



# Blackpool Stormwater Improvements Stage One

## Ecological Impact Assessment

Prepared for Auckland Council

Prepared by Beca Limited

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## Revision History

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1	Kimberley DSouza	Draft for Client Review	29/10/2024
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## Document Acceptance

Action	Name	Signed	Date
Prepared by	Kimberley DSouza		31/10/2024
	Kendall Leitch		9/05/2025
Reviewed by	Connor Whiteley		23/10/2024
	Claire Webb		9/05/2025
Approved by	Jenny Vince		09/05/25
on behalf of	Beca Limited		

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## Executive Summary

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Beca Limited has been engaged by Auckland Council Healthy Waters to prepare an Ecological Impact Assessment to support a resource consent application for the Blackpool Stormwater Improvements Stage 1.

The stormwater network comprises several open water channels within the Blackpool area on Waiheke Island. These channels have been modified (straightened and deepened) but are located within natural flow pathways, that retain natural meandering characteristics that flow through residential housing, under several culverts, before discharging into Huruhi Bay/ Blackpool Beach.

The proposed works involves improving the existing stormwater network by widening and deepening existing stream channels, installing several box culverts into the channel, removing 35 trees, and replanting the banks with suitable riparian vegetation.

The key potential ecological effects requiring management include:

- Injury/mortality to native fauna during construction phase works
- Loss of terrestrial habitat.
- Degradation of aquatic habitat quality from potential sediment runoff.
- Loss of wetland vegetation.

Appropriate management measures have been recommended within this report to address the above ecological effects. These recommendations include:

- The development and implementation of a Fish Management Plan by a suitably qualified and experienced ecologist to manage the potential injury / mortality to native fish.
- Tree removal undertaken outside of the bird nesting season (primarily for fantails – August to March). If this is unavoidable, bird nest checks should be undertaken by a suitably qualified and experienced person to identify for bird nests within any of the trees being cleared.
- Replanting of the riparian margins across all the channels is already proposed and will be undertaken following works completion.

With these in place, the overall ecological effects of the works are assessed as **Very Low**. Furthermore, the replanting efforts are expected to enhance habitat values for both native birds and fish and increase indigenous dominance, in an otherwise modified, low density urban landscape.

# 1 Introduction

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Beca Limited (Beca) has been engaged by Auckland Council Healthy Waters (ACHW) to prepare an Ecological Impact Assessment (EclA) to support the resource consent application for the Blackpool Stormwater Improvements Stage 1.

The proposed works involves the improving the existing stormwater network in the Blackpool area, on Waiheke Island, by widening and deepening existing stream channels, installing several box culverts into the channel, tree removal, and replanting the banks with suitable riparian vegetation.

## 1.1 Scope and Purpose

The purpose of this EclA is to quantify the values of the ecological features and species within the proposed works area and zone of influence (ZOI), and to determine the types and level of ecological effects arising from the construction works.

The scope of this report includes:

- To assess the existing ecological features and values.
- A desk-based review of fauna databases, aerial imagery, and existing available information about the site.
- An assessment of the ecological values and effects as well as recommended management activities in general accordance with the Environment Institute of Australia and New Zealand (EIANZ) – Ecological Impact Assessment Guidelines (Roper-Lindsay et al., 2018).

Beca has previously undertaken wetland and watercourse delineation surveys at the site on 17<sup>th</sup> May 2024. Beca subsequently prepared a Wetland and Watercourse Assessment for ACHW<sup>1</sup>, which is attached as Appendix 1 of this report. Given this, no field surveys were undertaken as part of the scope of the EclA.

## 1.2 Statutory Context

### 1.2.1 Ecologically Relevant Policy and Provisions

The site is subject to limited ecologically relevant zones, overlays, and controls under the Auckland Unitary Plan: Operative in Part (AUP:OP) or the Auckland Council District Plan – Hauraki Gulf Islands (ACDP:HGI)<sup>2</sup>. In preparing this EclA the main overlays of relevance are the catchment and hydrology layers, particularly the rivers and permanent streams overlay and the overland flow paths overlay. It is noted that the site is not subject to any Significant Ecological Areas (SEAs).

Protection of native species under the Wildlife Act 1953 and Conservation (Indigenous Freshwater Fish) Amendment Act 2019 has been considered and advice has been provided to ACHW. However, matters relating to these Acts are considered out of scope. Furthermore, consideration has also been given to policy directives within the New Zealand Coastal Plan (NZCPS, 2010), particularly regarding Policy 11, which pertains to New Zealand's biological diversity.

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<sup>1</sup> Beca Limited. (2024). Blackpool Stormwater Improvements: Wetland and Watercourse Assessment. Prepared for Auckland Council Healthy Waters.

<sup>2</sup> Refer to the Blackpool Stormwater Improvements - Assessment of Effects on the Environment Report (Beca 2024) for further details.

## 1.2.2 Consenting Triggers

This EcIA has been prepared to inform the relevant consenting triggers under the AUP:OP, the ACDP:HGI, and the National Environmental Standards for Freshwater (NES-F, 2020). A full description of the consenting triggers is set out in the AEE<sup>3</sup>. Ecologically relevant triggers are summarised below:

### Auckland Council Unitary Plan Operative in Part (AUP:OP)

- E3.4.1 (A1) - The widening of the floodplain stream channel at 36 Tui Street is a **Discretionary Activity**.
- E26.3.3.1 (A77) - The removal of two trees that are over 6 m tall, which is located within the riparian zone and coastal area is a **Restricted Discretionary Activity**.

### Auckland Council District Plan – Hauraki Gulf Islands Section (ACDP:HGI)

- Development Control 10c.5.1.1 - Indigenous vegetation alteration / removal is a **Permitted** activity for the works within trees less than 3 m tall.
- Development Control 10c.5.1.2 - Indigenous vegetation alteration / removal is a **Restricted Discretionary** activity for the works within trees greater than 3 m tall and removal of 5 native trees.
- Development Control 10c.5.2.2 - Indigenous vegetation removal is a **Restricted Discretionary** activity for the removal of 11 native trees within the road reserve that are greater than 3 m tall.
- Development Control 10c.3.1 – The proposed works require 3,600m<sup>3</sup> of earthworks over an area of 5,500m<sup>2</sup>, which will be undertaken within the coastal, wetland and waterbody yards and this is a **Discretionary** activity.

### National Environmental Standards for Freshwater (NES-F)

- Regulation 70(2) – the placement of culverts in the bed of a stream complies with Regulation 70(2), so are a **Permitted** activity.
- Regulation 45 – earthworks within 10 m of a natural inland wetland is a **Discretionary** activity.

## 1.3 Project Overview

### 1.3.1 Site Location

The proposed works will be undertaken in the suburb of Blackpool on Waiheke Island, with Stage 1 taking place across Tui Street, Nikau Road, and Moa Avenue (referred collectively as “works area”) (Figure 1). The majority of the improvement works are occurring within natural streams that have been modified into stormwater drainage channels. The stormwater network discharges into the coastal environment at Blackpool Beach.

The works area is largely flat and gently slopes southwards towards Blackpool Beach. The surrounding area is low density urban, with residential dwellings and holiday houses as well as several public recreational areas including Blackpool Cemetery Reserve, Blackpool Park, and the Te Hurui Bay Reserve. There are almost no remnant native vegetation ecosystems within the Blackpool area itself, however west of the site are several large areas of remnant native bush including kānuka scrub / forest (VS2), kauri podocarp and broadleaved forest (WF11), pōhutukawa pūriri broadleaved forest (WF4) which are dominant.

<sup>3</sup> Refer to the Blackpool Stormwater Improvements - Assessment of Effects on the Environment Report (Beca 2024) for further details



Figure 1. Overview of the Stage 1 works area (outlined in red), in relation to nearby streets and the wider context of the catchment.

### 1.3.2 Summary of Project

The proposed works are understood to involve improving the existing stormwater network along Tui Street, Nikau Road, and Moa Avenue and includes:

- Lowering/widening the floodplain and reducing the slope of several existing open waterways (streams and artificial drains) – to increase capacity to convey flood flows.
- Replacement and installation of new underground stormwater pipes (ranging from 300-1800mm in diameter) and associated manholes (ranging from 1200-1800mm diameter).
- Upgrade of existing culverts/pipes with precast box culverts at vehicle accesses points. Sizes will vary in length between 6 m and 12 m, with 1 m height. All culverts will meet the relevant NES-F (2020) requirements, with the exception of the culverts adjacent to Tui Street and Moa Avenue as they do not meet requirements for 25% embedment (discussed further in 4.4.2).
- Upgrade of existing culverts/pipes beneath roads, including a concrete box culvert below Nikau Road (3 m wide by 1.5 m high), and a precast box culvert below Rata Street where it intersects with Tui Street (3m wide and 1.5m high). All culverts will meet the relevant NES-F (2020) requirements, with the exception of the culvert beneath Rata Street as will not meet requirements for 25% embedment (discussed further in 4.4.2).
- Grouting and abandonment of existing stormwater assets and removal of assets where they clash with new works.
- Relocation of existing power poles to the edge of new channels.
- Benching of the existing permanent stream at Tui Street to form a wetland bench.
- Replacement of the pedestrian bridge over the stormwater channel with a box culvert (to match existing) outside 32 Tui Street. All culverts will meet the relevant NES-F (2020) conditions.
- Removal of approximately 35 trees or tree groups (both within the road corridor and in private property) ranging from approximately 1 m to 7 m in height. Of this, two trees exceed 6 m height and require resource consent.
- Replacement / conservation planting is proposed within the scope of works. The extent of this has not yet been defined.

Overall, works are required within artificial drains, intermittent and permanent watercourses, and riverine wetlands.

Refer to the Blackpool SW Improvement Stage 1 design drawings<sup>4</sup> and Stage 1 Construction Methodology<sup>5</sup> for further details.

### 1.3.3 Construction Methodology

A preliminary construction methodology has been prepared<sup>6</sup> and is summarised below in relation to instream works and tree removal:

<sup>4</sup> Auckland Council. (2024). Blackpool Stormwater Improvements Stage 1 – Design Drawings.

<sup>5</sup> Auckland Council. (2024). Blackpool Stormwater Improvements Stage 1 – (Preliminary) Construction Methodology.

<sup>6</sup> Auckland Council. (2024). Blackpool Stormwater Improvements Stage 1 – (Preliminary) Construction Methodology.

- Instream works to upgrade/install culverts, lower floodplains, and widen channels will require open channels to be isolated. This is proposed to be undertaken through bunding off open channels with sandbags and diverting water through a nova coil pipe.
- Watercourse excavations are proposed to be undertaken with a digger, with spoil material taken offsite.
- Approximately 35 trees will be removed. This comprises some native species including pōhutukawa (*Metrosideros excelsa*, *M. collenoi*, and *M. kermadecensis*), cabbage tree (*Cordyline australis*), nikau (*Rhopalostylis sapida*), and karo (*Pittosporum classifolium*), with a majority of the trees being exotic species including ornamental fruit trees. A full list of tree removal is outlined within the Project's Arboricultural Report<sup>7</sup>.

The programme for the entirety of Stage 1, excluding revegetation planting, is estimated to take a total of 12 months. Works within the open waterways will be staged and are anticipated to take between 2 – 8 weeks.

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<sup>7</sup> The Tree Consultancy. (2024). Arboricultural Assessment of Effects and Tree Protection Plan For Stormwater improvements including new pipes, culverts, and swale drains – STAGE 1. Prepared for Auckland Council Healthy Waters.

## 2 Methodology

### 2.1 Desktop Investigation

A desktop-based review was undertaken to identify and assess sites of ecological value using GIS data and ecological information from the following sources:

- Auckland Council Geomaps: Catchment and Hydrology, Potential and Current Ecosystems, Aerial Imagery Layers.
- Department of Conservation Fauna Databases – herpetofauna and bat records.
- New Zealand Freshwater Fish Database (NZFFD) (Sotffels, 2022).
- Ecological district information (McEwen, 1987).
- Citizen science data bases – iNaturalist and eBirds (*iNaturalist*, n.d.; Sullivan et al., 2009).
- Species threat classification systems (Dunn et al., 2018; Melzer et al., 2022; New Zealand Birds Online, 2013; Simpkins et al., 2023; Woolly et al., 2024)

### 2.2 Field Investigation

As previously stated, no field surveys were scoped for the preparation of the EclA, however wetland and watercourse delineations were undertaken in May 2024 to support a Wetland and Watercourse Assessment prepared for ACHW. The field surveys undertaken to support that assessment included:

- Wetland delineations in accordance with the New Zealand Wetland Delineation Protocols and current Ministry for the Environment guidance in order to classify *natural inland wetlands* and delineate extents where necessary in accordance with the National Policy Statement for Freshwater Management (NPS-FM) (Clarkson, 2018; Ministry for the Environment, 2020).
- Watercourse delineations in accordance with the AUP:OP guidelines.
- Two eDNA surveys at several locations along the Stage 1 existing stormwater network.
- Habitat assessments across the open channels (methodology adopted from the Rapid Habitat Assessment Protocol by Cawthron Institute).

### 2.3 Assessment Methodology

An assessment of ecological effects was undertaken in accordance with Ecological Impact Assessment (EclA) EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems (Roper-Lindsay et al., 2018).

The EIANZ guidelines set out a methodology to assign ecological value to species and ecosystems based on four attributes. These are reproduced in this report as Appendix 2: Tables 2.1-2.4. In summary:

- Attributes are considered when considering ecological value or importance. They relate to matters such as representativeness, the rarity and distinctiveness, diversity and patterns, and the broader ecological context.
- Determining Factors for valuing terrestrial species; terrestrial species span a continuum of very high to negligible, depending on aspects such as whether species are native or exotic, have threat status, and their abundance and commonality at the site impacted.
- Ecological Values are scored based on an expert judgement, qualitative and quantitative data collected.

Once ecological values have been identified and valued, the severity of potential impacts is assessed by determining the change from baseline ecological values likely to occur as a result of the proposal along the lines of a magnitude of effect as determined by the criteria set out in Appendix 2:Table 2.5.

Finally, once these two factors have been determined (the ecological value and the magnitude of effect), an overall level of effect on each of the identified ecological values is determined by applying the matrix shown in Appendix 2:Table 2.6.

## 3 Ecological Context and Values

### 3.1 Ecological Context

The site is located in the Blackpool area on Waiheke Island, which is located in the Inner Gulf Islands Ecological District (ED). This ED comprises a group of inshore islands in the Hauraki Gulf, with Waiheke being the largest island. Original vegetation on most of the islands would have been coastal forests comprising primarily pōhutukawa, with some kauri, and on Waiheke Island hard beech, rimu, miro, and tawa was also common. A majority of the historic ecosystems have been lost, with the island having gone significant modifications and is now farmed with cattle and sheep, as well as a permanent and holiday settlements (McEwen, 1987). Within the Blackpool area specifically, potential ecosystem extent includes taraire/tawa/podocarp forests (WF9) northwards of Blackpool Park and spinifex/pīngao grassland / sedgeland (DN2) southwards of Blackpool Park, with mangrove forest and scrub (SA1) along Blackpool Beach<sup>8</sup>. The site is no longer representative of these ecosystem types, with the area modified for urban and holiday houses and is cleared of any native and duneland systems. Blackpool Beach is also absent of any mangrove forest ecosystems and is only a white sand beach.

The stormwater network comprises several open water channels. Historical aerial imagery identifies the presence of these watercourse channels since as early as 1961 and these channels have been modified (straightened and deepened) but are located within natural flow pathways. This is supported by contour data which clearly indicates hydrological driven erosion sloping downgradient towards Blackpool Beach. Furthermore, several of the watercourses originate upstream near Alison Park, where the permanent stream retains natural meandering characteristics as it flows through residential housing, under several culverts, before flowing through modified open channels along Tui Road and discharges into Huruhi Bay/ Blackpool Beach.

### 3.2 Ecological Features and Values

This section provides a summary of the ecological features identified within the works area that may be impacted during the stormwater improvement works. In total, six watercourses (P1, P2, P3, A4, P5 and P6) and two wetlands were assessed, and these are shown on Figure 2.

<sup>8</sup> Auckland Council Geomaps: Potential Ecosystem Extent Overlay.

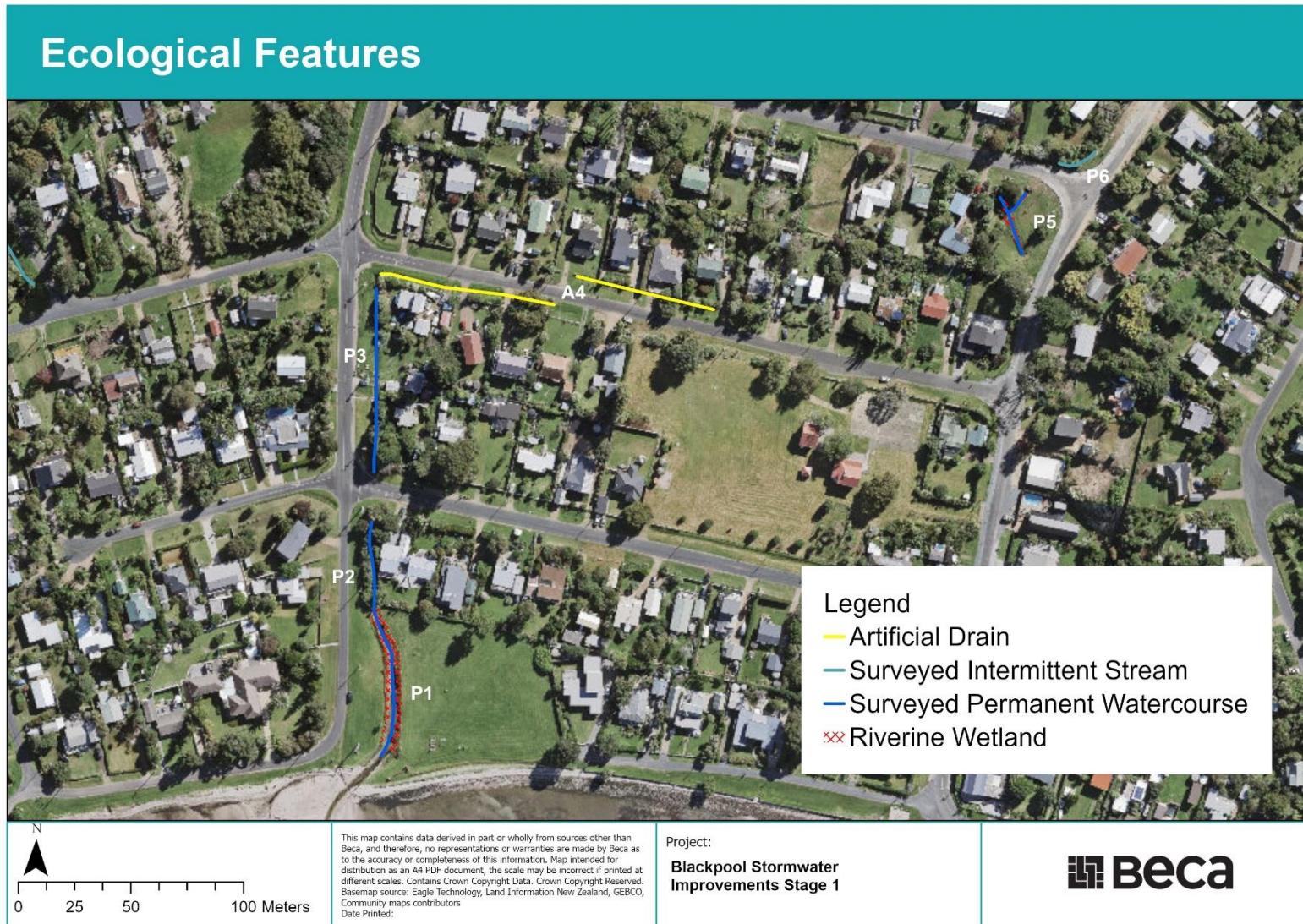


Figure 2. Overview of the location of the watercourses and wetlands surveyed within the Stage 1 works area.

### 3.3 Vegetation, Watercourses and Riverine Wetlands

#### 3.3.1 Terrestrial Vegetation

As outlined in Section 1.2.2 there are only two trees that trigger resource consent to be removed, this comprises a pōhutukawa (Not Threatened) and a Sydney golden wattle (Introduced). Given this, the ecological value of these trees is assessed as **Low**. The reason for this is that neither species are classified as At Risk or Threatened (Lange et al., 2024), the trees are isolated from any areas of contiguous forest and is largely within a modified landscape, they have limited contribution to overall ecological network, and provide limited habitat for roosting and nesting native birds.

#### 3.3.2 Watercourses and Riverine Wetlands

Table 1 summaries the watercourses and wetlands across the site, and the classification of ecological value. In general, the ecological value of the various watercourses is assessed as low due to the modification that has occurred to convert stormwater flows, the culverts that will reduce fish passage, the limited habitat provisions for fish and macroinvertebrates, and the low level of suitable riparian vegetation along the banks. P1 has been assessed as having moderate ecological value and is located in the open space zone. This assessment has been made given the (limited) habitat available for intertidal invertebrates and foraging coastal birds, the presence of a riverine wetland along the stream margins, and the suitable fish passage present.

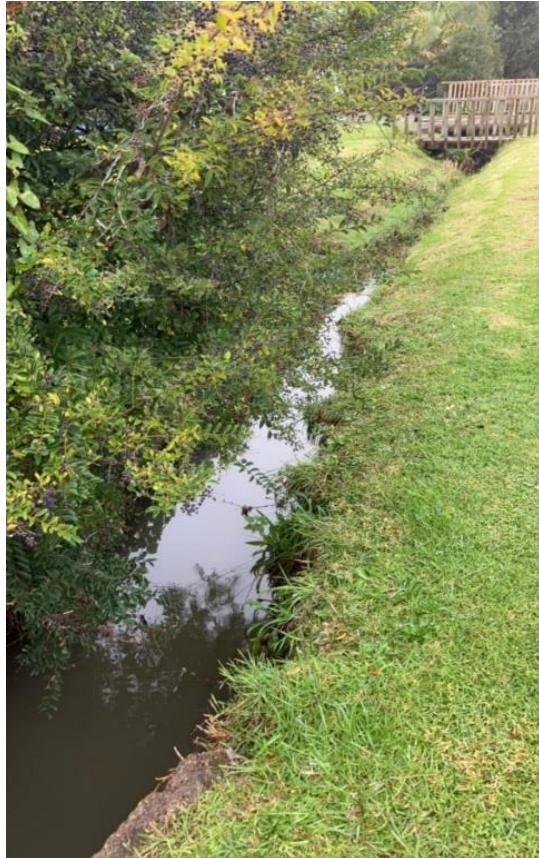
Table 1. Description and assigned ecological value to the watercourses identified across the project area.

Watercourse ID	Assigned Ecological Value	Description of Feature	Classification	Photos
P1	Moderate	<p><b>Representativeness: Low</b> Permanent estuarine channel from a first order channel<sup>9</sup>. Channel has been modified to convey stormwater flows.</p> <p><b>Rarity/distinctiveness: Moderate</b> Grey mangroves (<i>Avicennia marina</i>; Not Threatened) present within the channel. eDNA sample detected shortfin eel and banded kōkopu within the channel (both Not Threatened), and a benthic community largely comprised by tolerant taxa. WL10 (oioi, m restiad rushland/reedland) ecosystem mapped, and the site visit confirmed the dominance of dominated by <i>Bolboschoenus fluviatilis</i>, a diagnostic species of this ecosystem type.</p> <p><b>Diversity/pattern: Low</b> Includes coastal vegetation that potentially supports native fish, invertebrates, and birds.</p>	Permanent stream under the AUP:OP with wetland riverine margins under the NPS-FM (2020)	

<sup>9</sup> Auckland Council Geomaps – Catchment and Hydrology Layer.

Watercourse ID	Assigned Ecological Value	Description of Feature	Classification	Photos
		<p>Overall low level of diversity and complexity.</p> <p><b>Ecological Context: Moderate</b></p> <p>Provides limited habitat and foraging for native/endemic bird species.</p> <p>Habitat for intertidal invertebrates.</p> <p>Pūkeko (<i>Porphyrio melanotus</i>) and one oystercatcher (<i>Haematopus unicolor</i>; At Risk – Recovering) observed adjacent Blackpool Cemetery Reserve.</p> <p>This section of the channel provides suitable pathway for migratory native fish, with no barriers identified.</p> <p>Limited riparian vegetation, providing low shading for the channel.</p> <p>Limited provisioning of natural coastal processes including shoreline protection and trapping sediment.</p>		

Watercourse ID	Assigned Ecological Value	Description of Feature	Classification	Photos
P2	Low	<p><b>Representativeness: Low</b> First order permanent stream channel Stream channel and morphology has undergone significant modifications including channel straightening, installation of culverts, and artificial lining and base.</p> <p><b>Rarity/distinctiveness: Low</b> Benthic community is expected to comprise of taxa predominantly tolerant to environmental changes and pollution.</p> <p><b>Diversity/pattern: Low</b> Low diversity and complexity.</p> <p><b>Ecological Context: Moderate</b> Provides limited habitat for native fish. This section of the channel with an upstream culvert that is partially embedded in the streambed. Riparian vegetation dominated by karo (<i>Pittosporum crassifolium</i>) in a well-established closed canopy, providing high shading and organic debris input into the channel. Channel forms part of the wider stormwater network, which retains nature characteristics,</p>	Permanent stream under the AUP:OP	

Watercourse ID	Assigned Ecological Value	Description of Feature	Classification	Photos
		however, has been highly modified to convey stormwater flows.		
P3	Low	<p><b>Representativeness: Low</b> First order permanent stream channel – represents the upstream section of Sites 1 and 2.</p> <p>Stream channel and morphology has undergone significant modifications including channel straightening and deepening</p> <p><b>Rarity/distinctiveness: Low</b> Benthic community is expected to comprise of taxa predominantly tolerant to environmental changes and pollution.</p> <p>Vegetation is only present along the true left bank and includes karo, scattered patches of woolly nightshade (<i>Solanum mauritianum</i>), flax (<i>Phormium tenax</i>), Chinese privet (<i>Ligustrum sinense</i>), a large blue jacaranda (<i>Jacaranda mimosifolia</i>) and red mapou (<i>Myrsine australis</i>). The understorey comprises <i>Agapanthus praecox</i>, <i>Acanthus mollis</i>, arum lily (<i>Zantedeschia aethiopica</i>), and exotic grasses.</p> <p>Native fish community are expected to be typically low</p>	Permanent stream under the AUP:OP	

Watercourse ID	Assigned Ecological Value	Description of Feature	Classification	Photos
		<p>diversity, due to limited habitat availability.</p> <p><b>Diversity/pattern: Low</b> Low diversity and complexity.</p> <p><b>Ecological Context: Low</b> Provides limited habitat for native fish and invertebrates including some overhanging and instream vegetation.</p> <p>Riparian vegetation is limited to mixed native and exotic species, that does not form a closed canopy as such, provides limited shading to the stream channel.</p> <p>Channel forms part of the wider stormwater network, which retains nature characteristics, however, has been highly modified to convey stormwater flows.</p>		

Watercourse ID	Assigned Ecological Value	Description of Feature	Classification	Photos
A4	N/A	<p>As detailed within the Wetland and Watercourse Assessment<sup>10</sup>, A4 typifies a constructed swale channel alongside the road, directed slightly against contour gradient. Therefore, A4 has been classified as an artificial watercourse under the AUP:OP.</p> <p>Given this, A4 not been assessed for ecological value and is not further addressed in this report.</p>	Artificial watercourse under the AUP:OP	 

<sup>10</sup> Beca Limited. (2024). Blackpool Stormwater Improvements: Wetland and Watercourse Assessment. Prepared for Auckland Council Healthy Waters.

Watercourse ID	Assigned Ecological Value	Description of Feature	Classification	Photos
P5	Low	<p><b>Representativeness: Low</b> The channel is mapped as an overland flow pathway.</p> <p>Supports a low diversity of native fish only, given the modified nature of the system and the perched culverts present.</p> <p><b>Rarity/distinctiveness: Low</b> Benthic community is expected to comprise of taxa predominantly tolerant to environmental changes and pollution.</p> <p>Current ecosystem mapping indicates this area is WL19 ecosystem type. This is representative of a <i>raupō</i> reedland ecosystem (Endangered), which often occur alongside rivers and lakes and are widespread in the Auckland region (Singers et al., 2017). This was verified during the May site visit, where hydrophytic vegetation present included scattered patches of <i>B. fluviatilis</i>, fool's watercress (<i>Helosciadium nodiflorum</i>), flax, and small areas of <i>Persicaria</i> sp. The presence of other rafted aquatic species (e.g., watercress) and flax indicates that this area is only partially</p>	Permanent stream under the AUP:OP with wetland riverine margins under the NPs-FM.	  

Watercourse ID	Assigned Ecological Value	Description of Feature	Classification	Photos
		<p>representative of an WL19 ecosystem type.</p> <p><b>Diversity/pattern: Low</b> Low diversity and complexity.</p> <p><b>Ecological Context: Low</b> System has four separate culverts entering from the north, southeast, south, and southwest</p> <p>Provides limited habitat for native fish and invertebrates.</p> <p>Riparian vegetation limited to patches of flax, and a few large willows and a pōhutukawa tree – which provides some shading to the channel.</p> <p>Channel forms part of the wider stormwater network, which retains nature characteristics, however, has been highly modified to convey stormwater flows.</p> <p>The soil plot identified the top 10 cm of soil is moist topsoil and below that is a layer of clay with some large gravels. This is potentially from fill material historically placed at the site.</p>		

Watercourse ID	Assigned Ecological Value	Description of Feature	Classification	Photos
P6	Low	<p><b>Representativeness: Low</b> The channel is mapped as an overland flow pathway but is more likely intermittent.</p> <p>Located within a highly modified catchment.</p> <p>Expected to support a low diversity of native fish only, given the modified nature of the system and the piped upstream end, and the perched culvert downstream.</p> <p>Channel has been modified with the installation of a culvert at the upstream and downstream end.</p> <p><b>Rarity/distinctiveness: Low</b> Benthic community is expected to comprise of taxa predominantly tolerant to environmental changes and pollution</p> <p>The blocked culvert has allowed for water pooling, which has enabled the establishment of watercress, an obligate wetland species often found in shallow water ponds and drains. Given this, the establishment of watercress is considered to have established around an artificial structure (the culvert), and is excluded as a <i>natural inland wetland</i> under the NPS-FM.</p> <p><b>Diversity/pattern: Low</b></p>	Intermittent watercourse	 

Watercourse ID	Assigned Ecological Value	Description of Feature	Classification	Photos
		<p>Low diversity and complexity.</p> <p><b>Ecological Context: Low</b></p> <p>Channel provides no linkages to upstream suitable habitat.</p> <p>Provides very limited habitat for native fish and invertebrates.</p> <p>Riparian vegetation limited to primarily exotic species.</p> <p>Channel forms part of the wider stormwater network, which retains very limited nature characteristics and has been highly modified to convey stormwater flows.</p>		

## 3.4 Potential Ecological Value

The NPS-FM 2020 requires that both the current ecological value and potential ecological value of freshwater systems is considered<sup>11</sup>. When considering the potential ecological value of P1 – P6, it is assumed that some of the streams would be subject to reasonable restoration (i.e. replanting). These actions would improve shading, organic debris input, and stabilise bank the banks. However, this is expected to improve the value of these systems only slightly. Given the modified nature of the channels and the purpose they serve as part of the stormwater network, land use pressures would remain, as would channel modification. In addition, the proximity of the road network and housing would limit the amount of native planting that could be undertaken.

Overall, given the modified nature of the system, the potential ecological value of P1 – P6 is expected not to significantly increase.

## 3.5 Native Fauna

### 3.5.1 Freshwater Fish

The freshwater fish values of the project are assessed as **Moderate**, based on the findings from the field and desktop assessments, which indicate the presence of primarily Not Threatened species, with potential for At Risk – Declining species to be present.

Two eDNA samples were collected from P1 and P5 during the May 2024 site survey. The results indicated the presence of shortfin eel (*Anguilla australis*) and banded kōkopu (*Galaxias fasciatus*), both Not Threatened. P1 is an open water channel that can provide fish passage and (limited) habitat for other species (including longfin eel (*Anguilla dieffenbachii*) and īnanga (*Galaxias maculatus*), both At Risk – Declining). However, the presence of perched culverts in the upstream catchment will limit the ability of īnanga to reside in upstream sections given they have low climbing abilities. P5 is considered to be completely inaccessible to īnanga given the piped nature of the stormwater network, and the perched culverts. Longfin eel juveniles, however, have excellent climbing and are likely to access upstream habitat.

A review of NZFFD also identified only banded kōkopu and shortfin eel from 2003 near the modified stream channel along Te Huruhi Bay Reserve. A 2003 record of giant bully (*Gobiomorphus gobiooides*; At Risk – Naturally Uncommon) is also available from near Oneroa Bay. Given the lowland estuarine nature of P1 there is potential for giant bully to reside here, and there is some (albeit limited) instream habitat in P2. However, given they are not strong climbers, it is unlikely that they will be able to access further upstream habitat.

Overall, given the modified nature of the stream channels, only a low diversity of native freshwater fish is expected to reside here.

### 3.5.2 Birds

The bird values of the site are assessed as **High** due to the expected presence of several Regionally Vulnerable and one Regionally Endangered bird within and within 3 km of the site. This is supported by information obtained through public fauna databases (*INaturalist*, n.d.) and observations made during the May 2024 site visit.

Records available on public, citizen science, databases identify the presence of numerous native birds within the Blackpool and Oneroa area. Given the mobile nature of most of these species, it is expected that they will naturally disperse across the landscape. The below table outlines species recorded, the conservation status, and habitat preferences.

<sup>11</sup> See NPS-FM 2020 clauses 3.21, 3.22 and 3.24.

Additionally, observations made during the field survey identified fantails roosting in the karo (*Pittosporum crassifolium*) trees at P2, and variable oystercatcher and pūkeko foraging in the Blackpool Cemetery reserve, adjacent to P1.

Table 2. Native birds identified within the Blackpool and Oneroa areas (*INaturalist*, n.d.; New Zealand Birds Online, 2013; Woolly et al., 2024)

Common Name	Scientific Name	National Conservation Status	Regional Conservation Status	Main Habitat Preference
New Zealand fantail	<i>Rhipidura fuliginosa</i>	Not Threatened	Not Threatened	Nests in sheltered trees with foliage.
New Zealand pigeon	<i>Hemiphaga novaeseelandiae</i>	Not Threatened	Not Threatened	Forage and breed in sheltered trees, that are tall and strong enough to support the weight of the bird.
Sacred kingfisher	<i>Todiramphus sanctus</i>	Not Threatened	Not Threatened	Coastal and inland freshwater habitats
Silveryeye	<i>Zosterops lateralis</i>	Not Threatened	Not Threatened	Nests in outer branches of trees and shrubs, which are at least 8 m high.
White-faced heron	<i>Egretta novaehollandiae</i>	Not Threatened	Not Threatened	Rocky shore and estuarine mudflats, but generally nest within trees and/or high manmade structures
Southern black backed gull	<i>Larus dominicanus</i>	Not Threatened	Not Threatened	Coastal and estuaries but adapted to urban environments.
Spur winged plover	<i>Vanellus miles</i>	Not Threatened	Not Threatened	Wide range of nesting habitat including low vegetation, near water, margins of wetlands/rivers/lakes, estuaries, and parks/recreational areas.
Pūkeko	<i>Porphyrio melanotus</i>	Not Threatened	Not Threatened	Typically, near fresh or brackish systems, adjacent to open grassy areas and pastures.
Pied stilt	<i>Himantopus</i>	Not Threatened	Not Threatened	Brackish estuaries, saltmarshes, freshwater lakes, swamps, and braided rivers.
Red-billed gull	<i>Chroicocephalus novaehollandiae</i>	At Risk - Declining	Regionally Vulnerable	Coastal, but adapted to urban environments. Breed in colonies along the coast including river mouths, and sandy shores.
White fronted tern	<i>Sterna striata</i>	At Risk – Declining	Regionally Vulnerable	Common near the coast. Breeds in colonies on sand dunes and shingle riverbeds.
Variable oystercatcher	<i>Haematopus unicolor</i>	At Risk - Recovering	Regionally Vulnerable	Predominantly forage and breed near the coast.
New Zealand dotterel	<i>Charadrius obscurus aquilonius</i>	At Risk – Recovering	Regionally Increasing	Breed on sandy beaches, sandspits, and harbours, as

				well as can be found near river mouths.
Australasian gannet	<i>Morus serrator</i>	Not Threatened	Not Threatened	Predominantly cliffside species only.
Little shag	<i>Microcarbo melanoleucus</i>	Relict	Regionally Endangered	Coastal and freshwater habitat, and nest in large trees over-hanging water.

### 3.5.3 Bats

There is no assigned ecological value to native bats, and this is not further assessed in this report, given that there have been no records of native bats present on the island, despite much surveying<sup>12-13</sup>.

### 3.5.4 Lizards

The lizard values within the project works area is assessed as **Low**. This assessment has been made using three key factors; (1) recent species records demonstrating presence within 2 km to the site, (2) availability of moderate to high quality habitat that meets species requirements and (3) the magnitude of landscape modification at the site and surrounding areas (Ussher, 2015).

The table below outlines the existing lizard records within 2 km of the project area, the habitat preference of each species, the habitat available within the site, and the overall likelihood of presence. In addition to the species identified below, there are existing records of plague skink (*Lampropholis delicata*), green and golden bell frog (*Ranoidea aurea*), and southern bell frog (*Ranoidea raniformis*) all of which are **Introduced**<sup>14</sup>.

<sup>12</sup> Te Korowai o Waiheke. (2023). One of two bat species native to Aotearoa. Retrieved from <https://tekorowaiowaiheke.org/latest-news/one-of-two-bat-species-native-to-aotearoa-written-by-te-korowai-o-waiheke-team-member?rq=bats>

<sup>13</sup> Department of Conservation Bat Records. Records include up to 2022.

<sup>14</sup> Department of Conservation Herpetofauna Database. Records include up to 2022.

Table 3. Recorded native lizards within 2 km of the project area, their known habitat preference and likelihood of being present within the project area.

Common Name / Scientific Name	Regional Threat Status	Known Habitat Preference <sup>15</sup>	Habitat within the site	Likelihood of Presence <sup>16</sup>
Copper skink / <i>Oligosoma aeneum</i>	Regionally Declining	Cryptic species Prefers shaded forests and dense rank grasslands, underneath rocks, decaying logs or other debris. Not recorded with the DOC herpetofauna database, however, this does not exclude its likely presence	Project area is primarily alongside roads and grass berms are regularly mowed. Little to no suitable habitat within the project area.	Unlikely
Elegant gecko / <i>Naultinus elegans</i>	Regionally Declining	Found in a range of habitats, and in the North Island they have been found in scrub, shrublands, secondary forest and mature forest habitats	Trees proposed for removal include nikau, pōhutukawa, cabbage tree, karo, and a range of ornamental fruit trees (pear and cherry). The project area comprises no forests, or connection to contiguous forested areas.	Unlikely
Moko skink / <i>Oligosoma moco</i>	Regionally Relict	Present and abundant on many offshore islands. Found in coastal forest, scrub, and grassland under rocks/logs and rank grass and flax.	The project area does not comprise any coastal forests, or organic debris, rank grassland that would provide suitable habitat for this species.	Unlikely

<sup>15</sup> All herpetofauna habitat information has been sourced from the New Zealand Herpetological Society. Accessed from <https://www.reptiles.org.nz/>.

<sup>16</sup> Likelihood is usually presented using a qualitative 5-point scale ranging from an occurrence being of low likelihood to one being of such high likelihood as to be almost certain (Ussher, 2015). The likelihood scale is (from lowest to greatest likelihood of occurrence):

**Unlikely** – There is no evidence to support presence of that species, or the evidence available supports their absence;

**About as likely as not** – the balance of evidence provides some small support for that species of lizard being present at that site;

**Likely** – the balance of evidence provides a moderate degree of support for that species of lizard being present at that site;

**Very likely** – the balance of evidence provides compelling support for that species of lizard being present at that site; and

**Virtually certain** – the balance of evidence is overwhelming (albeit still circumstantial) such that it is almost certain that the site supports that species of lizard

Common Name / Scientific Name	Regional Threat Status	Known Habitat Preference <sup>15</sup>	Habitat within the site	Likelihood of Presence <sup>16</sup>
Forest gecko / <i>Mokopirirakau granulatus</i>	Regionally Declining	Found in a range of habitats, and in the North Island they have been found in scrub, shrublands, secondary forest and mature forest habitats.	Trees proposed for removal include nikau, pōhutukawa, cabbage tree, karo, and a range of ornamental fruit trees (pear and cherry). The project area comprises no forests, or connection to contiguous forested areas.	Unlikely

Given the information in the table above, there is considered to be little to no habitat available within the project area for the known and expected lizard species recorded within 2 km of the site. Given this, effects on herpetofauna values are not further assessed within this report.

## 4 Assessment of Ecological Effects

### 4.1 Proposed Activities (as relevant to the ecological features)

The proposed activities are detailed within the project's AEE and summarised in Section 1.3.2 and 1.3.3 of this report. When considering the ecological effects, the following key proposed activities have been identified and will inform the assessment of ecological effects:

- Isolated instreams work within sections of a permanent stream channel to widen and deepen channels and install culverts. Works will include damming and diverting water for a temporary period of time to create a dry area of works and excavating the channel to increase the floodplain extent.
- Removal of 35 trees which comprise both native and introduced tree species, of which only two trigger resource consent.
- Widening / lowering of the floodplain and trimming stream banks to reduce slope.
- Upgrading of under road and under driveway culverts.
- Planting with native species along the wetland and stream riparian margins, and further tree planting within the reserve, although extent of any planting is as yet undefined.

### 4.2 Zone of Influence

The Zone of Influence (ZOI) is defined by the EIANZ guidelines as all land, water bodies and receiving environments that could be potentially impacted by the proposed project and associated activities (Roper-Lindsay et al., 2018).

For the purpose of this assessment, the ZOI encompasses the permanent watercourse channels proposed for improvement works, the instream habitat, the riparian vegetation alongside the banks, the riverine wetland margins, and the terrestrial vegetation being directly impacted by the works. This effects assessment does not consider any artificial watercourses.

### 4.3 Ecological Effects Overview

- Temporary disturbance to fish passage during the improvement works and culvert upgrades.
- Potential loss to instream habitat from flow changes.
- Injury/mortality to native fauna during construction phase works
- Loss of terrestrial habitat.
- Degradation of aquatic habitat quality from potential sediment runoff.
- Loss of wetland vegetation.

A summary of the effects and overall unmitigated level of effect can be found in Table 4.

## 4.4 Magnitude of Effect

### 4.4.1 Temporary disturbance to fish passage

As detailed within the preliminary construction methodology<sup>17</sup> works within the open channels will require isolating sections of stream channels, diverting water flow, and excavating the channel banks. Instream works are proposed to be undertaken in a staged approach, taking between 2 – 8 weeks per stage. These works will result in the complete obstruction of fish passage into the works area, and upstream section for the duration for the works. Following the completion of each stage, the site will be de-established including removing instream barriers (e.g. sandbags) and flows will be re-established.

This is assessed as having a **Low** magnitude and overall, **Low** level of effect on fish passage, given that works are temporary in nature, are isolated to certain stretches of the open watercourses (at one time), and any artificial barriers placed into the channels will be removed following works completion.

### 4.4.2 Potential Effects on Fish Passage and Instream Habitat following Changes to Stream Morphology and Culvert Upgrades.

To improve stormwater drainage and minimise flooding during heavy rainfall periods the floodplain of channels P1, 2, 3, and 6 will be widened and the stream banks trimmed to reduce bank height. Channel P5 will not be modified, therefore is not considered within this assessment. An overview of the channel modifications at each section can be found in the project design drawings, and are briefly outlined below:

- P1 and P2 – floodplain to be lowered and stream banks trimmed to improve connectivity. Banks and floodplain to be replanted with suitable native species. Channel width is not proposed to be altered.
- P3 – floodplain to be lowered by ~ 1.4 m and the stream channel will be moved approximately 1 m west to reduce side batter slopes. The channel will be widened to approximately 1 m wider than the existing channel (0.75 m). Banks and floodplain to be replanted with suitable native species.
- P6 – floodplain to be lowered by ~ 1.2 m and replanted with low growing native species. Channel width is not proposed to be altered.

Existing culverts beneath roads and driveways will be upgraded to increase capacity and improve stormwater conveyance during heavy rainfall events. Project design drawings within the project application provide details of the culvert upgrades. In summary, culverts beneath Rata Street and Manuka Avenue will be upgraded to pre-cast concrete culverts that are 3m wide and 1m high. Culverts beneath driveways on Tui Street, Nikau Avenue and Moa Avenue will vary in length between 6m and 12m and are twin LDPE corrugated culverts that are 1m high by 1m wide.

All culverts will be embedded, improving fish passage within the catchment however three culverts will not meet fish passage guidelines for having 25% embeddedness. Notwithstanding this, the two culverts adjacent to Tui Street will provide an improvement to current fish passage limitations, including allowing passage for swimming species, with 300 mm embedded. The culvert beneath Manuka Road will be embedded by 200 mm, this will also improve on current fish passage conditions where the culvert is perched, blocked, and undersized. Additionally, the habitat upstream of the Matai culvert provides very limited habitat for native fish within P6 (Table 1).

The above works are expected to have a **Positive** magnitude of effect on fish passage, and an overall **Positive** magnitude of effect on instream habitat for freshwater fauna, resulting in a **Net Gain** level of effect on both fish passage and instream habitat. The reasons for this are outlined below:

<sup>17</sup> Auckland Council. (2024). Blackpool Stormwater Improvements Stage 1 – (Preliminary) Construction Methodology.

- Given the active channels will be the same width across all four channel sections, there is anticipated to be no change to the existing fish passage provisions within the open stream sections of the catchment.
- The upgrading of culverts within the catchment will remove existing barriers to native fish by removing perched, blocked, and undersized culverts and replacing them with larger, embedded designs.
- Lowering of the floodplain and replanting with suitable native species may potentially provide suitable habitat to spawning galaxiids, specifically īnanga (*Galaxias maculatus*) and banded kōkopu which spawn in streamside vegetation during floods/ high tides.
- Replanting the banks with wetland/riparian suitable species and tall trees will improve shading provisions, bank stability, reduce erosion, and increase organic debris input thereby filtering nutrients, reducing water temperatures and providing habitat for freshwater fauna.

#### 4.4.3 Potential injury/mortality to native fauna during the construction phase works

##### 4.4.3.1 Freshwater Fish

As detailed within the preliminary construction methodology<sup>18</sup> works within the open channels and culvert upgrades will require isolating sections of stream channels, diverting water flow, and excavating channels/banks. These instream works are expected to result in the direct injury or mortality of native freshwater fish, should they be isolated within the works area.

This is assessed as having a **Moderate** magnitude and overall **Moderate** level of adverse effect.

This assessment has been made given the recorded presence of native freshwater fish within the upstream environment, and the known behaviours of species such as shortfin eels – which burrow into soft stream substrate. There is deemed to be suitable, albeit degraded, habitat across almost all identified natural stream channels, particularly P3 and P5, which have suitable soft sediment substrate. A moderate magnitude of effect is assigned as any direct injury/mortality, particularly to shortfin eels and banded kokopu, are expected to have a minimal effect on the known population size and extent of both species. Banded kokopu are widely distributed along the northern portion of the North Island and the northern west coast of the South Island<sup>19</sup>, and shortfin eel are also widely distributed across the entirety of the North Island, and the west and east coast of the South Island<sup>20</sup>.

##### 4.4.3.2 Birds

Tree clearance within the project area is expected to have an overall **Low** magnitude of effect and overall **Low** level of effect on native bird populations. This assessment has been made given the limited roosting and nesting habitat in the works area, which comprises juvenile to early mature native and introduced species. Given this, as well as given that all trees proposed for removal are disconnected from areas of continuous vegetation and are isolated to stands near / in front of residential dwellings, they are not expected to provide key nesting habitat for native birds.

<sup>18</sup> Auckland Council. (2024). Blackpool Stormwater Improvements Stage 1 – (Preliminary) Construction Methodology.

<sup>19</sup> NIWA. (n.d.). Banded kokopu. Retrieved from <https://niwa.co.nz/freshwater/nz-freshwater-fish-database/niwa-atlas-nz-freshwater-fishes/banded-kokopu>.

<sup>20</sup> NIWA. (n.d.). Shortfin eel. Retrieved from <https://niwa.co.nz/freshwater/nz-freshwater-fish-database/niwa-atlas-nz-freshwater-fishes/shortfin-eel>.

As outlined in the Arboriculture Report<sup>21</sup>, introduced species proposed for removal comprise fruit trees, which range from 2 – 5 m in height, one Sydney gold wattle (*Acacia longifolia*), and one Italian cypress (*Cupressus sempervirens*), which are 6 m and 7 m tall, respectively. Native species proposed for removal comprise several nikau and cabbage trees, which are all < 5 m, three karo, which range from 3 - 6 m tall, and two pōhutukawa, both < 7 m tall.

Of these species identified within proximity to the site (Table 2), most are not expected to nest within any of the trees proposed for clearance, with the exception of potentially Not Threatened fantail and silvereye individuals. These species are protected under the Wildlife Act (1953) therefore management will be required if tree clearance occurs within the nesting season (August to March).

#### 4.4.4 Loss of Terrestrial Vegetation Habitat

As a resource consent is only required for the removal of two trees across the project area that do not meet the permitted standards under the regional provisions of the AUP:OP, this assessment is limited to only assessing the effects of the loss of the two trees (refer to the AEE for further details).

The removal of a pōhutukawa and wattle is assessed as a **Negligible** magnitude of effect and an overall **Very Low** level of effect. This assessment has been made due to the loss of these trees resulting in a very slight change in the existing baseline conditions, and any changes will be barely distinguishable. Additionally, ACHW are proposing to remedy any effects by replanting the banks with native vegetation.

#### 4.4.5 Temporary Loss of Wetland Vegetation

The clearance of vegetation within the riverine wetland along P1 is assessed as a **Moderate** magnitude of effect and an overall **Moderate** level of effect. It is understood that no clearance of wetland vegetation at P6 is required.

Vegetation within the P1 wetland comprises primarily *Bolboschoenus fluviatilis*. To increase the floodplain, the stream bank and bed will be excavated, resulting in the removal of wetland vegetation. However, ACHW are proposing to remedy the effects by replanting the banks with native vegetation suitable to this ecosystem type (WL10) in the planting season following works completion, and this is further detailed in Section 5 below.

Therefore, any effects are considered temporary in nature, and in the long term once plants have established, there are anticipated to be no residual effects. Following replanting efforts there is expected to be only a minimal change to the existing conditions, and any changes will be largely indiscernible.

#### 4.4.6 Degradation of Instream Habitat Quality from Sediment Release from Excavation Works

The excavation of the stream banks and bed will result in the clearance of instream habitat and release of sediment into the stream channel, which has the potential to impact freshwater fauna. This is assessed as having a **Moderate** magnitude of effect, which results in an overall **Low** level of effect for P2, 3, 5, and 6, and **Moderate** level of effect for P1. Uncontained sediment discharge has the potential to smother freshwater habitats and clog the gills of fish, leading to mortality.

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<sup>21</sup> The Tree Consultancy. (2024). Arboricultural Assessment of Effects and Tree Protection Plan For Stormwater improvements including new pipes, culverts, and swale drains – STAGE 1. Prepared for Auckland Council Healthy Waters.

As part of the resource consent application, a draft Erosion and Sediment Control Plan (ESCP) has been prepared by ACHW<sup>22</sup>. It is expected that once a contractor is tended, the ESCP will be finalised.

With the implementation of the ESCP the mitigated level of effect is assessed to be **Low** on all watercourses.

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<sup>22</sup> Auckland Council. (2024). Blackpool Stormwater Improvements Stage 1 – (Preliminary) Construction Methodology.

Table 4. Summary of the magnitude and unmitigated level of effect.

Activity	Ecological Feature	Assigned Ecological Value	Magnitude of Effect	Unmitigated Level of Effect	Effects Management Required
Temporary Disturbance to fish passage	Freshwater fish	Moderate	Low	Low	No
Potential effect on fish passage and instream habitat following changes to channel morphology and culvert upgrades	Freshwater fish	Moderate	Low	Low	No
	P1, 2, 3, and 5	Low – Moderate (P1)	Positive	Net Gain	No
	P3, P5, P6	Low - Moderate	Positive	Net Gain	No
Injury/mortality to native fauna	Freshwater Fish	Moderate	Moderate	Moderate	Yes
	Birds	High	Low	Low	Yes
Loss of terrestrial vegetation habitat	Terrestrial Vegetation	Low	Negligible	Very Low	No – however replanting is proposed.
Temporary loss of wetland vegetation	Riverine wetland at P1	Moderate	Moderate	Moderate	Yes
Degradation of instream habitat and sediment release	All permanent streams	P2, 3, 4, 5, - Low P1 - Moderate	Moderate	P2, 3, 4, 5, - Low P1 - Moderate	An ESCP has been prepared for the resource consent application.

## 5 Effects Management

The proposed effects management adheres to accepted practices and industry guidelines, considering the significance of affected ecological values, the level of ecological effects, the feasibility of implementation, and the likelihood of success. Should the level of effects fall below the threshold of concern (moderate effect) according to the EIANZ guidelines, practical mitigation measures are still recommended for native fauna due to their protection under the Wildlife Act (1953) and the Conservation Act (2019).

### 5.1 Avoidance

As per EIANZ guidelines, avoiding impacts on biodiversity or ecological values is the most effective and least risk method for managing adverse effects. Avoidance can be spatial (e.g., relocating the proposal to avoid sensitive habitats) or temporal (e.g., timing activities to avoid bird migration periods). Successful avoidance requires early consideration of ecological impacts during the project's planning stages, although project redesign can occur at any stage when practicalities or costs of mitigation become apparent.

However, given that works require the upgrade the existing stormwater network within the Blackpool area, effects are largely unavoidable in the first instance.

### 5.2 Minimisation

#### 5.2.1 Fish Management Plan

A Fish Management Plan (FMP) must be prepared and implemented during construction given the identification of shortfin eels and banded kōkopu within the catchment and the requirement to excavate into the stream bed and banks to widen floodplains and reform the channels.

This is required as native freshwater fish are afforded protection under the Conservation (Indigenous Freshwater Fish) Amendment Act 2019. The FMP will include:

- A detailed methodology for the capture relocation of all native fish.
- The release location of all captured native fish.
- A list of the suitably qualified and experience personnel to undertake fishing activities.
- The relevant permit(s) required to capture and handle native freshwater fish.

#### 5.2.2 Native Bird Management

If it is unavoidable to remove trees within the bird nesting season (primarily for fantails/silvereyes – August to March) bird nest checks should be undertaken by a suitably qualified and experience person to identify for bird nests within any of the trees being cleared. If any nests are identified, and felling of the tree is unavoidable, the tree must be clearly marked and cordoned off (20 m buffer) until the nesting birds have fledged or the nest has been naturally abandoned.

### 5.3 Remediation

#### 5.3.1 Riparian/ and Wetland Revegetation Planting

As part of the proposed works, replanting of the riparian margins across all the channels is already proposed and will be undertaken following works completion. It is recommended that planting with suitable species is undertaken in the first planting season (May to September) following works completion. Species for P1 and the riverine wetland should include the below species which are based on the existing ecosystem type (WL10) (Singers et al., 2017):

- Oioi (*Apodasmia similis*)
- Flax/harakeke (*Phormium tenax*) – planted further away from the stream edge
- *Bolboschoenus fluviatilis*

The riparian margins of P2, 3, and 6 are also proposed to be planted with suitable riparian species. This should include species that are suited to the local conditions with native grasses and sedges within the stream edge and flood zone and taller tree species near the outer edge and sloped area. This is expected to adequately address the loss of 35 trees within the project footprint.

Vegetation should be inspected biannually (twice a year) for dieback and infill planting, with the same species, for a total of 5 years.

These replanting efforts are expected to enhance habitat values and increase indigenous dominance, in an otherwise modified, low density urban landscape.

## 5.4 Residual Effects

Should the above recommended management measures be implemented, there are expected to be no further residual effects which require management.

## 6 Conclusion

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The Blackpool Stormwater Improvements Stage 1 is required to increase the capacity of the stormwater network to convey flood flows. These improvement works have the potential to result in Low to Moderate adverse ecological effects if not appropriately addressed. With the implementation of the recommended management measures, the effects can be managed so they are Very Low, with no residual effects expected.

Appropriate management measures include:

- The development and implementation of a Fish Management Plan by a suitably qualified and experienced ecologist to manage the potential injury / mortality to native fish.
- Tree removal undertaken outside of the bird nesting season (primarily for fantails and silvereyes - August to March). If this is unavoidable, bird nest checks should be undertaken by a suitably qualified and experience person to identify for bird nests within any of the trees being cleared.
- Replanting of the riparian margins across all the channels is already proposed and will be undertaken following works completion.

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# 1

## Appendix 1 – Assessment Methodology

## Appendix 1: Ecological Impact Assessment Guidelines

### Assigning Ecological Value

#### Freshwater and terrestrial habitat

The ecological values of freshwater and terrestrial systems (riparian vegetation, habitats and species present) potentially impacted by the works were assessed against the following attributes:

- Representativeness;
- Rarity or distinctiveness;
- Diversity or pattern; and
- Ecological context.

These attributes are described in Table 1.1 and Table 1.2 below.

Table 1.1. Matters that may be considered when assigning ecological value to a freshwater site or area.

Matters	Attributes to be assessed
Representativeness	Extent to which site/catchment is typical or characteristic Stream order Permanent, intermittent or ephemeral waterway Catchment size Standing water characteristics
Rarity/distinctiveness	Supporting nationally or locally threatened, at risk or uncommon species National distribution limits Endemism Distinctive ecological features Type of lake/pond/wetland/spring
Diversity and pattern	Level of natural diversity Diversity metrics Complexity of community Biogeographical considerations - pattern, complexity, size, shape
Ecological context	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 Role in ecosystem functioning – high level, proxies

Table 1.2. Attributes to be considered when assigning ecological value or importance to a site or area of vegetation/habitat/community.

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

The freshwater habitat features were assessed considering each of the attributes in Table 1.1, and terrestrial habitat features were assessed considering attributes in Table 1.2. Features of interest were subjectively given a rating on a scale of 'Very Low' to 'High' for each attribute and assigned a value in accordance with the description provided in Table 1.3.

Table 1.3. Rating system for assessing ecological value of terrestrial and freshwater systems (Roper-Lindsay et al. 2018)

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

## Species

The EIANZ provides a method for assigning value (Table 1.4) to species for the purposes of assessing actual and potential effects of activities.

Table 1.4. Criteria for assigning ecological values to species

Ecological Value	Species
Very High	Threatened (Nationally Critical, Nationally Endangered, Nationally Vulnerable)
High	At Risk (Declining)
Moderate	At Risk – Recovering and At Risk – Naturally Uncommon
Low	Nationally and locally common indigenous species

## Assigning Magnitude of Impacts

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

Based on the assessor's knowledge and experience, the magnitude of identified impacts on the ecological values within the project area and zone of influence were assessed and rated on a scale of 'Very High' to 'Negligible' based on the description provided in Table 1.5.

Table 1.5. Criteria for describing the magnitude of effects (Roper-Lindsay et al. 2018)

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

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

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

## Assessing the Level of Effects

The overall level of effect on each ecological feature identified within the zone of influence were determined by considering the magnitude of impacts and the values of impacted ecological features (Roper-Lindsay et al. 2018).

Results from the assessment of ecological value and the magnitude of identified impacts were used to determine the level or extent of the overall impacts on identified ecological features within the project area and zone of influence using the matrix described in Table 1.6.

Table 1.6. Matrix combining magnitude and value for determining the level of ecological impacts (Roper-Lindsay et al. 2018).

Effect Level		Ecological and/or Conservation Value				
		Very High	High	Moderate	Low	Negligible
Magnitude	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

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

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

A 'Very High' level of impact is unlikely to be acceptable on ecological grounds alone and should be avoided. Where avoidance is not possible, a net gain in biodiversity values would be appropriate.