



Ecological Assessment for Pākōwhai Pump Station Upgrade

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EXECUTIVE SUMMARY

Hawke's Bay Regional Council (**HBRC**) proposes to upgrade the existing Pākōwhai Pump Station under the Severe Weather Emergency Recovery (Hawke's Bay Flood Protection Works) Order 2024. The upgrade forms part of HBRC's broader programme of flood resilience improvements following Cyclone Gabrielle and is intended to improve the reliability, resilience and operational performance of critical drainage infrastructure serving the Pākōwhai catchment. This assessment describes the ecological values present and evaluates the potential effects associated with construction and operation of the proposed upgrade.

The pump station is located within a highly modified floodplain environment characterised by engineered drainage channels, stopbanks, maintained grassland, hardstand areas, and other infrastructure associated with flood management activities. Broad-scale habitat mapping confirms that most terrestrial habitats within the proposed works footprint are of negligible to low ecological value, reflecting extensive modification, dominance of exotic vegetation, ongoing maintenance, and limited habitat complexity. No naturally uncommon ecosystems were identified within or adjacent to the works area, and no significant natural inland wetlands occur within the project footprint.

Terrestrial ecological values at the site are limited. Habitat suitable for protected terrestrial fauna is scarce and highly fragmented. No bat roosting habitat is present, and no mature trees will be removed as part of the proposal. Lizard surveys and habitat assessments indicate a low likelihood of resident lizard populations occurring within the works area due to the absence of secure refuge habitat and the highly disturbed nature of the site. Native bird species are known to utilise the wider Ngaruroro River corridor; however, opportunities for regular nesting or roosting within the immediate project footprint are limited. Potential effects on terrestrial fauna are therefore expected to be minor and can be managed through standard ecological management measures during construction.

The receiving environment is connected to the lower Ngaruroro River, which supports a diverse indigenous fish community including taonga species and nationally threatened or at-risk species such as īnanga, longfin eel and lamprey. Existing information indicates that at least 16 native fish species utilise the lower Ngaruroro River system and that the drainage network upstream of the pump station provides a substantial extent of potentially accessible habitat. Maintaining and improving fish passage is therefore the primary ecological consideration associated with the project.

The existing pump station provides limited fish passage opportunities, with upstream movement constrained by the current infrastructure and downstream movement exposing fish to potential injury through conventional pumping systems. The proposed upgrade includes replacement of the existing pumps with fish-friendly Bosman pumps and enhancement of a modified gravity outlet intended to provide upstream fish passage. Collectively, these measures are expected to improve both upstream and downstream fish passage outcomes relative to the current situation and improve access to approximately one hectare of upstream aquatic habitat.



Construction-related ecological effects are expected to be localised and temporary. These include vegetation clearance, disturbance to bird species through noise and vibration, temporary modification of riparian habitats, and potential effects on water quality associated with earthworks, dewatering and construction within the river margin. The most notable temporary effects however relate to the River and Riparian habitat unit and Stream and Riparian habitat unit, which are assessed as having High and Moderate ecological values respectively. A relatively modest package of riparian planting along 50-100m lengths of the inlet and outlet channels of the Pump Station would convert these residual effects into net gains for ecological values in the affected habitat units.

The proposal is not expected to increase the risk of pest plant or animal spread beyond existing conditions and does not involve significant adverse effects on wetlands, naturally uncommon ecosystems, bats, lizards or indigenous vegetation communities. Ecological effects on most terrestrial habitat units are assessed as Very Low to Low due to the highly modified nature of the receiving environment.

In summary, the proposed Pākōwhai Pump Station Upgrade is located within a highly modified environment where terrestrial ecological values are generally low. Temporary construction-related effects on portions of the river margin and riparian habitats are expected but can be appropriately managed through standard environmental controls. The principal ecological consideration is fish passage. Unlike the existing situation, the proposal incorporates both fish-friendly pumping technology and provision for upstream fish passage and is therefore expected to result in a net positive outcome for indigenous fish communities.



1. INTRODUCTION

Hawke's Bay Regional Council (**HBRC**) is proposing to upgrade the existing Pākōwhai Pump Station under the Severe Weather Emergency Recovery (Hawke's Bay Flood Protection Works) Order 2024 (**OiC**). The project forms part of HBRC's ongoing programme of flood resilience improvements following Cyclone Gabrielle and is intended to improve the reliability, resilience, and operational performance of critical drainage infrastructure serving the Pākōwhai catchment. The proposed works include construction of a replacement pump station incorporating fish-friendly pumping technology, installation of new discharge infrastructure, upgrade of existing fish passage components, and associated modifications to the inlet channel and surrounding infrastructure.

Although the proposal is being progressed through the streamlined consenting framework established by the OiC, there remains a requirement to identify, assess and appropriately manage ecological effects associated with both the construction and operation of the upgraded pump station. This report provides the ecological assessment required to support the resource consent application and has been prepared having regard to the matters of control identified under the OiC, the nature and scale of the proposed works, and the ecological values associated with the receiving environment.

The Pākōwhai Pump Station is located within a highly modified floodplain and drainage network characterised by engineered channels, stopbanks, maintained grassland, and other infrastructure associated with flood management. Terrestrial habitats within and adjacent to the proposed works area are generally expected to be of low ecological value, reflecting their modified condition and long history of disturbance. Nevertheless, the waterways connected to the pump station are likely to provide habitat for a range of indigenous freshwater fish species, including migratory taonga species, making fish passage a central ecological consideration for the project.

Unlike many historical pump station installations, the proposal includes both fish-friendly pump technology and provision for upstream fish passage. The continued operation of effective fish passage is therefore fundamental to the ecological outcomes anticipated from the project. The upgraded pumps are expected to substantially reduce the risk of injury to downstream-migrating fish while maintaining or improving connectivity for upstream movement through the existing passage route. On the basis of the concept design currently available, the project is anticipated to result in a significant improvement over the status quo and a net positive outcome for freshwater ecological values. However, because this specific fish-friendly pump technology has not previously been tested in New Zealand settings, post-construction monitoring will help verify pump performance and fish passage objectives and enable appropriate responses as part of ongoing management of the asset.

The assessment focuses on:

- The identified scope of assessment required under the Severe Weather Emergency Recovery (Hawke's Bay Flood Protection Works) Order 2024;
- The existing environmental context at Pākōwhai; and



- Ecological effects in the context of a highly modified site with recent flood history.

2. PROJECT OVERVIEW AND ECOLOGICAL CONTEXT

The proposed project involves the upgrade of the existing Pākōwhai Pump Station, including replacement of pumping equipment and associated structural, mechanical, and electrical works required to improve flood response capacity, system resilience, and operational reliability. Construction activities will be largely confined to the existing pump station footprint and its immediate surrounds, including areas required for access, construction laydown, temporary works, and operation of the upgraded facility.

The Pākōwhai Pump Station serves a low-lying and highly modified drainage catchment on the Heretaunga Plains, functioning to maintain drainage and facilitate the rapid removal of excess water during rainfall events. The catchment comprises a network of artificial and modified waterways that have been developed over many decades to support flood management, productive land use, and associated infrastructure. The pump station forms part of this wider managed drainage network. This assessment is limited to the ecological effects associated with the pump station upgrade itself and does not consider any separate flood protection or stopbank projects that may be undertaken in the area.

Although the immediate surroundings are highly modified, the pump station is hydraulically connected to the Ngaruroro River, a river of high ecological significance that is recognised through both its pending Water Conservation Order status and identification as a regionally Outstanding Water Body within a regional planning framework. The waterways connected to the pump station are likely to provide habitat for a range of indigenous freshwater fish species, including migratory taonga species such as longfin eel (*Anguilla dieffenbachii*), shortfin eel (*Anguilla australis*), and īnanga (*Galaxias maculatus*). The drainage network upstream of Pākōwhai provides a substantial extent of potentially accessible freshwater habitat, meaning the maintenance of fish passage and aquatic connectivity are key ecological considerations for the project.

As part of the proposed upgrade, the existing pumps will be replaced with purpose-designed fish-friendly submersible pumps (Bosman Vision series). These pumps incorporate a single-blade, low-speed mixed-flow impeller and a wider, less obstructed internal flow path, reducing the likelihood of blade strike, turbulence-induced injury, and physical compression when compared with conventional flood pumps. The proposal also includes provision for fish passage through the pump station system, enabling continued access between the Ngaruroro River and upstream drainage habitats. While no pumping technology can completely eliminate risk to fish, the proposed upgrade is expected to substantially improve conditions for both upstream and downstream movement and represents a material improvement over the existing infrastructure.



3. ECOLOGICAL EVALUATION METHODS

Purpose and approach

Assessments were undertaken to identify ecological values that may be affected by the Pākōwhai Pump Station upgrade. The level of assessment was informed by the requirements of the Severe Weather Emergency Recovery (Hawke's Bay Flood Protection Works) Order 2024 and was proportionate to the scale and nature of the proposal to upgrading an existing pump station within a highly modified landscape.

The methods therefore focused on identifying the ecological values relevant to the pump station upgrade, and its ongoing operation and discharge, with particular attention to:

- naturally uncommon ecosystems,
- at-risk or threatened species,
- taonga species that may be significantly adversely affected during or as a result of construction,
- significant natural inland wetland values,
- pest plants or animals that may spread or become established with regard to the HBRC Pest Management Plan,
- any fish, bird nesting areas, bat habitats, or habitats of species protected under the Wildlife Act 1953,
- or other ecological risks that would require avoidance, mitigation, or management measures as part of the proposal.

Desktop assessment and site familiarisation

Existing ecological information available for the Pākōwhai Pump Station area and Ngaruroro River was reviewed including:

- Aerial imagery and LiDAR data;
- Freshwater fisheries information from national databases;
- Wetland mapping and regional planning information; and
- Previous ecological reports and monitoring.

Broadscale habitat mapping

Broadscale habitat surveys were undertaken to characterise the ecological context of the project area and to identify any ecological features that may be affected by the proposed works. This involved a combination of desktop assessment using recent aerial imagery, LiDAR, and existing ecological information, followed by site walkover surveys to ground-truth habitat conditions and confirm the extent and nature of modification.

During site walkovers, the study area was assessed in its entirety, with particular focus on areas within and adjacent to the proposed works footprint. Habitats were categorised into discrete habitat units based on land cover, hydrology, vegetation composition, and geomorphological features. This approach was used to break up the broader area into



habitat units that aligned with their potential ecological value, to provide the context for the assessment of ecological effects.

Assessment of Ecological Value

The assessment of ecological value followed guidelines provided by the Environment Institute of Australia and New Zealand (**EIANZ**)¹. The assessment is based on four matters: representativeness; rarity/distinctiveness; diversity and pattern; and ecological context. All matters are scored along a 5-point scale of Very High – High – Moderate – Low – Very Low. See **Table 1** for the assessment approach.

An overall ecological value is produced based on the combination of scores for each of the matters listed in **Table 1**, as per **Table 2**.

Table 1. Matters considered when assessing ecological value / importance

Matter	Attributes of vegetation/ habitat/ community to be considered	Attributes of freshwater site or area to be considered
Representativeness	<u>Criteria for representing vegetation and aquatic habitats</u> 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 (i.e. is it one of the better examples remaining?) <u>Criteria for representative species and species assemblages</u> Species assemblages that are typical of the habitat Indigenous species that occur in most of the guilds expected for the habitat type	Extent to which site/catchment is typical or characteristic Stream order Permanent, intermittent or ephemeral waterway Catchment size Standing water characteristics
Rarity/distinctiveness	<u>Criteria for rare/distinctive vegetation and habitats:</u> Naturally uncommon, or	Supporting nationally or locally Threatened, At Risk or

¹ Roper-Lindsay J, Fuller SA, Hooson S, Sanders MD, Ussher GT. 2018. Ecological impact assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd Edition.



	induced scarcity Amount of habitat or vegetation remaining Distinctive ecological features National priority for protection <u>Criteria for rare/distinctive species or species assemblages:</u> 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	uncommon species National distribution limits Endemism Distinctive ecological features Type of lake/pond/wetland/spring
Diversity and pattern	Level of natural diversity, abundance and distribution Biodiversity reflecting underlying diversity Biogeographical considerations – pattern, complexity Temporal considerations, considerations of lifecycles, daily or seasonal cycles of habitat availability and utilisation	Level of natural diversity Diversity metrics Complexity of community Biogeographical considerations - pattern, complexity, size, shape
Ecological context	Site history, and local environmental conditions which have influenced the development of habitats and communities The essential characteristics that determine an ecosystem's integrity, form, functioning, and resilience (from "intrinsic value" as defined in RMA) Size, shape and buffering Condition and sensitivity to	Stream order Instream habitat Riparian habitat Local environmental conditions and influences, site history and development Intactness, health and resilience of populations and communities Contribution to ecological networks, linkages, pathways



	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	Role in ecosystem functioning – high level, proxies
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Table 2. Approach for scoring ecological value based on the four matters

Value	Description
Very High	Area rates High for 3 or all of the four assessment matters listed in Table 1 . Likely to be nationally important and recognised as such.
High	Area rates High for 2 of the assessment matters, Moderate and Low for the remainder; or Area rates High for 1 of the assessment matters, Moderate for the remainder. Likely to be regionally important and recognised as such.
Moderate	Area rates High for 1 matter, Moderate and Low for the remainder; or Area rates Moderate for 2 or more assessment matters, Low or Very Low for the remainder. Likely to be important at the level of the Ecological District.
Low	Area rates Low or Very Low for majority of assessment matters and Moderate for one. Limited ecological value other than as a local habitat for tolerant native species.
Negligible	Area rates Very Low for 3 matters and Moderate, Low or Very Low for the remainder.

Assessment of Level of Effect

The approach outlined in the EIANZ guidelines were also used to describe the level of effects expected from the proposed activity, based on values that had been identified during the steps described earlier.

Briefly, the approach is to contrast the magnitude of potential (negative) effects against the quality of ecological values (explained above) currently present at a site. The magnitude of effect is based on the degree of loss or alteration to existing ecological elements or features, including a consideration of the duration of any effects. See **Table 3.** Ecological impact assessment level of effects.

Magnitude	Description
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Very High	Substantial change likely to cause long-term changes in condition, structure or function
High	Significant change likely to cause some change in condition, structure or function, but unlikely to be permanent
Moderate	Detectable and measurable change, but not long-lasting
Low	Small change, difficult to measure, unlikely to affect condition, structure or function
Negligible	Imperceptible change with no detectable effect

Table 4 and 4.



Table 3. Ecological impact assessment level of effects.

Magnitude	Description
Very High	Substantial change likely to cause long-term changes in condition, structure or function
High	Significant change likely to cause some change in condition, structure or function, but unlikely to be permanent
Moderate	Detectable and measurable change, but not long-lasting
Low	Small change, difficult to measure, unlikely to affect condition, structure or function
Negligible	Imperceptible change with no detectable effect

Table 4. Ecological impact assessment level of effects.

Level of Effect		Current Ecological Value				
		Very High	High	Moderate	Low	Negligible
Magnitude of effect from activity	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

Aquatic ecology and fish passage

Aquatic ecological values were assessed with a focus on:

- The reaches within the immediate area of construction impact;
- The upstream and downstream reaches of waterway where fish communities may be affected by barriers to fish passage;
- Migratory freshwater fish known or expected to use the lower catchment; and

Information on fish communities was compiled from the New Zealand Freshwater Fish Database (**NZFFDB**) and Freshwater Ecosystems of New Zealand (**FENZ**) predicted distributions. There were no environmental DNA (**eDNA**) results from relevant sites upstream of the Pump Station, but eDNA data was available from the mainstem of the Ngaruroro River. No additional fish sampling was undertaken as existing information was sufficient to characterise relevant fish values and assess effects.

Wetland assessment

The areas around each proposed pump station and discharge points were examined for potential wetlands having regard to the latest protocols from the Ministry for the



Environment^{2,3,4}. A combination of high-resolution aerial imagery⁵, LiDAR derived digital elevation models and vegetation assessments during site visits was used.

A key step for identifying and delineating wetland habitat is looking at the characteristics of the plant community. Briefly, if an area is dominated by plants that are typically associated with wetlands, the site is identified as a wetland. If a site is dominated by plants that are typically associated with upland habitat, then it is classified as a non-wetland. Because ecology is not black and white, plant species have different degrees of affiliation with wetland habitats, and some plants can occur in either wet or dry conditions. Each plant species has therefore been assigned one of five indicator status categories based on the consistency of their association with wetland conditions⁶:

- i) Obligate wetland, almost always associated with wetlands (**OBL**)
- ii) Facultative wetland, usually occurs in wetlands but can occur in uplands (**FACW**)
- iii) Facultative, commonly occurs in both wetland and non-wetland habitat (**FAC**)
- iv) Facultative upland, occasionally occurs in wetlands but can occur in uplands (**FACU**)
- v) UPL, rarely occurs in wetlands and almost always associated with uplands (**UPL**)

Depending on the initial inspection at a site, either a rapid delineation method is applied (when the plant community is obviously a wetland type, or not) or a more involved assessment is undertaken (when the nature of the plant community is less obvious). The latter requires precise measurements of the amount of area within a plot that is occupied by different species and a formula is applied to the species occupancy results to calculate a Prevalence Index (**PI**). A $PI \leq 3$ is classed as wetland, and a $PI > 3$ is classed as non-wetland. When wetland status is still not clear, additional assessments of soil and hydrology may need to be undertaken.

A separate step can be applied in areas dominated by exotic pasture species. Specifically, if designated exotic pasture species⁷ cover more than 50% of an area, it passes the Pasture Exclusion Test and is designated as non-wetland.

The approach taken to identify wetlands during on ground assessments within the large construction footprint of this project was based on the logic outlined in **Figure 1**.

² Ministry for the Environment. 2021. *Wetland delineation hydrology tool for Aotearoa New Zealand*. Wellington: Ministry for the Environment.

³ Ministry for the Environment. 2022. *Pasture exclusion assessment methodology*. Wellington: Ministry for the Environment.

⁴ Ministry for the Environment. 2022. *Wetland delineation protocols*. Wellington: Ministry for the Environment.

⁵ Provided by The Surveying Company, via JP Neethling at HBRC.

⁶ Clarkson BR, Fitzgerald NB, Champion PD, Forester L, Rance BD. 2021. New Zealand wetland plant list 2021. Manaaki Whenua – Landcare Research Contract Report LC3975 for Hawke's Bay Regional Council.

⁷ Cosgrove G, Dodd M, James, T. 2022. National list of exotic pasture species. Prepared for the Ministry of the Environment by AgResearch Ltd. Wellington: Ministry for the Environment.

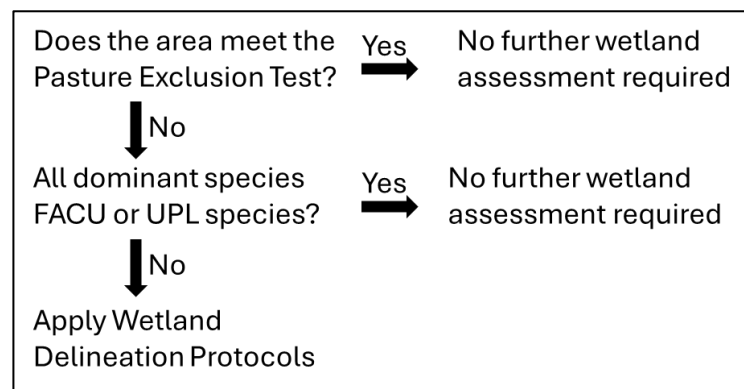


Figure 1. Wetland Assessment Logic

Protected wildlife

Assessments on the potential effects on wildlife protected under the Wildlife Act 1953 were broken down into the broader faunal groupings of bats, lizards and birds. Initial assessments were based on:

- Habitat suitability within the works area and likelihood of risk from the proposed activity;
- Known distribution records and regional survey data;
- Site disturbance and recent flood history.

Bats

Based on the initial assessment, no targeted investigations around bats were required because there are no potential roosting trees on site that would be removed as part of the project, meaning there is no risk to any bats that may or may not be present in the area.

Lizards

Biodiversity information for lizards was reviewed using a range of existing data sources, including the Department of Conservation's Bioweb Herpetofauna database and online distribution atlas, research-grade observations available through iNaturalist, and published information on species' known ranges and threat classifications. A 5km radius was applied to the project footprint to define 'nearby' records. This information was supplemented by a review of relevant regional reports and previous ecological assessments where available.

The area contained some large areas of rank grass which is noted as potential habitat for at least one species of skink that may occur in the area, and so targeted lizard searches were undertaken using the Diurnal Search Method described in the Department of Conservation's Herpetofauna Toolbox. The survey occurred in areas within and immediately adjacent to the proposed construction footprint between 2pm and 5pm on the 29th of April 2025. Conditions were suitable for lizard surveys, being fine with light winds (<12 km/h) and temperatures above 15 degrees. Focused effort was spent on potential refuge features, by first scanning these visually from a distance using Bushnell 8×42 mm binoculars. Closer inspection involved systematic examination of crevices and cover objects using torchlight, with loose debris such

Stopbank

The stopbank corridor comprises an engineered bund, with compacted fill, access tracks, and maintained grass cover (**Figure 3**). Vegetation is dominated by exotic species (see **Table 5**), is often sparse and low-growing and subject to regular disturbance and maintenance. This habitat unit has negligible ecological value (see **Table 5**) other than for transient use by common fauna.



Figure 3. Stopbank habitat unit

Table 5. Plant species observed in the stopbank habitat unit

Common Name	Latin Name	Biostatus	Wetland Indicator Status
Bermuda grass	<i>Cynodon dactylon</i>	Exotic	FACU
Cocksfoot	<i>Dactylis glomerata</i>	Exotic	FACU
Prairie grass	<i>Bromus catharticus</i>	Exotic	UPL
Tall fescue	<i>Lolium arundinaceum</i>	Exotic	FAC
Perennial ryegrass	<i>Lolium perenne</i>	Exotic	FACU
Tree lupin	<i>Lupinus arboreus</i>	Exotic	UPL
White clover	<i>Trifolium repens</i>	Exotic	FACU
Hoary mustard	<i>Hirschfeldia incana</i>	Exotic	UPL
Large-flowered mallow	<i>Malva sylvestris</i>	Exotic	UPL



Table 6. Stopbank assessment of ecological value

Matter	Value	Reasons
Representativeness	Very Low	Exotic species dominate an unnatural and regularly disturbed landform. Highly managed (mown short).
Rarity/distinctiveness	Very Low	Does not support any rare or threatened species. No indigenous plant communities.
Diversity and Pattern	Very Low	A constructed habitat with highly unnatural features and disruptive management.
Ecological Context	Very Low	A highly unnatural origin and current context. Creates an unnatural barrier within the natural floodplain.
Overall Score	Negligible	Very low for 3 or more matters. Negligible ecological value.

Stream and riparian

This habitat unit consists of a modified stream channel with associated riparian margin adjacent to the pump station infrastructure (**Figure 4**). The channel is highly engineered with incised banks. Riparian corridor is narrow and largely composed of exotic and opportunistic species that are frequently mown (**Table 7**). While habitat quality is degraded, this unit provides connectivity within the wider drainage system and receiving environment and is relevant for being a key node for fish passage to the upstream catchment which leads to an ecological value of moderate due to the aquatic values supported (**Table 8**).

Table 7. Plant species observed in the stream and riparian habitat unit

Common Name	Latin Name	Biostatus	Wetland Indicator Status
Hemlock	<i>Conium maculatum</i>	Exotic	FAC
Tall fescue	<i>Lolium arundinaceum</i>	Exotic	FAC
Barnyard grass	<i>Echinochloa crus-galli</i>	Exotic	FACU
Bermuda grass	<i>Cynodon dactylon</i>	Exotic	FACU
Broad-leaved flea-bane	<i>Erigeron sumatrensis</i>	Exotic	FACU
Broad-leaved dock	<i>Rumex obtusifolius</i>	Exotic	FAC
Blue sweet grass	<i>Glyceria declinata</i>	Exotic	OBL
Prairie grass	<i>Bromus catharticus</i>	Exotic	UPL
Water celery	<i>Helosciadium nodiflorum</i>	Exotic	OBL
Creeping bent	<i>Agrostis stolonifera</i>	Exotic	FACW



Figure 4. Stream and riparian margin habitat unit. Top, looking up the main inflow. Bottom, looking across the riparian margins.



Table 8. Stream and riparian assessment of ecological value

Matter	Value	Reasons
Representativeness	Moderate	Exotic herbs and grasses in riparian corridor. No indigenous plant species observed. Highly modified landform. Moderate amount of aquatic habitat is likely to support representative range of fish albeit with passage issues and macroinvertebrate communities likely compromised.
Rarity/distinctiveness	Moderate	The terrestrial component does not support any rare or threatened plant species, or critical habitat for threatened species. But aquatic habitat is likely to support several native fish species including inanga (threatened) and tuna species, albeit abundance probably suppressed.
Diversity and Pattern	Moderate	Terrestrial plant diversity is exotic-dominated and unlikely to provide any substantial habitat for native fauna, but aquatic birds may use for feeding and common native species may nest here. Moderate extent of aquatic habitat albeit fish passage is currently partially restricted.
Ecological Context	Low	Provides corridor that connects upstream and downstream aquatic habitats, but is within a highly modified landscape, is degraded and only partial fish passage provided.
Overall Score	Moderate	<i>Area rates Moderate for 2 or more assessment matters, Low or Very Low for the remainder. Likely to be important at the level of the Ecological District.</i>

Stream berm

A narrow berm-like feature between the stream margin and stopbank toe (Figure 5). The area looked to have been disturbed recently with as much pasture associated weed species as grass (Table 9). This habitat has negligible ecological value (Table 10) but may provide transitional habitat for common wetland-associated fauna, especially during wetter periods.



Figure 5 Stream berm habitat unit

Table 9. Plant species observed in the stream berm habitat unit

Common Name	Latin Name	Biostatus	Wetland Indicator Status
Barnyard grass	<i>Echinochloa crus-galli</i>	Exotic	FACU
Hemlock	<i>Conium maculatum</i>	Exotic	FAC
Prairie grass	<i>Bromus catharticus</i>	Exotic	UPL
White clover	<i>Trifolium repens</i>	Exotic	FACU
Curled dock	<i>Rumex crispus</i>	Exotic	FAC
Large-flowered mallow	<i>Malva sylvestris</i>	Exotic	UPL
Scotch thistle	<i>Cirsium vulgare</i>	Exotic	FACU



Table 10. Stream berm assessment of ecological value

Matter	Value	Reasons
Representativeness	Very low	Exotic species dominate, appears to be recently disturbed and is not representative of an indigenous lowland environment.
Rarity/distinctiveness	Very Low	Does not support any rare or threatened plant species or fauna.
Diversity and Pattern	Very Low	A habitat unit that occupies a confined space between stopbank and stream margin, with highly unnatural features and likely ongoing disturbance.
Ecological Context	Very Low	A disturbed habitat with unnatural features in a modified landscape setting with disruptive management.
Overall Score	Negligible	<i>Very low for 3 or more matters. Negligible ecological value.</i>

River and riparian habitat

The River and Riparian habitat unit comprises the Ngaruroro River margin adjacent to the proposed pump station location, including the active river channel, periodically inundated berm habitat, riparian margins, and associated aquatic habitat (**Figure 6**). The river corridor has been influenced by extensive flood protection and river management works, including stopbank construction, channel management, and vegetation maintenance. Nevertheless, it retains important ecological functions and forms part of a regionally significant freshwater ecosystem.

The aquatic component of this habitat unit is part of the Lower Ngaruroro River which is recognised through a pending Water Conservation Order status as well as being identified as a regionally Outstanding Water Body. The area of waterway that the Pump Station discharges into does not display the braided river characteristics that underpin much of this recognition; however, it remains connected to the lower Ngaruroro River system and functions as part of the broader aquatic migration corridor. The river supports the full diversity of indigenous freshwater fish expected in a large lowland waterway, including īnanga (*Galaxias maculatus*; Threatened - Nationally Vulnerable). The river also provides an important migration corridor linking freshwater habitats throughout the catchment with the marine environment, noting the area in closest proximity to the Pump Station is more of a backwater to this larger river system.

While two indigenous wetland species were recorded along the water's edge, riparian and berm vegetation is dominated by exotic grasses and herbs (**Table 11**). Consequently, the ecological significance of this habitat unit is derived primarily from its role as aquatic habitat and a fish passage corridor, rather than from its current vegetation values.

Overall, while the terrestrial riparian margins are highly modified and support relatively limited indigenous biodiversity values, the combined river and riparian habitat unit is assessed as having High ecological value due to its connection to the highly significant Ngaruroro River itself, the channel's role in supporting indigenous fish communities, and its importance in maintaining freshwater connectivity to the upstream catchment (**Table 12**)



Figure 6. River and Riparian habitat unit



Table 11. Plant species observed in the River and Riparian Habitat unit

Common Name	Latin Name	Biostatus	Wetland Indicator Status
Tall fescue	<i>Lolium arundinaceum</i>	Exotic	FAC
Broad-leaved dock	<i>Rumex obtusifolius</i>	Exotic	FAC
Narrow-leaved plantain	<i>Plantago lanceolata</i>	Exotic	FACU
Red clover	<i>Trifolium pratense</i>	Exotic	FACU
Creeping bent	<i>Agrostis stolonifera</i>	Exotic	FACW
Marsh clubrush	<i>Bolboschoenus fluviatilis</i>	Native	OBL
Perennial ryegrass	<i>Lolium perenne</i>	Exotic	FACU
Water celery	<i>Helosciadium nodiflorum</i>	Exotic	OBL
Creeping buttercup	<i>Ranunculus repens</i>	Exotic	FAC
Oxtongue	<i>Helminthotheca echioides</i>	Exotic	UPL
Cutty grass	<i>Carex geminata</i>	Native	FACW
Prairie grass	<i>Bromus catharticus</i>	Exotic	UPL

Table 12. River and riparian habitat assessment of ecological value

Matter	Value	Reasons
Representativeness	Moderate	Large lowland river supporting expected indigenous fish assemblages, although riparian margins are modified, plant communities are exotic dominated, and the area in immediate vicinity of Pump Station discharges is a backwater.
Rarity/distinctiveness	High	The area is associated with the Ngaruroro River, a Water Conservation Order river and Outstanding Water Body, supports īnanga a Threatened fish species, and may support wetland bird species like Australasian bittern and spotless crane although not as critical habitat.
Diversity and Pattern	Moderate	Diverse fish fauna and likely to support at least moderate diversity bird species, but simplified riparian vegetation and other fauna values are limited.
Ecological Context	Moderate	Sits within the broader Ngaruroro River floodplain, with full connectivity to riverine processes albeit as more of a backwater habitat off the main channel.
Overall Score	High	Area rates High for 1 of the assessment matters, Moderate for the remainder. Likely to be regionally important and recognised as such.

Wasteland

This habitat unit includes hardstand, compacted surfaces, construction areas, and zones of bare or sparsely vegetated ground (**Figure 7**). No native plant species were observed (**Table 13**) and rodent sign was noticed. These areas are subject to frequent disturbance and have negligible ecological value, offering little potential habitat beyond transient use by highly mobile or disturbance-tolerant species. This habitat unit is of negligible ecological value (**Table 14**).



Figure 7. Wasteland habitat unit

Table 13. Plant species observed in the wasteland habitat unit

Common Name	Latin Name	Biostatus	Wetland Indicator Status
Bermuda grass	<i>Cynodon dactylon</i>	Exotic	FACU
Broad-leaved flea-bane	<i>Erigeron sumatrensis</i>	Exotic	FACU
Narrow-leaved plantain	<i>Plantago lanceolata</i>	Exotic	FACU
Creeping buttercup	<i>Ranunculus repens</i>	Exotic	FAC
Scotch thistle	<i>Cirsium vulgare</i>	Exotic	FACU
Cocksfoot	<i>Dactylis glomerata</i>	Exotic	FACU
Prairie grass	<i>Bromus catharticus</i>	Exotic	UPL
Broad-leaved dock	<i>Rumex obtusifolius</i>	Exotic	FAC
Tall fescue	<i>Lolium arundinaceum</i>	Exotic	FAC



Perennial ryegrass	<i>Lolium perenne</i>	Exotic	FACU
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Table 14. Wasteland assessment of ecological value

Matter	Value	Reasons
Representativeness	Very Low	Bare ground and exotic species dominate an unnatural and regularly disturbed landform. A highly unnatural and managed environment.
Rarity/distinctiveness	Very Low	Does not support any rare or threatened species. No indigenous plant communities. Supports exotic mammalian predators.
Diversity and Pattern	Very Low	A highly disturbed environment with negligible diversity or ecological function.
Ecological Context	Very Low	This area presents a disturbed habitat unit within a broader disturbed context.
Overall Score	Negligible	<i>Very low for 3 or more matters. Negligible ecological value.</i>

River Berm

The habitat unit comprises flat to gently sloping, low-lying land associated with the river berm areas around the Pump Station discharge point and associated channels (**Figure 8**). Vegetation within the lowland unit is dominated by rank grass and associated exotic pasture species with some crack willow (**Table 15**). No indigenous plant species were observed, and the structural diversity is primarily rank grassland. The area is subject to periodic inundation during high river flows. This habitat unit has been assessed as having low ecological value (**Table 16**).



Figure 8. River Berm habitat unit

Table 15. Plant species observed in the River Berm Habitat unit

Common Name	Latin Name	Biostatus	Wetland Indicator Status
Hemlock	<i>Conium maculatum</i>	Exotic	FAC
Tall fescue	<i>Lolium arundinaceum</i>	Exotic	FAC
Cocksfoot	<i>Dactylis glomerata</i>	Exotic	FACU
Broad-leaved fleabane	<i>Erigeron sumatrensis</i>	Exotic	FACU
Narrow-leaved plantain	<i>Plantago lanceolata</i>	Exotic	FACU
White clover	<i>Trifolium repens</i>	Exotic	FACU
Creeping bent	<i>Agrostis stolonifera</i>	Exotic	FACW
Crack willow	<i>Salix x fragilis</i>	Exotic	FACW
Prairie grass	<i>Bromus catharticus</i>	Exotic	UPL
Red clover	<i>Trifolium pratense</i>	Exotic	FACU
Perennial ryegrass	<i>Lolium perenne</i>	Exotic	FACU
Broad leaved plantain	<i>Plantago major</i>	Exotic	FACU



Table 16. River Berm assessment of ecological value

Matter	Value	Reasons
Representativeness	Low	Exotic herb and grass dominated. No indigenous plant species observed. Modified landform but still forms part of floodplain.
Rarity/distinctiveness	Low	Not known to support any rare or threatened species but common native birds tolerant to mammalian predators may utilise this area.
Diversity and Pattern	Low	Plant diversity is exotic-dominated and unlikely to provide any substantial habitat for native fauna. Predation pressure from mammalian predators including cats (observed) is likely high.
Ecological Context	Low	The river berm forms part of the riparian corridor and connects to the larger river system. But is surrounded by modified landscape and is constrained by stop bank.
Overall Score	Low	<i>Low for all matters. Limited ecological value other than as a local habitat for tolerant native species.</i>

Aquatic Ecology and Fish Passage

Freshwater fish

The Pākōwhai Pump Station sits at the terminal point of a drainage network that lies between the lower reaches of the Tūtaekurī and Ngaruroro Rivers, with the discharge entering near the upper tidal limit of the Ngaruroro River. This means the freshwater fish community expected to occur in the vicinity of the Pump Station outfall is representative of a typical lowland river system.

There are 8 native fish species modelled⁸ to have a likelihood of “Possibly” or higher for the stream segment that the Pump Station is situated on (**Table 17**). There were 4 native species and rainbow trout recorded in eDNA sampling on the mainstem of the Ngaruroro River at Chesterhope Bridge. An assessment of the native fish community for the lower Ngaruroro River identified at least 16 native species, along with rainbow trout and brown trout, using this area for at least some part of their life cycle⁹. The records and modelling support confirm that a

⁸ <https://www.hbrc.govt.nz/environment/biodiversity/native-fish-in-hawkes-bay/>

⁹ Holmes, R. 2019. Relative Value of the Lower Ngaruroro River Native Fish Community. Cawthron Report No. 3089. Prepared for Hawke's Bay Regional Council.



large suite of native and other valued fish species occur in the vicinity of the Pump Station discharge, and many of these are likely to utilise the habitat upstream of the Pump Station.

The observed or expected native species include two threatened species (īnanga and lamprey) and 5 At Risk species including longfin eel.

Table 17. Freshwater fish species recorded or predicted to occur in or near the project area

Common Name	Latin Name	Biostatus and life history	Recorded nearby in NZFFDB/eDNA?	FENZ Likelihood for	Threat status
Black flounder	<i>Rhombosolea retiaris</i>	Native marine wanderer	NZFFDB: No eDNA: No	Possibly	Not Threatened
Common bully	<i>Gobiomorphus cotidianus</i>	Native migratory	NZFFDB: Yes eDNA: Yes	Likely	Not Threatened
Common smelt	<i>Retropinna retropinna</i>	Native migratory	NZFFDB: Yes eDNA: No	Possibly	Not Threatened
Giant bully	<i>Gobiomorphus gobioides</i>	Native migratory	NZFFDB: Yes eDNA: No	Likely	At Risk – Naturally Uncommon
Redfin bully	<i>Gobiomorphus huttoni</i>	Native migratory	NZFFDB: No eDNA: Yes	Not expected	At Risk – Naturally Uncommon
Torrentfish	<i>Cheimarrichthys fosteri</i>	Native migratory	NZFFDB: No eDNA: Yes	Not expected	At Risk – Naturally Uncommon
īnanga	<i>Galaxias maculatus</i>	Native migratory	NZFFDB: Yes eDNA: No	Possibly	Threatened – Nationally Vulnerable
Longfin eel	<i>Anguilla dieffenbachii</i>	Native migratory	NZFFDB: Yes eDNA: Yes	Likely	At Risk – Declining
Shortfin eel	<i>Anguilla australis</i>	Native migratory	NZFFDB: Yes eDNA: No	Highly Likely	Not Threatened
Yellow eye mullet	<i>Aldrichetta forsteri</i>	Native marine wanderer	NZFFDB: Yes eDNA: No	Not modelled	Not Threatened
Mosquitofish	<i>Gambusia affinis</i>	Exotic	NZFFDB: Yes eDNA: No	Likely	Introduced and naturalised
Banded kokopu	<i>Galaxias fasciatus</i>	Native migratory	NZFFDB: No eDNA: No	Possibly	At Risk: Naturally Uncommon



Goldfish	<i>Carassius auratus</i>	Exotic	NZFFDB: No eDNA: Yes	Likely	Introduced and naturalised
Rainbow Trout	<i>Oncorhynchus mykiss</i>	Exotic	NZFFDB: No eDNA: Yes	Not expected	Introduced and naturalised
Lamprey	<i>Geotria australis</i>	Native migratory	NZFFDB: Yes eDNA: No	Not modelled	Threatened – Nationally Vulnerable

Fish passage

There is no fish passage provided through the existing pump station infrastructure (i.e. discharge pipes). There is a secondary gravity flow outlet that provides greater opportunity for fish passage. Because it is fitted with a conventional flap gate (**Figure 9**), however, it will be effectively closed when the ambient Ngaruroro River is higher than the water level on the upstream side of the stopbank. Unless there is debris or other material preventing the flap gate from closing completely. Either way, the lack of a purpose-designed fish-friendly flap gate is likely to at least partially restrict fish passage through the current gravity outlet.

The fish community that occurs upstream of the existing pump station may therefore be less diverse or of a lower abundance than what is downstream.

Extent of upstream habitat

Given the strongly migratory (diadromous) nature of the fish community in the lowland riverine environment, it is appropriate to characterise the potential fishery values upstream of the Pump Station, because the site provides a conduit (or bottleneck) to potential fish habitat. The extent of this fish passage value can be estimated in terms of the extent and quality of freshwater habitat that exists upstream.

A map outlining the extent of upstream waterway network isolated by the Pump Station is provided in **Figure 10**. An initial desktop assessment estimates the area of aquatic habitat at approximately 1 Ha. This estimate is based on assigning different widths to different lengths of the network and is provided to help understand the scale of beneficial effect from improving fish passage. Field measurements undertaken in summer would provide both a more precise estimate of this aquatic habitat and confirm what stream segments provide permanent versus intermittent aquatic habitat.



Figure 9. Gravity outflow upstream of Pākōwhai Pump Station. Top, the inlet side of the gravity flow bypass flowing to the right of image, with the existing Pump Station in background. Bottom, outlet side of gravity bypass, with conventional flap gate shut due to ambient river level.

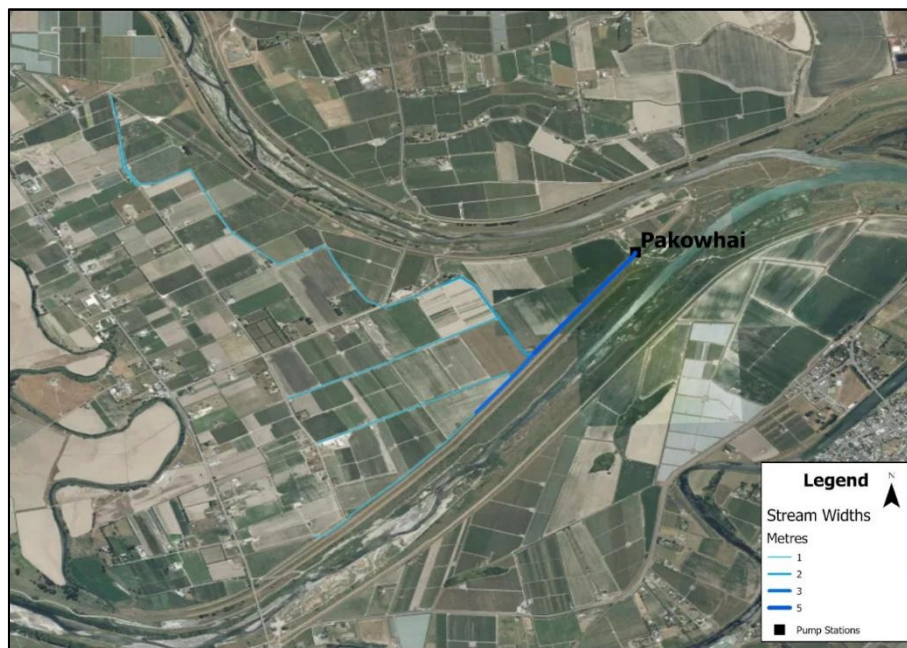


Figure 10. Extent of freshwater habitat upstream of the Pākōwhai Pump Station

Significant Natural Inland Wetland Values

The areas within and immediately surrounding the Pākōwhai Pump Station works footprint were assessed for features that met the definition for inland wetland. No inland wetland features were observed.

5. PROTECTED WILDLIFE

Lizards

No lizards were observed during the Diurnal Search undertaken for this project.

There was 1 record of a native lizard within a 5km radius of the Pākōwhai Pump Station on iNaturalist, a Raukawa gecko detected approximately 5km away towards Haumoana. There were also a number of records for Northern Spotted Skink (*Oligosoma kokowai*) and Northern Grass Skink (*Oligosoma polychroma*) within 5km of the site in the DoC herpetological database (**Figure 11**).

Northern spotted skink is classified as At Risk: Uncommon nationally, but it is only known to occur in this one location in Hawke's Bay, and so the Napier population is therefore of very high regional significance. The population, however, is located on the opposite side of the State Highway and on the other side of two major rivers, which form substantial barriers to movement. The population is understood to be highly localised in extent. Given this separation and the absence of suitable dispersal pathways or habitat connectivity between the known population and the project site, it is considered unlikely that any Northern Spotted



Skinks would occur within the project site. Accordingly, the risk of effects from this proposal on this regionally significant northern spotted skink population is assessed as negligible.

Nearby records for Northern Grass Skink are from the same Napier foreshore area, and this species is more likely to occur near the project footprint. The Pakohwai Pump Station site and immediate surrounds provide relatively poor-quality habitat, however, and are considered to have a low likelihood of supporting any native lizards due to:

- Extensive site modification;
- Regular disturbance and maintenance;
- A lack of suitable habitat structures providing long term refuge;
- Isolation from any known populations with anything higher than a very low density of lizards; and
- Inundation and sediment deposition during Cyclone Gabrielle.

Although areas of long grass are present within and adjacent to the site, the habitat lacks the structural elements required to provide safe, long-term refuge for native lizards. In particular, there is an absence of long-standing habitat features typically required to support sustained lizard occupancy, such as large or complex woody debris accumulations, rock piles of cobble size or larger, or extensive anthropogenic debris (e.g. stacked concrete, rubble, or similar materials). Rank grass in the area would provide cover and foraging habitat but would not provide secure refugia. Debris piles that may provide secure refugia tend to be transitional in the project footprint as part of ongoing site maintenance and clean up. For example, debris piles that were present in the wasteland habitat at the time of survey were recent accumulations of flood debris that have since been cleared from the site.

Long grass without structural elements provides limited and transient cover but offers poor protection from land-based predation, temperature extremes, and disturbance, particularly in an exposed, low-lying environment. In the absence of stable refuge structures that offer secure shelter and overwintering opportunities, the site is considered unlikely to support resident lizard populations over the long term.

As such, the potential lizard habitat within the project footprint has been assessed to be of low value for lizards, and the likelihood of lizards being present within the site is similarly low.

Birds

The lower Ngaruroro River is recognised as being of high avifauna value and supports nationally significant populations of indigenous riverbed birds. A region-wide survey of the Tūtaekurī, Ngaruroro and Tukituki Rivers in 2019 recorded 62 bird species, including 39 native or endemic species, with the Ngaruroro River providing important breeding habitat for indigenous shorebirds such as banded dotterel, black-fronted dotterel and South Island pied oystercatcher¹⁰. This aligns the very high diversity of bird species ($n = 43$) that was reported from the Ngaruroro River in a compilation of observations made from the 1960s through to

¹⁰ McArthur, N., Hashiba, K. and Lees, D. 2020. State and trends in the abundance and distribution of riverbed-nesting shorebirds on the Tutaekuri, Ngaruroro and Tukituki Rivers. Client report prepared for Hawke's Bay Regional Council, Napier.



the 1980s¹¹, indicating a persistence of bird values being supported by the broader landscape. In particular, the braided reaches of the lower Ngaruroro River are recognised as being of regional and national significance for the wildlife values they support and form part of a regional Outstanding Water Body that was recognised for its habitat values for native aquatic birds, including banded dotterel and black-fronted dotterel.

Notable species known to utilise the wider Ngaruroro River corridor that may also use adjacent habitats include the banded dotterel (At Risk – Declining), black-fronted dotterel (At Risk – Naturally Uncommon), black-billed gull (At Risk – Declining), white heron (Threatened – Nationally Critical) and Australasian bittern (Threatened – Nationally Critical). These species are primarily associated with braided river, riparian, wetland and estuarine habitats, but may also utilise nearby waterways, drains and backwater environments for foraging and movement.

The diversity of bird species evident within the wider Ngaruroro River corridor is likely to be represented in the broader area surrounding the Pākōwhai Pump Station. However, the project footprint is located within an existing operational pump station and associated hardstand area situated within a highly modified backwater environment that is largely separated from the active braided river channel. Consequently, opportunities for nesting, roosting or regular use by indigenous bird species within the works footprint are limited. While temporary disturbance (e.g. noise and vibration) may occur during construction, particularly if works are undertaken during the breeding season, these effects would primarily relate to discouraging incidental use of the immediate area for nesting. Given the availability of more suitable habitat within the adjacent Ngaruroro River corridor and surrounding waterways, no specific bird management measures are considered necessary beyond standard site establishment and ecological management measures incorporated into the Ecology Management Plan to deter birds from nesting in the immediate footprint in the lead up to construction activities commencing.

Bats

Bat roosting habitat is absent within the Pākōwhai pump station footprint and is absent from the vicinity of the associated infrastructure and discharge locations. The site contains no mature trees, structures, or vegetation suitable for roosting. Based on habitat characteristics and regional survey information, bats are considered highly unlikely to utilise this site or be affected by the proposed works. The bat values for this site are therefore considered Very Low.

¹¹ Parrish, G.R. 1988. Wildlife and Wildlife Habitat of Hawke's Bay Rivers. Science and Research Series No. 2. Science & Research Directorate, Department of Conservation, Wellington.

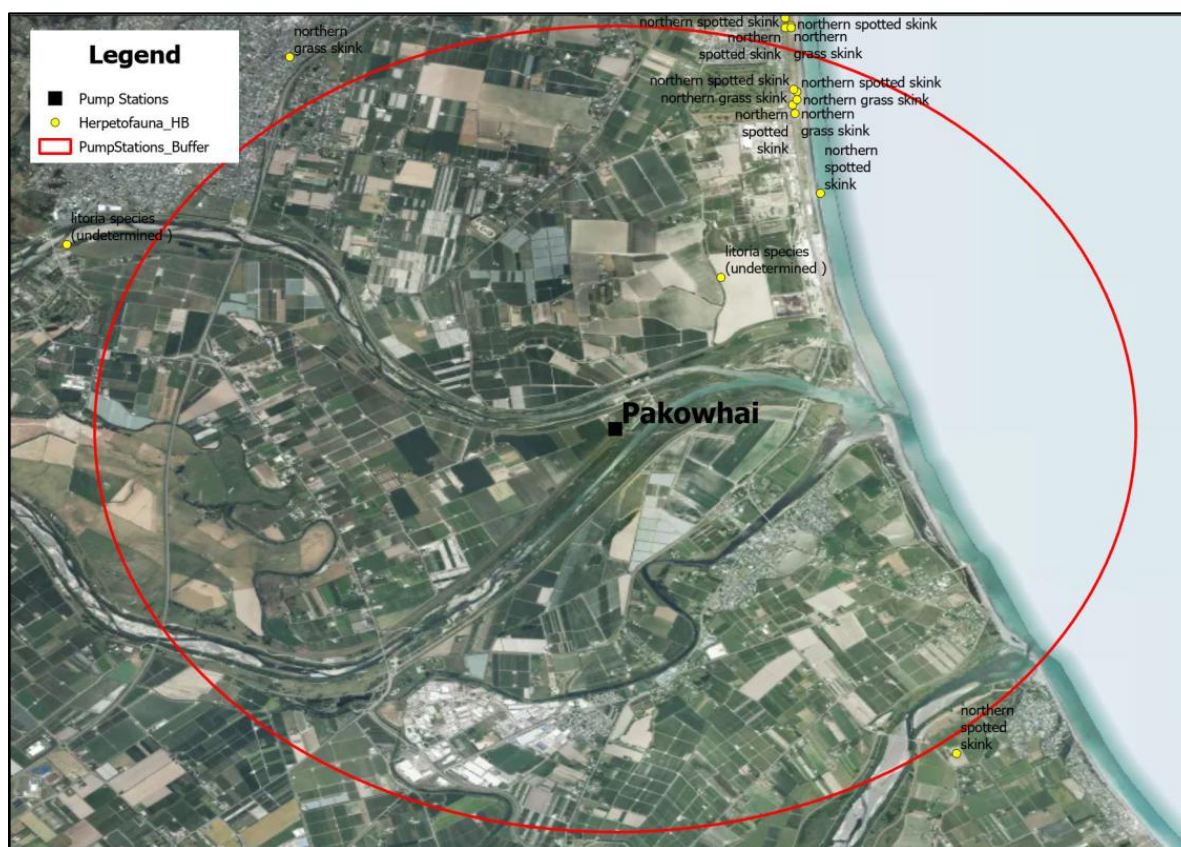


Figure 11. Lizard and amphibian records from the DoC Herpetological Database. Red circle represents 5km radius around the Pākōwhai Pump Station.

6. THE PROPOSAL

The Pākōwhai Pump Station upgrade includes replacement and upgrade of existing pump station components, modifications to associated drainage infrastructure, and site works required to enable installation of new equipment and improve operational reliability and flood resilience.

The proposed works will involve a range of construction activities within and immediately adjacent to the existing pump station footprint, as well as within the adjacent stopbank and river margin. Key activities include site establishment (including temporary hardstand, access routes, and laydown areas), excavation and earthworks, installation of temporary works required to facilitate below-ground construction, dewatering of excavations, construction of new pump station infrastructure, and installation of discharge pipelines through the existing stopbank. Works will also include removal or modification of existing infrastructure and reinstatement of disturbed areas following completion. The existing pump station will remain operational throughout construction to maintain flood protection capacity.



Construction will be undertaken in a staged manner, with peak disturbance occurring during initial site establishment, excavation, pipeline installation, and construction of the new discharge structures.

Construction activities have the potential to result in disturbance to terrestrial and aquatic habitats in the immediate vicinity. This includes vegetation clearance, ground disturbance, and localised modification of drainage and river margin environments. Works undertaken in and around waterways may result in temporary increases in sediment mobilisation, turbidity, and changes to local water quality. Dewatering activities will also generate temporary discharges that require management to avoid adverse effects on receiving environments. There is also potential for disturbance associated with the handling of contaminated soils or sediments and the movement of machinery within and near aquatic habitats. However, these effects can be managed through implementation of standard and project-specific erosion and sediment control measures, dewatering management, and other controls set out in the Construction Environmental Management Plan (**CEMP**).

Once operational, the upgraded pump station will continue to function as part of the managed drainage network, regulating water levels within the surrounding low-lying landscape. The operational environment within the pump station footprint will remain a highly modified, infrastructure-dominated system, with ongoing maintenance activities, periodic disturbance, and limited opportunity for the development of natural habitat features. From an ecological effects perspective, the long-term operation within the site footprint is therefore largely equivalent to the status quo.

Although the site footprint will be similar to the existing situation, the design and operation of the upgraded facility include several improvements from a fish passage perspective. The proposal includes replacement of the existing pumps with purpose-designed fish-friendly submersible pumps (Bosman Vision series). These pumps incorporate a low-speed single-blade impeller and less obstructed internal flow paths that are intended to reduce the risk of injury and mortality to fish passing through the pumping system.

The Bosman pumps have been independently tested under European standards. While these standards provide a consistent methodology for quantifying fish injury and mortality, they have not been validated for New Zealand fish species and do not prescribe thresholds for defining a pump as "fish friendly". Consequently, some uncertainty remains regarding performance under local conditions. Nevertheless, the proposed pumps are expected to represent an improvement over conventional flood pumping infrastructure.

In addition to improving downstream passage conditions, the proposal also provides for upstream fish passage. The existing gravity outlet through the stopbank will be retained and modified to facilitate fish movement between the Ngaruroro River and the upstream drainage network. Detailed design of the proposed fish passage provisions has not yet been completed, and the final configuration will be confirmed during subsequent design phases. For the purposes of this assessment, it has been assumed that the fish passage design will function as intended, resulting in an improvement in upstream fish passage and aquatic connectivity relative to the current situation. This will maintain and enhance aquatic



connectivity across the pump station structure and enable continued access to upstream habitat for migratory fish species.

While no pumping system can completely eliminate risks to fish, the combination of fish-friendly pumps and provision of upstream fish passage represents a material improvement over the existing situation. Accordingly, the proposal is expected to improve both upstream and downstream fish passage outcomes while maintaining the flood protection and drainage functions of the pump station.

Level of Effects

The expected magnitude of effects from the above activities were compared to ecological values identified earlier, and the level of effect was calculated according to **Table 3** (repeated here as **Table 18** for ease of reference) for each of the habitat units and wildlife groups.

Table 18. Ecological impact assessment level of effects.

Level of Effect		Current Ecological Value				
		Very High	High	Moderate	Low	Negligible
Magnitude of effect from activity	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

Habitat Units

Stopbank

This habitat unit has a current ecological value of Negligible. The proposed activity will involve construction works within an already highly modified stopbank environment dominated by maintained exotic grasses and associated infrastructure. While construction will temporarily disturb or remove existing vegetation within the immediate footprint, the affected habitat is of very low complexity, is routinely maintained, and will be reinstated to a similar low-value condition following completion of the works. In that context, the expected magnitude of effect is Low. Based on the current ecological value of Negligible, the resulting level of effect is Very Low.



Stream and Riparian

The stream and riparian margin habitat unit has a current ecological value of Moderate in terrestrial terms, noting its role in providing aquatic connectivity within the wider drainage and tidal system. The proposal will involve localised disturbance to part of this habitat through site establishment, excavation, outfall works, and associated construction activity adjacent to the channel margins. These activities will temporarily alter portions of the immediate margin and create short-term disturbance, but the affected habitat is already narrow, exotic-dominated and highly modified. Assuming that erosion and sediment control, dewatering management, and general construction environmental controls are appropriately implemented, the mitigated magnitude of effect on the riparian margin habitat itself is expected to be moderate. Based on a current ecological value of Moderate, the resulting level of effect is therefore Moderate.

River and riparian

The river and riparian habitat unit has a current ecological value of High, reflecting its connection to the broader Ngaruroro River, its role in supporting migratory fish and its potential value for aquatic bird species. The proposal has the greatest potential to affect this habitat unit through temporary construction disturbance associated with cofferdam installation, dewatering, outfall construction, riprap placement, machinery movement, and short-term reductions in local water quality if sediment is mobilised. However, the area directly affected is localised relative to the broader habitat unit, the disturbance is temporary, and the works occur in an already modified edge environment associated with an existing pump station discharge point. Assuming standard and project-specific controls are implemented, the mitigated magnitude of effect is assessed here as Moderate. Against a current ecological value of High, **Table 19** indicates that the corresponding level of effect is High (but temporary).

Wasteland

The wasteland habitat unit has a current ecological value of Negligible. It comprises hardstand, compacted surfaces, bare ground and other highly disturbed areas with little ecological function beyond transient use by highly mobile and disturbance-tolerant species. The proposal will disturb these areas further during construction, but this will not materially alter ecological values because those values are already extremely limited. The expected magnitude of effect is therefore Negligible to Low. Adopting the more conservative Low magnitude still results in a Very Low level of effect when applied to a habitat unit of Negligible ecological value.

River berm

The river berm habitat unit has a current ecological value of Low. Although it is dominated by rank exotic grassland and has limited structural diversity, it does provide some local habitat for common native fauna and forms part of the wider river berm and floodplain context. Construction activity has the potential to temporarily remove or disturb portions of this habitat through access, laydown, machinery operation, earthworks and reinstatement. However, the habitat is already highly modified, exotic-dominated, and subject to periodic natural and anthropogenic disturbance. The expected magnitude of effect is therefore expected to be



Low. On the basis of a Low current ecological value and Low magnitude of effect, the resulting level of effect is Very Low.

Stream berm

The stream berm habitat unit has a current ecological value of Negligible. It is a repeatedly disturbed pasture environment with high prevalence of weeds and very low habitat complexity with negligible ecological function. Construction effects within this unit will be confined to further temporary disturbance of an already artificial and recently modified habitat type. The expected magnitude of effect is therefore Low, noting that the habitat can be readily reinstated to an equivalent condition. When compared with a current ecological value of Negligible, the resulting level of effect is Very Low.

Fish

The aquatic environment associated with the pump station discharge supports a fish community of High ecological value, due to its connectivity to the Ngaruroro River, the presence of taonga species, and the presence of at-risk or threatened freshwater species including īnanga.

The proposed activity is expected to result in an improved fish passage outcome, whereby upstream passage to approximately 1 Ha of aquatic habitat is improved, and the replacement of the existing pumps with purpose-designed fish-friendly pumps is expected to reduce the risk of injury or mortality to downstream-migrating fish, relative to the current situation. This equates to a clear Net Positive outcome for the project on fish values.

Wetlands

No inland wetland features were observed.

Lizards

Native lizards are considered unlikely to occur within the project site due to the limited availability of suitable habitat, and as such, the risk of harm to, and level of effect on, lizards is assessed as low. However, where areas of rank grass are present, or if any piles of debris remain on site for an extended period (e.g. weeks), there remains a small potential for transient individuals to occur. As a precautionary measure, any low risk to lizards from this activity can be further reduced through the implementation of 'soft clearing' techniques, whereby rank grass is progressively mown or trimmed, and where debris piles are carefully moved out of the way, in advance of any more impactful construction works. This approach encourages any lizards present to disperse from the works area prior to ground disturbance, and the adoption of soft clearance techniques in the construction methods would further minimise any risk to native lizards. Accordingly, if soft clearing measures are undertaken as prescribed, the expected mitigated magnitude of effect on lizards is Negligible to Low, with a resulting level of effect of Very Low.



Birds

The primary ecological risk to birds would be disturbance from any major construction noise and vibration during construction, rather than habitat loss.

Bird species are known to utilise the wider Ngaruroro River and riparian corridor, but nesting and roosting opportunities are limited within the works footprint itself, and the main risk is temporary disturbance to proximal habitats during construction rather than direct disturbance or habitat loss. The current ecological value of bird habitat within the immediate works footprint is assessed here as Low, notwithstanding the much higher avifauna values of the broader river system outside the primary construction footprint. Vegetation clearance, machinery movement, noise and human activity may cause temporary disturbance to bird species using the site or immediate surrounds, particularly if works overlap with nesting periods.

If vegetation clearance on the river side of the stopbank can avoid the September to January period, the expected magnitude of effect would be Low and result in an overall level of effect of Very Low. If this period cannot be avoided, standard site establishment works can be undertaken to help avoid occupation of the work site and ensure suitable buffer zones.

Bats

Bat roosting habitat is absent from the pump station footprint and bats are considered highly unlikely to be affected by the proposed works. On that basis, the current ecological value of the site for bats is characterised as Negligible. Because there are no mature trees or structures suitable for roosting within the footprint, and no identified bat habitat features will be removed, the expected magnitude of effect is Negligible. This equates to a Very Low level of effect on bats.

7. SUMMARY OF ECOLOGICAL EFFECTS

With appropriate management, the proposed works are expected to have only a Very Low or Low mitigated level of effect on the following ecological features: Stopbank, Wasteland, River Berm, Lizards, Birds and Bats. Effects on wetlands are not applicable.

The proposal is expected to have a temporary mitigated level of effect of High on the River and Riparian habitat unit, and Moderate for the Stream and Riparian habitat unit.

A relatively modest package of riparian planting along 50-100m lengths of the inlet and outlet channels of the Pump station would convert these residual effects into net gains for ecological values in the affected habitat units – with the location and design of planting being subject to operational requirements of the Flood Protection Scheme. This aligns with the ecological principles to obtain net positive outcomes and is consistent with the recommendations of the CIA.



The current proposal is expected to create opportunities for Net Gain and contribute to Net Positive outcomes for Fish, due to the installation of Pump Station infrastructure that is expected to be fish friendly, and improvements to the fish passage provided at the gravity outflow.

See **Table 19** for the full summary.

Table 19. Summary of ecological values and levels of effect

Habitat Unit	Current Ecological Value	Magnitude of Effect	Mitigated Level of Effect
Stopbank	Negligible	Low	Very Low
Stream and Riparian	Moderate	Moderate	Moderate (temporary)
River and Riparian	High	Moderate	High (temporary)
Wasteland	Negligible	Low	Very Low
River Berm	Low	Low	Very Low
Stream Berm	Negligible	Low	Very Low
Fish	High	Positive	Net Gain
Wetlands	N/A	N/A	N/A
Lizards	Low	Very Low	Very Low
Birds	Low	Low	Very Low
Bats	Negligible	Negligible	Very Low

8. RECOMMENDED MONITORING

The fish-friendly pump technology has not previously been tested in New Zealand settings so post-construction monitoring will help verify pump performance and fish passage objectives and enable appropriate responses as part of ongoing management of the asset.

The monitoring programme should be developed following completion of detailed design and commissioning of the facility, and may include a combination of fish surveys, fish passage assessments, operational inspections, or other appropriate methods. Monitoring results should be reviewed by a suitably qualified freshwater ecologist and cultural monitors. Recommendations can then be made and considered as part of the long-term management of the site and asset.

9. SUMMARY AND CONCLUSIONS

The project footprint is located within a highly modified floodplain environment, with the majority of terrestrial habitats assessed as having Low-Negligible ecological value. These areas are dominated by exotic vegetation, engineered landforms, and ongoing



disturbance, and provide limited habitat for indigenous species. As a result, ecological effects associated with construction and reinstatement within these habitats are expected to be Low or Very Low.

Higher ecological values are associated with the backwater receiving environment connected to the Ngaruroro River, and with the fish communities it supports. These values are locally important but occur within a system that is already modified and influenced by the existing pump station.

The proposal is expected to improve outcomes for fish values due to both improvements to upstream fish passage and adoption of fish friendly Pump Station technology.

Currently, construction activities would have High and Moderate effects on the River and Riparian and Stream and Riparian habitat units, respectively. These effects would be temporary and would become Net Gains with the recommended riparian planting.

Overall, the proposal is expected to result in no more than minor effects in the long term, with Net Positive outcomes being achieved for Fish values.