced channel capacity and altering natural flow regimes. These changes have increased flood risk during high rainfall events.

In response to the extensive flooding caused by Cyclone Gabrielle in February 2023, Te Kaunihera o Te Tairāwhiti – Gisborne District Council (GDC) is advancing a programme of flood resilience improvements that aims not only to reduce flood risk and protect homes and livelihoods, but also to enhance the ecological integrity of the river system. The Te Karaka flood scheme improvement falls under this programme.

Te Karaka community has about 600 people and is situated on a U bend of the Waipaoa River, 30 km north of Gisborne. The flood scheme consists of an existing stopbank that separates a floodplain of approximately 39 ha of low-lying land on the river margin from the community. During Cyclone Gabrielle, the river overtopped the stopbank, starting at the eastern corner and continuing westward until the entire stopbank was overtopped, creating a forceful flooding event of Te Karaka.

1.2 Report purpose

The purpose of this report is to provide an assessment of ecological effects to support the resource consent application to more than double the capacity of the Te Karaka flood scheme along the Waipaoa River. Key features and habitat values of vegetation and fauna were identified, and an assessment of ecological effects was undertaken to assess the potential effects pertaining to the proposed works.

2.0 Methodology

The site visit covered the western riverbank of the proposed flood scheme expansion area and was accompanied by an in-depth desktop assessment, both of which are described in this section.

2.1 Desktop assessment

Prior to and following the site visit, a desktop assessment of the site was undertaken. A review of relevant background literature and databases was conducted to understand the ecological values within the site and surrounding areas, these included:

- Tairāwhiti Services
- S-Map Online | Manaaki Whenua - Landcare Research
- iNaturalist
- New Zealand Bird Atlas
- Public Data — Wilderlab
- Land, Air, Water Aotearoa (LAWA) - Waipaoa River at Kanakanaia

- New Zealand Plant Conservation Network
- Department of Conservation Bat Database
- Retrolens - Historical Imagery Resource
- Manaaki Whenua Potential Natural Vegetation » Maps » Our Environment

2.2 GIS mapping

The proposed project area was mapped using ArcGIS Pro. Within the proposed flood scheme expansion area, existing vegetation types were mapped onto aerial imagery to allow for identification of the areas of vegetation to be impacted by the proposed works.

2.3 Site survey

Following a preliminary desktop assessment, the habitat characteristics of the site and proximal surrounding area were assessed during a site visit on 13 May 2025 during dry, sunny weather. Due to the size and homogeneity of the site, as well as lack of access due to landowner permissions, photos were taken from only one area of the riverbank accessed via the track that splits off from Kipling Road.

2.4 Assessment of Ecological Effects

The assessment of ecological effects was informed by the Ecological Impact Assessment (EcIA) guidelines of the Environment Institute of Australia and New Zealand (Roper-Lindsay et al. 2018). The following steps were used for this assessment:

- Ecological values were assigned a level on a scale of Negligible, Low, Moderate, High or Very High. This was based on an assessment of the values of identified species, communities and habitats according to the criteria set out in the EcIA guidelines.
- The magnitude of effect of the site works on ecological values was evaluated as either Positive, Negligible, Low, Moderate, High, or Very High.
- The ‘Magnitude of Effect’ is based on:
    - The scale of the unmitigated effect per se (i.e. the proposed works, impacts on hydrology, impacts on wetland vegetation);
    - The proportion of habitat loss versus local availability;
    - The expected duration of the effect (e.g. permanent versus temporary); and
    - The intensity of the effect (i.e. the extent to which habitat loss within the site is complete or partial).
- The overall level of effect in the absence of mitigation was 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 (Table 1).
- The overall level of effect was used to determine if mitigation is required. Effects assessed as ‘Moderate’ or greater warrant efforts to avoid, remedy and/or mitigate them.

- A critical lens and expert judgement are applied across all stages of the assessment as the EIANZ matrix approach has been criticized for under-stating effects and it is important that this does not happen.

Table 1. Criteria for describing level of effects from Table 10 of the EIANZ EcIA Guidelines 2nd Edition.

Table 10. **Criteria for describing level of effects** (Adapted from Regini (2000) and Boffa Miskell (2011))

Ecological Value ▸ Magnitude ▾	Very high	High	Moderate	Low	Negligible
Very high	Very high	Very high	High	Moderate	Low
High	Very high	Very high	Moderate	Low	Very low
Moderate	High	High	Moderate	Low	Very low
Low	Moderate	Low	Low	Very low	Very low
Negligible	Low	Very Low	Very low	Very low	Very low
Positive	Net gain	Net gain	Net gain	Net gain	Net gain

3.0 Ecological context

The site of the proposed works is rural lowland bordered by the Waipaoa River, a hard bottomed watercourse that originates from the eastern slopes of the Raukūmara Range. During pre-human times, the area where Te Karaka community sits would have been native podocarp forest consisting of kahikatea-pukatea-tawa, matai-kahikatea-totara, kahikatea-totara and rimu-matai-miro-totara/kamahi, rimu-matai-miro-totara/kamahi forest types, according to the Singers and Rogers Potential Natural Vegetation layer developed by Manaaki Whenua Landcare Research. Settlers began clearing the area for agricultural use in the mid-1800s and it is now highly productive horticulture, cropping and sheep and cattle grazing land. It is highly susceptible to flooding during heavy rainfall when the Waipaoa overtops its banks. Figure 1 shows an aerial image from 1940 showing the farms withing the natural floodplain area prior to the existing flood scheme being built in the 1950s. It also shows an image from 1969, after the stopbank was built, with agricultural paddocks in the flood plain. The existing flood scheme includes approximately 39 ha of floodplain and a stopbank however during cyclone Gabrielle, the river breached the stopbank causing widespread devastation in the Te Karaka community.

The Waipaoa River travels 80 km before flowing out to sea at Poverty Bay just south of Gisborne. Significant tributaries include the Wharekōpae, Waikohu, Mangatū, Te Ārai, Waingaromia and Waihora rivers. The Waipaoa River suffers massive sedimentation contributions from the tributaries (approximately 15 million tonnes of suspended sediment annually) due to the area's inherent susceptibility to erosion, starting with the clearance of indigenous forest from erosion-prone terrain during European settlement, and continued by intensive agricultural and forestry practices. Sedimentation and nutrient inputs from the surrounding agricultural areas have contributed to the generally poor water quality in the river.

Figure 1. Te Karaka in 1948, prior to the building of the flood control scheme in the 1950s, and in 1969. http://retrolens.nz and licensed by LINZ CC-BY 3.0.

Te Karaka in 1948 prior to the flood scheme being built.

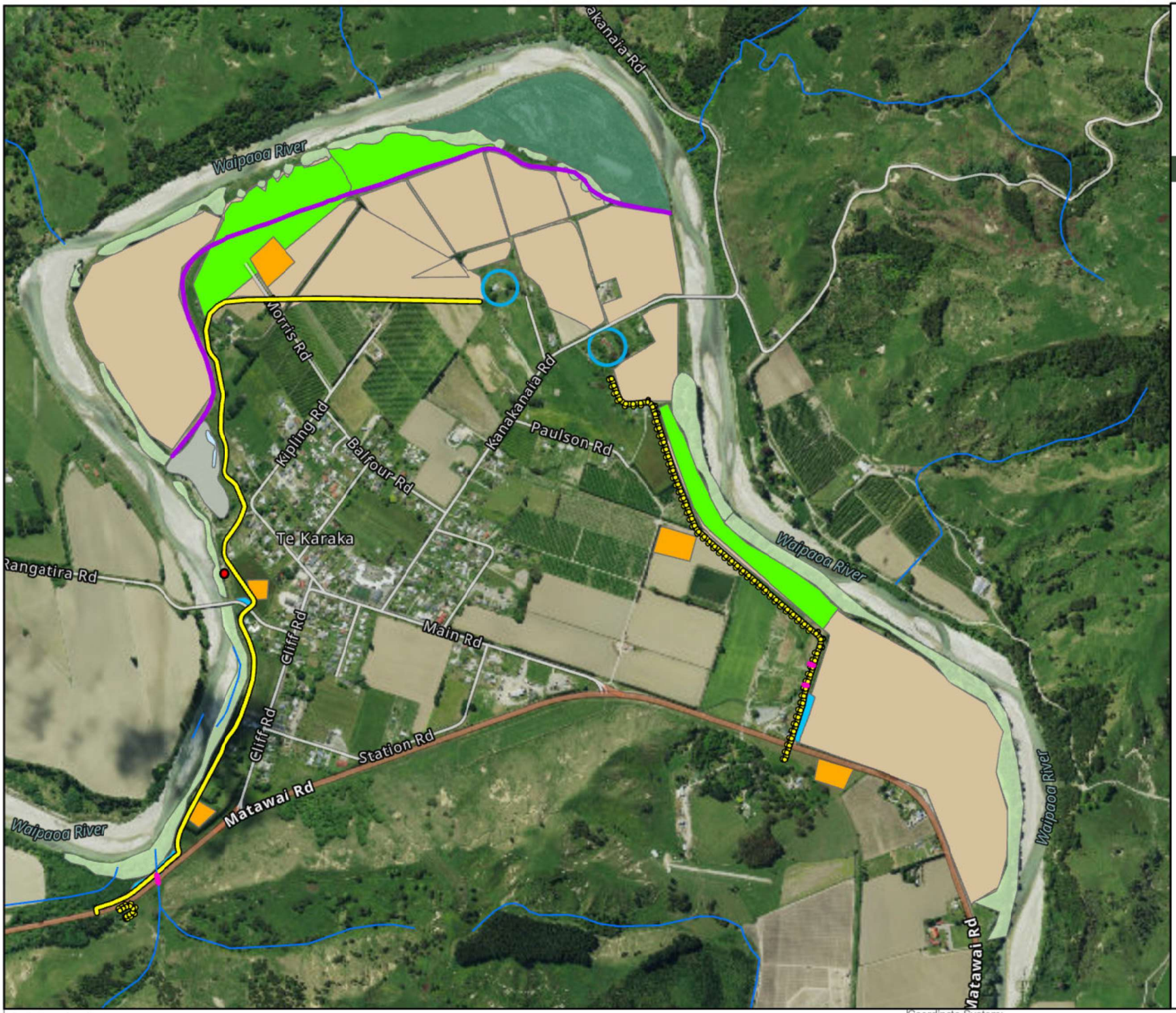
Te Karaka in 1969 after flood scheme built.

4.0 Results

The proposed works area can be divided into two categories: terrestrial and freshwater habitats. Both of these habitat types have the potential of hosting different fauna species. This section is therefore divided into habitat types followed by discussing the potential fauna species present.

4.1 Terrestrial habitats

Vegetation was identified through aerial interpretation in conjunction with vegetation observed during the site visit, and as such, species identification is not definitive. Due to the low ecological value of grazed pasture and cropland, a thorough investigation of plant species was not undertaken (Figure 2). There are some areas of tree removal that are required as part of the road raising proposals which will involve the removal of mature exotic trees.



TE KARAKA ECIA

EXISTING AND PROPOSED FLOOD SCHEME

FIGURE 2

LEGEND

- Photo location
- Existing stopbank
- Exotic shrubland
- Grazed pasture or crop
- Poplar and/or willows
- Willow shrubland
- Borrow pit
- Raised land
- Potential wetland
- Proposed new stopbank
- Culvert
- Rivers
- Laydown areas
- Trees to be removed

0 0.2 0.4 km

Scale:	1:11,439 at A4
Project Number:	850.016774.00001
Date Drawn:	14-Apr-2026
Drawn by:	HH

SLR

Service Layer Credits:
Eagle Technology, LINZ, StatsNZ, NIWA, Natural Earth, © OpenStreetMap contributors., Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors, Eagle Technology, LINZ

Coordinate System:
Name: NZGD 2000 New Zealand Transverse Mercator

4.1.1 Vegetation

The area of the proposed flood scheme expansion is agricultural and predominantly made up of grazed pasture and cropland with residential buildings and associated amenity planting. The area on the north side of the existing stopbank is used for sheep grazing. A screenshot from the GDC river webcam at the Kanakanaia Bridge on the east side of the community shows rank grass in the riparian zones (Figure 3)

Figure 3. Screenshot from the river webcam at Kanakanaia Bridge, Te Karaka.

The riparian vegetation is primarily grey willow (*Salix cinerea*) planted for bank stabilisation dotted with occasional poplar. There is likely crack willow (*Salix fragilis*) encroaching as well. There is a section of willow shrubland and rank grass on the western edge, north of the Rangatira bridge and west of Kipling Road (Figure 5) that will be incorporated into the flood scheme but will be largely untouched by the works.

There are sections of large exotic trees that are intended for removal (Figure 2 and Figure 4). These are situated around the Rangatira Bridge, adjacent to SH2 on the western side of the site, and adjacent to the stopbank on the eastern side next to the existing dwelling.

Figure 4. Photo taken of some of the proposed trees intended for removal. (Source GDC)

Figure 5. Photo taken from the western edge of the site along the river, looking northeast along the stopbank.

4.1.2 Wetlands

A review of aerial imagery and the GDC Regional Wetland Assessment (2025) did not identify any wetlands in the existing scheme or within the proposed scheme expansion area nor are any present on the Provisional Regional Wetland Assessment 2022 layer.

A small area of standing water in the willow shrubland area can be seen on the Tairawhiti Services map (Figure 6) The same area on Google Earth and ArcGIS pro aerial imagery shows up as a 0.1 ha darker green patch however it was not detected during the field visit. It remains unclear if it is a wetland or an area that ponds during heavy rain as part of an

overland flow path. The area is outside of the works area and is discussed further in Section 4.4.2.

Figure 6. Image of wet area from the Tairawhiti Services aerial imagery.

4.2 Freshwater habitat

The reach that creates a U around Te Karaka is constrained on both banks by intensive agricultural land use and is characterised by shallow, incised stream banks. Riparian vegetation is generally sparse, consisting predominantly of rank grasses, with scattered exotic trees such as grey willow (*Salix cinerea*), crack willow (*Salix fragilis*) and hybrid poplar (*Populus deltoides* × *yunnanensis*) (Figure 7).

Figure 7. Waipaoa River taken from the track that splits off from Kipling Rd. March 2025 (Red dot on Figure 2).

The state of environment and NIWA water quality sampling location closest to Te Karaka on the Waipaoa River is at the Kanakanaia Bridge where GDC conducts State of the Environment monitoring. There is little shading of the river. The following section refers to data collected at this location (Figure 8).

Figure 8. Kanakanaia bridge over the Waipaoa River looking west towards Te Karaka (2010).

4.2.1 Ecological stream data

No formal macroinvertebrate surveys were completed during the site visit however the Land Air Water Aotearoa database was reviewed.

Macroinvertebrate Community Index (MCI), Quantitative Macroinvertebrate Community Index (QMCI) and Macroinvertebrate Average Score Per Metric (ASPM) were all sampled annually between 2016 and 2022 and results were consistently in the D band. Under the National Policy on Freshwater Management (NPS-FM 2020), D band is the lowest possible grade.

The MCI score was 81 in 2016 and fell to 57 in 2020 before hitting 67 in 2022. Under the NPS-FM (NPS-FM 2020) MCI scores below 90 indicate severe organic pollution or nutrient enrichment with communities largely composed of taxa insensitive to nutrient enrichment.

QMCI scores fluctuated between 3.6 and 4 over the same timeframe which indicates a macroinvertebrate community composition of taxa insensitive to inorganic pollution and nutrient enrichment.

Taxonomic richness, the number of different species of invertebrates in a sample, had a mean value of 11 over the sampling period while the Ephemeroptera, Plecoptera and Trichoptera (EPT-taxa) had a mean of 11%, both indicative of poor stream health.

The macroinvertebrate ASPM score fluctuated between 0.1 and 0.2 with the national bottom line for stream health being 0.3, thus indicating macroinvertebrate communities that have had severe loss of ecological integrity.

4.2.2 Water quality data

Sediment loading from agricultural and forestry runoff is the largest threat to water quality in the Waipaoa River. Water quality parameters associated with such inputs naturally rank

poorly in the national data. E. coli, clarity, ammoniacal-nitrogen and total phosphorous levels are in the worst 25% of rivers nationally.

E. coli had a 5-year median of 280 n/100 mL and ranks in the lowest attribute band E (NPS-FM).

Ammoniacal nitrogen had a 5-year median value of 0.018 mg/L and is in the B band for toxicity and is trending towards further degradation.

The Waipaoa is a suspended sediment class of 2 therefore the national bottom line for clarity for it is 0.61 m. Clarity results for samples taken bimonthly between 2019 and 2024 have been below the national bottom line, in the D band, approximately 80% of the time.

4.3 Fauna

The fauna species potentially present on the site and therefore potentially affected are discussed in this section. It should be noted that no formal searches were conducted therefore this section is based on the desktop methodology as outlined in Section 2.0.

4.3.1 Birds

The New Zealand Bird Atlas and iNaturalist databases were consulted for the 20 km x 20 km area covering Te Karaka (see: AU94 - New Zealand Bird Atlas). Thirty bird species have been recorded since 2019, 28 were common, both exotic and indigenous, and two were At-Risk species (Table 2).

Kārearea, New Zealand Falcon, status At Risk - Recovering, is a raptor that feeds on live prey predominantly. They lay eggs in scrapes which can be in epiphytes on large trees or on the ground in rocky outcrops for example. They breed in a wide variety of habitats including native podocarp and beech forest, tussocklands, roughly grazed hill country and pine forest. They may also breed in more intensively farmed areas where suitable bush remnants remain (Seaton and Hyde, 2022).

Māpunga, Black Shag, status At Risk - Relict, live in proximity to water including the coast, estuaries, rivers, streams, ponds and lakes. The most common time of year to breed is autumn-winter but it is possible to find them nesting in any month. Colonies occur on trees or shrubs, on the ground in swamps, coastal cliffs and headlands, and on artificial structures. Nests are often used every year and are primarily made of sticks and foliage (Powlesland, 2013).

The lack of high-quality habitat in the proposed works site as well as the likely presence of pest mammals suggests there would not be an abundance of bird species including the At-Risk species.

Table 2. Bird species observed in the Te Karaka area as recorded in the NZ bird atlas between 2019-2024.

Scientific Name	Common Name	Status (Robertson, et al. 2021)
Common myna	*Acridotheres tristis*	Introduced: Naturalised
Eurasian skylark	*Alauda arvensis*	Introduced: Naturalised
Mallard	*Anas platyrhynchos*	Introduced: Naturalised
Greylag goose	*Anser anser*	Introduced: Naturalised

Scientific Name	Common Name	Status (Robertson, et al. 2021)
Korimake, Bellbird	*Anthornis melanura*	Not threatened
European goldfinch	*Carduelis carduelis*	Introduced: Naturalised
European greenfinch	*Chloris chloris*	Introduced: Naturalised
Pīpīwharauroa, Shining cuckoo	*Chrysococcyx lucidus*	Not Threatened
Swamp harrier	*Circus approximans*	Not Threatened
Rock pigeon	*Columba livia*	Introduced: Naturalised
White-faced heron	*Egretta novaehollandiae*	Not Threatened
Yellowhammer	*Emberiza citrinella*	Introduced: Naturalised
New Zealand falcon	*Falco novaeseelandiae*	At Risk: Recovering
Chaffinch	*Fringilla coelebs*	Introduced: Naturalised
Grey warbler	*Gerygone igata*	Not Threatened
Australian magpie	*Gymnorhina tibicen*	Introduced: Naturalised
Kererū	*Hemiphaga novaeseelandiae*	Not Threatened
Welcome swallow	*Hirundo neoxena neoxena*	Not Threatened
Southern black-backed gull	*Larus dominicanus*	Not Threatened
Korukoru, wild turkey	*Meleagris gallopavo*	Introduced: Naturalised
Pōpokotea, Whitehead	*Mohoua albicilla*	Not Threatened
House sparrow	*Passer domesticus*	Introduced: Naturalised
Pīkao, Peafowl	*Pavo cristatus*	Introduced: Naturalised
Māpunga, Black shag	*Phalacrocorax carbo*	At-Risk relict
Common pheasant	*Phasianus colchicus*	Introduced: Naturalised
Tūī	*Prosthemadera novaeseelandiae novaeseelandiae*	Not Threatened
Dunnock	*Prunella modularis*	Introduced: Naturalised
New Zealand fantail	*Rhipidura fuliginosa*	Not Threatened
Spotted dove	*Spilopelia chinensis*	Introduced: Naturalised
Common starling	*Sturnus vulgaris*	Introduced: Naturalised
Paradise shelduck	*Tadorna variegata*	Not Threatened
New Zealand kingfisher	*Todiramphus sanctus*	Not Threatened
Eurasian blackbird	*Turdus merula*	Introduced: Naturalised
Song thrush	*Turdus philomelos*	Introduced: Naturalised
Spur-winged plover	*Vanellus miles novaehollandiae*	Not Threatened
Silvereye	*Zosterops lateralis*	Not Threatened

4.3.2 Bats

Large exotic trees are proposed for removal in three areas to allow for road raising and realignment, and while no formal bat monitoring has occurred within ten kilometres of the site, records from the Department of Conservation show long-tailed bats (*Chalinolobus tuberculatus*) approximately 13 km east and west of Te Karaka, indicating they could be present locally. The combination of mature exotic trees and proximity to the river provides suitable roosting and foraging habitat, as long-tailed bats typically hunt nocturnally for flying insects such as flies and moths. Bats favour open areas, forest edges, waterways, wetlands, and linear landscape features like gullies and shelterbelts for commuting. Given this potential, a targeted bat survey should be completed before any tree felling, undertaken between 1 October and 30 April when bats are most active. If bats are detected, tree removal must follow the appropriate bat management protocols outlined by DOC (2024).

4.3.3 Lizards

No lizard observation records exist on iNaturalist for the proposed works site. Suitable lizard habitats, including refugia such as deadwood, rocks, wood stockpiles and leaflitter potentially exist in pockets within the greater flood scheme however the site to be disturbed is heavily impacted by agriculture and remaining habitat pockets are vulnerable to pest mammals. Much of the site comprises cultivated land or grazed and rough pasture offering limited habitat for lizards therefore it is highly unlikely that these reptiles are present in significant numbers within the site. The exotic plague skink would have the best chance of survival at the site as it is better adapted to mammalian predator avoidance.

4.3.4 Fish

While no formal fish surveys were completed during the site visit, eDNA sampling was undertaken at the Kanakanaia Bridge monitoring location on 28 March 2024 with the results available on the Wilderlab public database The results showed the presence of two At Risk-Declining (Dunn et al., 2025) freshwater fish species including longfin eel (*Anguilla dieffenbachia*) and common smelt (*Retropinna retropinna*) and two At Risk – Naturally Uncommon species; torrentfish (*Cheimarrichthys fosteri*) and bluegilled bully (*Gobiomorphus hubbsi*) (Table 3). The presence of eDNA is indicative of species presence in the environment but it is important to remember that it's difficult to estimate from how far upstream the eDNA has come. The presence of eDNA at the Kanakanaia bridge therefore simply indicates those species live somewhere upriver from that location. While these are the species that are located at this sampling location, there are other species that have been recorded further up in the catchment, which have not been listed below however should be considered when activities such as abstraction are being undertaken due to fish migration past the site location.

The sections of willow along the river, with some poplar dotted throughout, are important for bank stabilisation and erosion control as well as provide potential bat roosting habitat. They provide some habitat and forage for birds and bees as they provide early-season nectar and pollen. Tall poplar can be useful for bats to perch on as the river is a possible hunting ground for them. Willows are generally considered to have a negative effect on biodiversity values as they outcompete native vegetation with their ability to spread aggressively. At the landscape-scale, the north side of the river provides better quality and more habitat options as it is grazing pastures interspersed with bush and the outer north and east banks of the river offer denser riparian vegetation. The value of the willow and poplar areas has therefore been assessed as **'negligible'**.

Table 3. eDNA sample results from Kanakanaia Bridge Te Karaka, 28.03.2024 and threat classifications (Dunn et al., 2025)

Scientific name	Common name	Threat classification
Anguilla australis	tuna / shortfin eel	Not Threatened
Anguilla dieffenbachii	tuna / longfin eel	At Risk - Declining
Carassius auratus	morihana / goldfish	Not threatened
Cheimarrichthys fosteri	panoko / torrentfish	At Risk – Naturally Uncommon
Gambusia affinis	mosquitofish	Introduced and Naturalised
Gobiomorphus cotidianus	tīpokopoko / common bully	Not Threatened
Gobiomorphus hubbsi	bluegill bully	At Risk – Naturally Uncommon
Gobiomorphus spp	bully species	Not Threatened
Mugil cephalus	kanae / Grey mullet	Not Threatened
Retropinna retropinna	ngaore / common smelt	At Risk - Declining

4.4 Ecological values

In this section, the ecological values of each of the vegetation types and fauna were considered with respect to quantity (rarity or extent) and quality (integrity, functionality or condition) as per the criteria set out in the EIANZ guidelines (Section 2.4), and summarised in Table 4.

4.4.1 Vegetation

Most of the area proposed for development has been maintained as grazed pasture or crops since at least the 1940s and is therefore largely comprised of exotic pasture grasses and horticultural crops. It does not provide important habitat for indigenous flora or fauna and has been assessed as having 'negligible' ecological value.

The willow shrubland area with an understory of rank grass is approximately 2 ha and flanked by the Waipaoa River to the west and otherwise surrounded by agricultural land. It forms a small ecological 'island' of biodiversity that could be an important refuge for birds travelling through the area, both for foraging and roosting activities. There is possibly a wetland on the eastern edge of the shrubland as well. This section has therefore been assessed as '**low'** value.

4.4.2 Potential wetland

Given the nature of the surrounding area, it is likely that any wetland species present would be exotic. Therefore, the potential wetland area has been assessed as having **'low'** value.

In considering the value of doing a site visit to assess the wet area, the proposed stop bank is specified infrastructure under Regulation 45 of the National Environmental Standards for Freshwater (NES-F) therefore even if the wet area meets the definition of a natural inland

wetland under the National Policy Statement for Freshwater Management 2020 (NPS-FM), as long as the construction remains further than 10 m from it and does not alter the hydrology, it will not impact the consenting process. Currently the design of the stop bank is at least 30m from the wetland, with the construction occurring on the landward/protected side of the stop bank opposite the wetland.

If there is any chance of the earthworks coming within 10 m of the wet area, it would be pertinent to have it properly delineated.

4.4.3 Freshwater habitat

The Waipaoa River borders the proposed works site on the north side for approximately 600 m. The river is heavily constrained by surrounding agricultural land use, both locally and upstream. As indicated by the ecological stream data and water quality data, it is characterised by limited riparian vegetation, nutrient enrichment, and elevated sedimentation with most metrics being below the national bottom line. Despite these degraded habitat characteristics, eDNA sampling confirmed the presence of several fish species classified as At Risk – Declining and At – Risk Naturally Uncommon. On this basis, the ecological value of the freshwater habitat within the Waipaoa River at Te Karaka is assessed as '**moderate'**.

It is worth noting that no works are intended to be undertaken within the river system, and that works will be within the flood plain areas only.

A summary of the habitat values in the context of the Ecological Impact Assessment Guidelines (2018) are found in Table 4.

Table 4: Summary of ecological values for habitats identified on site.

Matter	Grazed pasture and crops	Willow poplar	Willow shrubland	Potential wetland	Freshwater habitat
Representativeness	**Very Low** Managed pasture vegetation with little or no indigenous species present and not representative of an indigenous vegetation type. The Manaaki Whenua Potential Ecosystem Vegetation layer suggests that the area would have been dominated by podocarp forest pre-human.	**Very Low** Comprises exotic species assemblages within a heavily modified environment. Historically this area would have been podocarp forest.	**Low** Native vegetation present within the site would have historically been podocarp forest including Kahikatea, Pukatea, tawa, Matai, tōtara, miro and rimu. The willow shrubland adjacent to the river is is typical of the more degraded natural areas in the ED.	**Low** Likely highly modified with pasture grasses and other exotic species.	**Low** Trees/shrubs provide little shading to the watercourse within the reach. Some within-stream ecology and water quality data rank below the national bottom line. The degraded state of this reach is typical of this river and does not represent its natural structure or composition.
Rarity/distinctiveness	**Very Low** Pasture and crops are anthropogenic vegetation types and common in most lowland parts of Gisborne district. No Threatened or At-Risk plants were observed in this habitat.	**Low** Comprised of exotic species commonly found within the region. May provide isolated habitat for common native birds but these species are highly mobile and are likely to utilise more optimal habitat nearby.	**Low** The plant assemblage present is common regionally and nationally however due to human impacts in the local area, shrubland is patchy however not uncommon.	**Low** Wetlands are under-represented nationally. They are a national priority for protection (MfE, 2007). However, these wetlands are likely comprised of common, exotic species.	**High** The habitat condition of the Te Karaka reach is impacted by intensive landuse however it provides habitat for At Risk – Declining fish species.

Matter	Grazed pasture and crops	Willow poplar	Willow shrubland	Potential wetland	Freshwater habitat
Diversity and Pattern	**Very Low** Several structural classes (grassland, herbaceous) with minor variations in composition where management and crop species has differs.	**Very Low** Non-natural diversity and pattern as entirely exotic in composition and offer little habitat value for fauna.	**Low** Natural species diversity is limited, and the community is missing late successional species however the habitat is suitable for some avifauna species to forage and potentially nest.	**Low** Likely to comprise primarily facultative wetland grassland vegetation.	**Moderate** Non-natural diversity and pattern as reflected in the stream ecology scores however this area likely offers habitat value for threatened fish species.
Ecological Context	**Low** This site is highly modified to grow pasture and crops for farming activities. It provides foraging for some common bird species. It provides some habitat connectivity by acting as a corridor between surrounding habitat types.	**Very Low** Minor connectivity or buffering is provided by the pockets of planted willow and poplar on site.	**Moderate** The site has been modified by planting and encroachment of pest plant species. Due to the high degree of land development in the area, the shrubland provides connectivity between habitat features within the wider landscape	**Moderate** Potential wetland area located in patch of willow shrubland. It contributes to the habitat value of the patch through habitat diversification.	**Low** The reach is highly modified and constrained by intensive agriculture locally and upstream. The poor riparian vegetation offers little shade and instream habitat diversity and cover is low. The river provides for fish migration in the wider catchment.
Overall Ecological Value	**Negligible**	**Negligible**	**Low**	**Low**	**Moderate**

4.4.4 Fauna

4.4.4.1 Birds

Two At-Risk bird species were recorded in the Te Karaka area over the past 5 years in the NZ Bird Atlas with the rest of the observations being common native and exotic species. It is possible birds are using the site of the proposed works for foraging, but the habitat is of low/negligible value, there is no formal pest control, and higher quality alternative habitat exists nearby. The ecological value assigned for bird species was therefore **'low'.**

4.4.4.2 Bats

Bats are not known to be using the site of the proposed works but have been identified 13 km away. Due to the presence of larger willow trees and poplars in the riparian zone, there is potential that bats could use these habitats for roosting or refuge. Due to the lack of data for the immediate vicinity, and the unknown if bats are present, the habitat has been given a value of '**Very High'**. Before trees are removed, surveys should be undertaken to identify if bats are present at the site or not.

4.4.4.3 Lizards

Given the intensity of farming practices across much of the site and lack of pest mammal control, it is likely that only exotic pest lizards would be present. The ecological value for lizards is therefore **'negligible'**.

4.4.4.4 Fish

Ten fish were identified in the 2024 eDNA sample and of these, two were At Risk-Declining and two were At Risk – Naturally Uncommon. The ecological value of fish was determined to be '**high**'.

4.4.5 Summary of ecological values

Table 5 summarises the overall ecological value of the features associated with the proposed works. The grazed pasture and cropland are deemed to have negligible ecological value while the willow and poplar areas and potential wetland were deemed to have low value, the willow and poplar provide potential roosting bat habitat for bats so has moderate ecological value. The willow shrubland and freshwater habitats were deemed as having moderate ecological value. Due to the presence of 'At Risk' fish species, fish were determined to be high value, with birds as low value and bats and lizards as negligible.

Table 5: Summary of ecological values within/near the site bounds

	Feature	Ecological value
Habitats	Grazed pasture & cropland	Negligible
	Willow and poplar	Negligible
	Willow shrubland	Moderate
	Potential wetland	Low
	Freshwater habitat	Moderate
Fauna	Birds	Low
	Bats	Very High
	Lizards	Negligible
	Fish	High

5.0 Ecological Impact Assessments

5.1 Proposed Works

The proposed works are to increase the size of the floodplain and build a new stopbank south of the existing stopbank. The purpose is to increase the carrying capacity of the flood scheme to protect the community of Te Karaka from future flooding of the Waipaoa River. The existing and proposed flood scheme are found in Figure 9. The proposed method is to use the fill from the existing stopbank (solid purple line), as well as fill from the existing floodplain (green area), and build a new stopbank (yellow line). During construction laydown areas will be used for stockpiles and vehicle parks as well as site offices and bases (orange squares).

The area of the existing floodplain is approximately 39 ha with a stopbank 1 m high. The area of the proposed floodplain is 80 ha effectively increasing the area to nearly 120 ha and a new stopbank height ranging from 1.3 to 4.5 m. The 7 ha borrow pit (green area in Figure 9) will be excavated providing additional carrying capacity. Significant bulk cut and fill earthworks will be required to build the new stopbank and there is no intention of removing any trees to undertake the site works. During construction a water take from the Waipaoa River will be required to provide dust suppression. The construction of the stopbanks will include various culverts (see Figure 2) of which one is located on a permanent stream, and two are on an artificial watercourse.

Two high points in the topography (blue circles in Figure 9) where houses are located will be incorporated into the new stopbank. The western terminus of the new stopbank will connect to the Rangatira Road bridge.

5.2 Effects of proposed works

Potential impacts of the proposed works that could have direct or indirect effects on the ecological features identified are discussed below. They have been separated into temporary (during earthworks) and long-term impacts.

The northern-most 7 ha of grazed land labelled ‘borrow pit’ (yellow area in Figure 9) borders approximately 600 m of riverbank and will be dug to one metre below the current topography

to collect fill for the new stopbank. Fill from the existing stopbank will also be excavated and used for the new stopbank.

Temporary impacts during earthworks include potential stormwater and sediment runoff from clearing vegetation, water abstraction and contouring the land and noise and vibration from heavy machinery.

In the long term cropped land is likely to be converted to pasture for sheep grazing and the installation of culverts within the stopbanks have potential to interrupt fish passage.

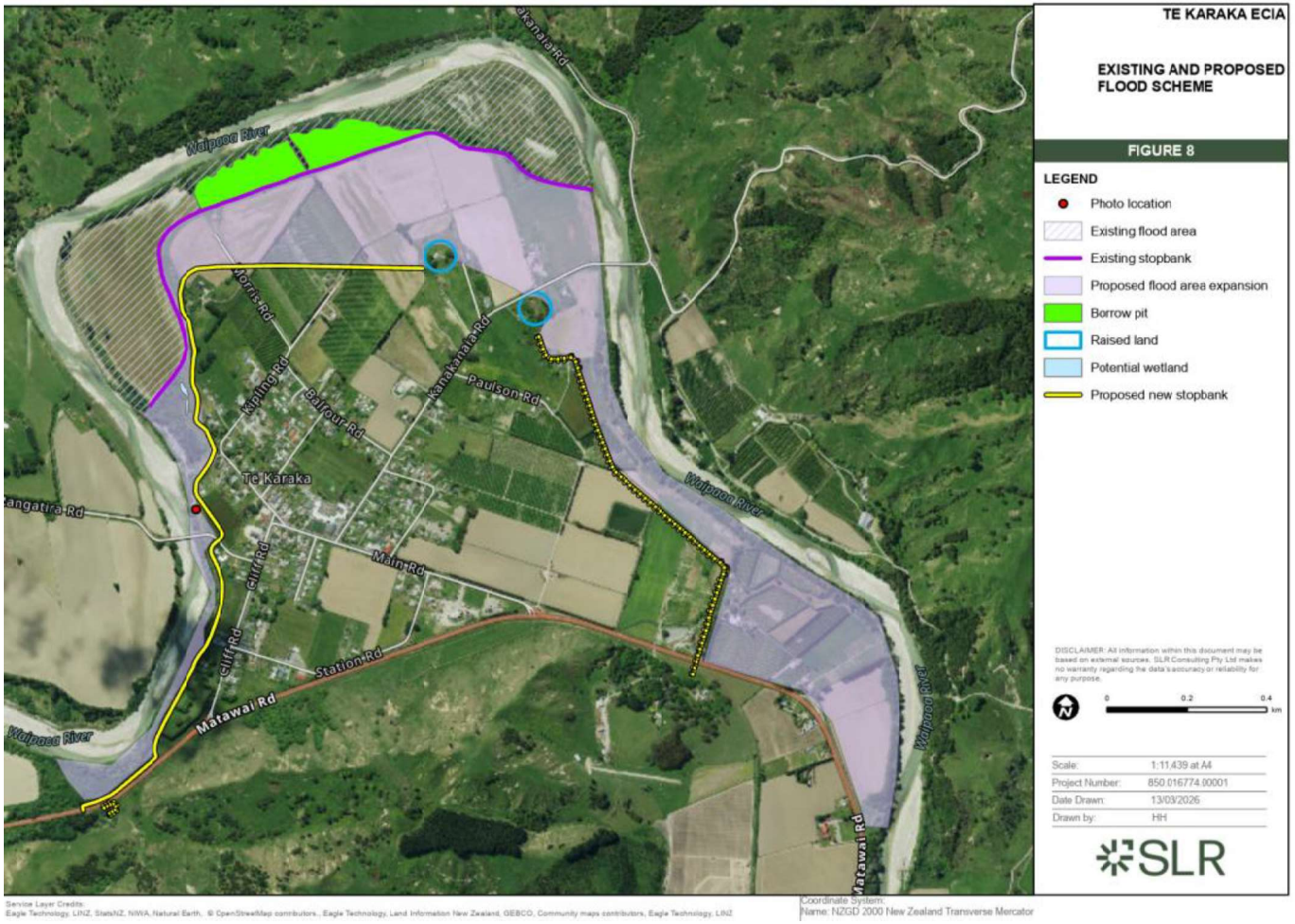


Figure 9. Diagram of the existing and proposed flood scheme for Te Karaka

5.3 Magnitude and level of effects

This section aims to identify any effects of the proposed works on the identified ecological features. Following the EIANZ guidelines, we have considered the spatial and temporal scales of the effects and then assigned a *magnitude* of effect. Once the magnitude of effect on the ecological feature is assigned, a resulting *level* of effect is determined by considering the ecological value of the affected feature as per the EIANZ guidelines described in Section 2.4. For example, a large effect on a very low value feature (such as pasture) results in a low level of effect, whereas even a small effect on a highly valuable ecosystem or species equates to at least a moderate level of effect. Not all the effects of the proposed works will impact all the ecological features identified so the following sections describe the effect and which ecological feature(s) it impacts.

5.3.1 Effect of sediment and stormwater runoff

Sediment and stormwater runoff during excavation works would have the highest magnitude of effect of the proposed works. Runoff could negatively impact the surrounding environment, in particular, the freshwater habitat (moderate ecological value) and fish (high ecological value) which already suffer due to sediment and nutrient runoff within the catchment. Due to the volume of earthworks prescribed, and the proximity to the river of 7 ha identified for excavation, as well as the works being temporary, the *unmitigated* effect of sediment runoff would be '**moderate**'.

Gisborne District Council and contractors are expected to adhere to GDC's erosion and sediment control guidelines for best practice during the construction period. This would result in a *mitigated* magnitude of effect, on all the described ecological features including the freshwater habitat and fish, of **'low'**.

It is expected that with these controls implemented, the overall *level of effect* on all ecological features, in particular the freshwater habitat and fish, by stormwater and sediment runoff would be **'low'.**

5.3.2 Effect of water take from Waipaoa river

The water take of up to 20 m^3/day with a maximum extraction of 30 l/s has the potential to reduce flow and alter instream habitat and disrupt the natural flow variability of the river. Water take infrastructure has the potential to suck in fish, cause them to become impinged, injured, or and kill them. The *unmitigated* effect on freshwater habitat (moderate ecological value) from the water abstraction would be '**moderate**' and the *unmitigated* effect on fish (high ecological value) would be '**high'**.

The Tairawhiti Resource Management Plan has rules and limits on water abstraction and rates which consider ecological value and the effects on the river. If these abstraction limits and rates are adhered to in relation to the plan, the mitigated level of effect of the water abstraction in regard to freshwater habitat is considered '**low**'.

In terms of the water abstraction infrastructure, to mitigate against the potential fish kill and fish being impinged on the intake, a fish screen should be installed that has the appropriate targeted design for the fish species present in the river. The fish screen design must exclude fish from entering a water intake. The current fish screening guidelines (Hickford et al., 2023) suggest that a wedge wire screen size of ≤3 mm is appropriate to exclude fish from the intake in streams in this distance inland within the catchment (Table 6) when there are eels and whitebait species present. If the water abstraction is occurring outside of the whitebait spawning season, 3mm screen size would be appropriate, however if whitebait are migrating upstream a smaller screen size would be recommended and a screen with gaps of

a maximum of 1.5 mm would be advised to eliminate glass eels and elvers, and juvenile whitebait being entrained in the intake.

Table 6. Characteristics of some migratory fish of concern at water intakes and the recommended aperture size of the mesh. (Hickford *et al*., 2023).

Fish species group	Size of fish	Migration/movement direction	Predominant location in water column	Size of mesh-wire screen
Elvers (longfin and shortfin)	< 60 mm	Upstream	Middle and Bottom	<3mm
Upstream migrating juvenile whitebait (i.e., īnanga, kōaro, banded kōkopu, shortjaw kōkopu, giant kōkopu) and smelt	< 60 mm	Upstream	Upper and Bottom	1.5mm
Larval whitebait and torrentfish, and Paratya shrimp zoea	<10mm	Downstream	Surface (day) Bottom (night)	1.5mm

It is recommended that the through screen/ approach velocity be less than the stream velocity to reduce the risk of fish entrainment (Hickford et al., 2023). This will ensure that fish are not entrained into or impinged onto the intake screen. Fish require the ability to be able to swim away from the suction flow of the intake structure.

It is expected that with these controls implemented, the overall *level of effect* of the water take on freshwater habitat and fish would be '**low**'.

5.3.3 Effect of noise and vibration from associated machinery during construction

Ambient noise above certain levels is known to cause wildlife disturbance, including for birds, which for this site have an ecological value of 'low'. Behavioural responses such as avoidance and changes to flight patterns are the most common disturbances. This can negatively impact on foraging and roosting. This is an emerging area of research without firm species-related sound frequency and intensity levels, so the current philosophy is to keep sound levels from the mechanical workings of machinery on-site as close to background levels as practical. The effects of *unmitigated* ambient noise on native fauna are therefore considered **'low'**.

It is expected that the overall *level of effect* on birds would be **'very low'**.

5.3.4 Effects of culvert installation in a permanent watercourse

The installation of a culvert in the permanent watercourse at the northern end of the site has the potential to have negative effects on fish passage. The stream has a catchment of approximately 92 hectares and is classified as a second order stream. Due to the environment in Gisborne, there is potential that the stream may be dry for periods in the summer months, however, it would provide fish habitat for the rest of the year. Due to the culvert being within a stop bank, there will be flood gates attached to it which would stop the flow of water in some or all instances. The *unmitigated* effect of the culvert on fish passage is considered '**high**'.

The considerations of culvert design need to include velocity, culvert capacity and size in relation to the stream width and depth and the installation of the culvert. These factors ensure that flow through the culvert mimics the natural stream flow and that substrate is

maintained within the culvert area, removing issues with high velocities or the culvert becoming perched.

A detailed flood-gate design is not yet available. To minimise barriers to fish passage, the flood gate should operate only when water levels reach a defined critical elevation, reducing impacts on fish movement. Section 4.8.2 of the *Fish Passage Guidelines* outlines key design principles for flood gates (Franklin & Bartels, 2025). The preferred option for new installations is an actively controlled automated gate or hydraulically powered as these systems significantly reduce the risk of creating fish passage barriers.

Because the flood gate will only close during high-flow or flood events, any barrier to fish passage will be temporary and limited in duration. However, the structure will still require a specific resource consent, as it will function as a barrier to fish movement during those elevated flow conditions that trigger gate closure.

If an automatic gate is not used in the design, the gate that is installed should be monitored for a period of time following installation to understand if fish passage is being achieved.

If the National Environment Standard for Freshwater (NES-F) culvert design and the requirements in the Tairawhiti Resource Management Plan (TRMP) for fish passage and culvert design and installation are followed, as well as the design and flood gate principals for installing a new flood gate in the New Zealand Fish Passage Guidelines it is expected that the overall level of effect on fish passage would be '**low**'.

5.3.5 Effect of removing trees that could provide bat habitat

With an extended boundary along the Waipaoa River and scattered willow and poplar treeland in the adjacent areas, the area contains a range of microhabitats created by the linear interface between open pasture and areas of trees or shrubs. Such habitat features are well suited for use by long-tailed bats. At the Te Karaka flood protection site, the vegetated areas could provide potential roost sites and diverse microhabitats, serving both as foraging grounds and as important linkages between other habitat components in the landscape. As an edge-adapted species, long-tailed bats are thought to commute primarily through open pasture situated alongside tree lines, while foraging most often takes place in pasture areas adjacent to shrubland, forest edges, and open water, particularly where these are associated with linear features, habitat edges, or canopy gaps (O'Donnell, 2001).

Under the EcIA guidelines, terrestrial species that are Nationally Threatened dictate the ecological value to be 'Very High'. Due to the unknown presence or absence of bats in the proposed works area, and that it is possible for bats to utilise the tree habitat on site, we consider the ecological value of these parts of the site for bats to be **Very High**. Therefore, the *unmitigated* effect of tree felling in the proposed works area without any surveys or mitigation prior is assessed to be **Very High.**

Prior to tree felling it is recommended to undertake bat surveys within the monitoring season between 1 October and 30 April to identify if there are bats present at the site. The surveys should use Automatic Bat Monitors (ABMs) and the monitors should be deployed for two weeks, within the monitoring guidelines from DOC (2024). If bats are found, the Bat Roost Protocols (BRPs) (DOC 2024) should be followed to ensure the risks to bats are managed. This involves pre-clearance monitoring to check whether bats are using the impacted trees and subsequent actions to ensure no harm to bats. This monitoring should be implemented prior to construction. If no bats are found during the surveys, felling can be undertaken without further monitoring or survey work. If the surveys and BMPs are followed (if required) the overall level of effect is expected to be '**low'**.

5.3.6 Conversion of intensively managed land to passively managed land

Most of the land in the flood scheme expansion zone is currently either grazed or cropped and has negligible ecological value. Once the new stop bank is built, it will be resown in pasture grasses. The expanded floodplain will be returned to pasture and maintained by grazing by sheep as per GDC stop bank engineering standards. Cattle are not permitted on the floodplain nor are growing crops. This will result in a '**positive'** magnitude of effect on the freshwater habitat and fish due to pasture requiring less intensive management including fertilizer and pesticide application and it being less prone to erosion than row crops.

It is expected that the overall *level of effect* of converting the flood scheme land from intensive agriculture to passively managed grazed land will be a '**net gain'** for the freshwater habitat and fish ecological features.

6.0 Summary and recommendations

The proposed flood scheme expansion works along the Waipaoa River, aimed at protecting the Te Karaka community, are expected to generate ecological effects; three temporary and low in magnitude when appropriate mitigation measures are implemented, one permanent and low in magnitude with appropriate mitigations, and one which will result in a net gain. While short-term impacts include increased potential for sedimentation and stormwater runoff into the Waipaoa River, these will be effectively managed through best-practice erosion and sediment control and replanting (in pasture) of bare areas. In the longer term, the conversion of intensively managed agricultural land to passively managed floodplain will reduce the erosion and nutrient and pesticide inputs into the river.

To maximise ecological benefits and reduce residual impacts, the following additional recommendations are made:

- Continue to prevent stock access to the river in the expanded flood plain to prevent bank degradation and allow riparian vegetation to establish.
- Ensure the flood gate design is automated and functions only during a high flow event, with fish passage being maintained during all other flows.
- Consider planting the riparian areas with native vegetation and not just *Salix cinerea* to improve biodiversity.
- Undertake bat monitoring prior to works starting to understand if bat populations are present at the site or not.

Sincerely,

SLR Consulting New Zealand Limited

Harriet Hunter, MSc
Principal Ecologist

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8.0 Feedback

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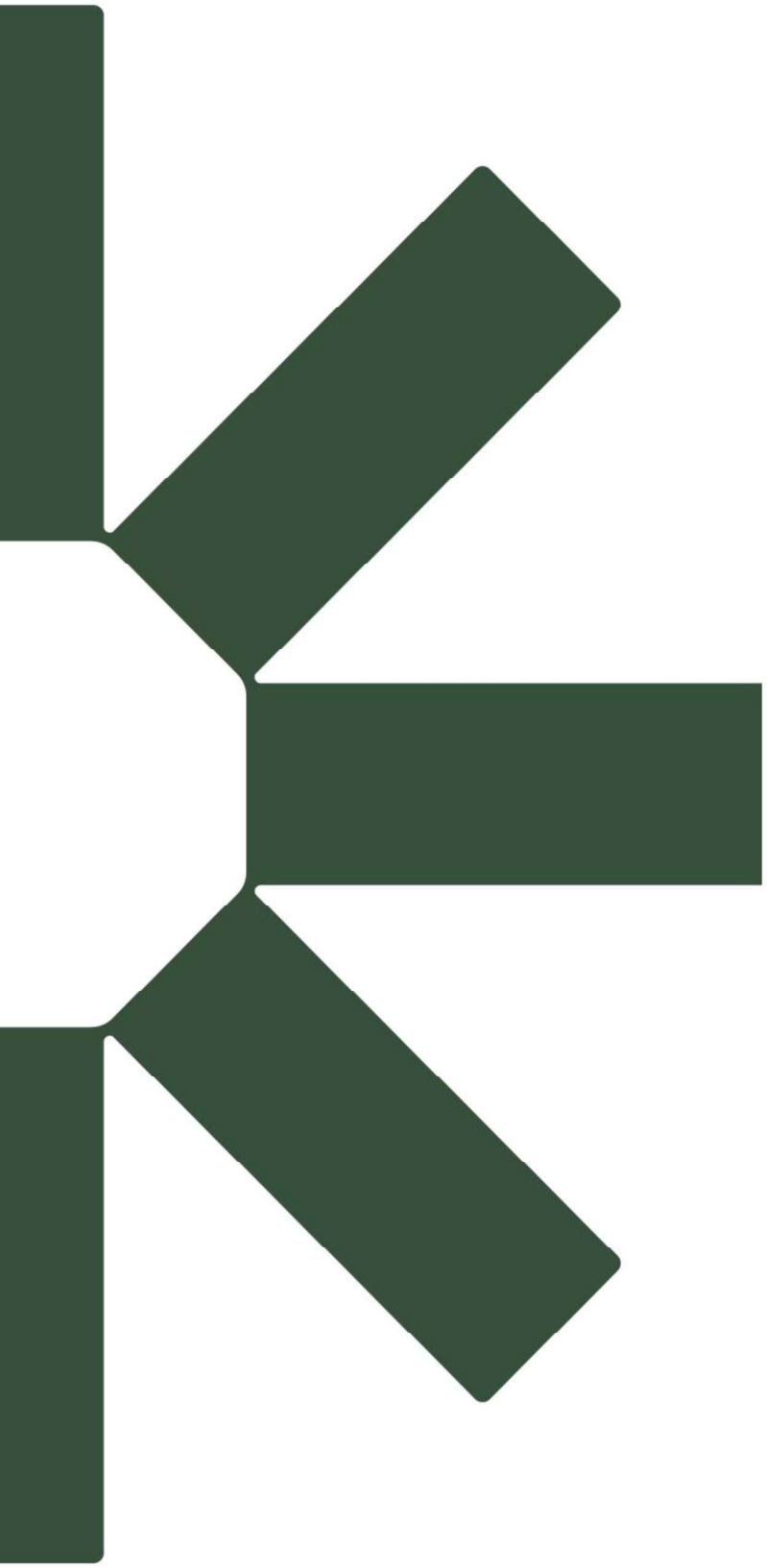

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