VIRIDIS
Environmental Consultants

Beachlands South Fast Track

Ecological Impact Assessment

Prepared for: Beachlands South Limited Partnership

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Author(s)		
	Mark Delaney, MSc.(Hons.)	Brittany Pearce, BSc. CEnvP
	Director & Lead Ecologist	Senior Ecologist
Reviewer(s)		
	Annabelle Coates, MSc. CEnvP	
	Senior Ecologist	

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Cover photo: Photo overlooking an existing constructed pond and golf course in the centre of the Site (January 2026).

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ABBREVIATIONS AND ACRONYMS

Acronym	Description
AEE	Assessment of Environmental Effects
AUP-OP	Auckland Unitary Plan (Operative in Part)
BCM	Biodiversity Compensation Model
BMP	Biodiversity Management Plan
BSLP	Beachlands South Limited Partnership
CMA	Coastal Marine Area
EcIA	Ecological Impact Assessment
EPAN	Ecological Protected Area Network
ESCP	Erosion and Sediment Control Plan
FMP	Fauna Management Plan
FTAA	Fast-track Approvals Act 2024
GD01	Auckland Council Guideline Document 01
GD05	Auckland Council Guideline Document 05
GWE	GWE Consulting Engineers Limited
HGC	Harrison Grierson Consultants Limited
NFCRP	Native Fish Capture and Relocation Plan
NPS-FM	National Policy Statement for Freshwater Management 2020
NPS-IB	National Policy Statement for Indigenous Biodiversity 2023
PCDI	Pressure Compensating Dripper Irrigation
SEA	Significant Ecological Area
SEV	Stream Ecological Valuation
SNA	Significant Natural Area
TP58	Auckland Regional Council Technical Publication 58: On-site Wastewater Systems Manual
WEV	Wetland Ecological Valuation

STATEMENT OF QUALIFICATIONS AND EXPERIENCE

Mark Delaney (Co-author)

My name is Mark Delaney. I am a Director and Lead Ecologist at Viridis Limited (Viridis). I have more than 15 years' professional experience in the field of ecology, specialising in terrestrial and freshwater ecology.

I hold a Master of Science in Ecology and Conservation from Massey University, completed in 2007.

I am a full member of the Environment Institute of Australia and New Zealand (EIANZ), the New Zealand Freshwater Sciences Society and the New Zealand Ecological Society.

My experience includes freshwater and terrestrial ecological impact assessments for urban and rural developments, ecological restoration, ecological monitoring, and ecological management planning. I have undertaken ecological field investigations, reporting and peer review for a wide range of residential, infrastructure and fast-track development projects throughout New Zealand. Relevant experience includes ecological input for the Milldale Stages 10-13 Fast Track project, Beachlands South Stage 1 Earthworks, ecological investigations and monitoring associated with Milldale Stages 7-9, and lead project ecologist roles for projects approved under the COVID-19 Recovery (Fast-track Consenting) Act 2020, including the Auckland Surf Park Community, Botanic Riverhead, Brickfields Scott Road, Melia Place, Unitec Residential Development – Wairaka Stage 1, Te Whenua Haa Ora, Wellsford North and Verran Mews developments.

I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2023 and that I have complied with it when preparing this report. Other than where I state that I am relying on the advice of another person, this report is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this report.

Brittany Pearce (Co-author)

My name is Brittany Pearce. I am a Senior Ecologist at Viridis. I have more than six years of professional experience in ecological consulting, specialising in terrestrial and freshwater ecology.

I hold a Bachelor of Science in Biological Sciences from the University of Auckland, completed in 2017.

I am a full member of the EIANZ and a Certified Environmental Practitioner (CEnvP).

My experience includes ecological impact assessments for urban and rural developments, ecological restoration, ecological monitoring, and ecological management planning. I have undertaken ecological field investigations, reporting and peer review for a range of residential and infrastructure developments throughout New Zealand, including projects progressed under the COVID-19 Recovery (Fast-track Consenting) Act 2020 and the Fast-track Approvals Act 2024 (FTAA). Relevant experience includes ecological input for the Milldale Stages 10-13 Fast Track project, Beachlands South Stage 1 Earthworks, quarterly wetland vegetation monitoring for Milldale Stage 7, and ecological investigations associated with the Auckland Surf Park Community developments.

I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2023 and that I have complied with it when preparing this report. Other than where I state that I am relying on the advice of another person, this report is within my area of

expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this report.

Annabelle Coates (Reviewer)

My name is Annabelle Coates. I am a Senior Ecologist at Viridis. I have more than 12 years of professional experience in ecological consulting, specialising in terrestrial and freshwater ecology.

I hold a Master of Science in Environmental Science from the University of Canterbury, completed in 2013.

I am a full member of the EIANZ and a Certified Environmental Practitioner (CEnvP).

My experience includes conducting freshwater, terrestrial and coastal ecological impact assessments for both urban and rural developments, as well as ecological restoration and monitoring. I have provided ecological input, reporting and peer review for projects approved under the COVID-19 Recovery (Fast-track Consenting) Act 2020 and for projects currently undergoing assessment under the FTAA, such as the Ridgeburn mixed use urban development, Parkburn mixed-use urban development and the Delmore residential subdivision. Additionally, I have been involved in various land development projects spanning Otago, West Coast, Canterbury, Wellington, Hawke's Bay, Waikato, Auckland and Northland.

I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court of New Zealand Practice Note 2023 and that I have complied with it when preparing this report. Other than where I state that I am relying on the advice of another person, this report is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this report.

1 INTRODUCTION

This report has been prepared in support of a substantive application submitted by Beachlands South Limited Partnership (BSLP) under the FTAA. The Project name is 'Beachlands South' and is included in Schedule 2 of the FTAA as a Listed Project with significant regional or national benefits. The Project location or Site is 110 Jack Lachlan Drive and 620, 712, 758 and 770 Whitford-Maraetai Road, Beachlands (the "Site" or the "project area").

In summary, the Project will provide for the development of live-zoned land at Beachlands into a comprehensively planned, public transport-focused community that achieves a well-functioning urban environment. The Project includes residential dwellings, a hotel and conference venue, community and commercial activities, protected ecological restoration areas, walking and cycling networks, community facilities, and the potential development of two schools.

The Project also includes all associated earthworks and infrastructure required to service the development. This includes transport infrastructure, intersection upgrades, roading, telecommunications, power, water supply, stormwater and wastewater infrastructure, including any associated treatment and storage facilities, drainage networks, pipelines, pump stations, outfalls and discharges.

Key elements of the Project include:

- Residential activities comprising approximately 2,000 dwellings in a variety of housing types and densities, and vacant sites for future residential development;
- Establishment of a commercial local centre supported by employment opportunities within and around the periphery of the local centre and on the Whitford-Maraetai Road frontage comprising approximately 27,000 m^2 of commercial Gross Floor Area (GFA) and 30,000 m^2 of light industrial GFA;
- Education facilities comprising the development of both primary and secondary schools;
- Establishment of an Ecological Protected Area Network (EPAN) comprising approximately 36 ha of protected and restored ecological land, and additional native revegetation, riparian enhancement and long-term ecological management;
- A series of open spaces including a suburban park, neighbourhood parks, the Fairway Reserve, golf course, esplanade reserve and riparian margins;
- Provision of public access to and along the coastal marine area and the creation of a quality coastal pathway;
- Public transport enhancements and integrations including expanded ferry passenger capacity;
- Staged road upgrades including the provision of pedestrian and cycling facilities along Jack Lachlan Drive, the upgrade of Whitford roundabout, and a series of intersection upgrades; and
- Establishment of infrastructure to service the project including wastewater, water supply, stormwater, telecommunications and power.

1.1 Assessment Scope

Viridis was engaged by BSLP to undertake an Ecological Impact Assessment (EcIA) to inform and accompany the application under the FTAA.

This EcIA identifies and describes the existing terrestrial and freshwater ecological values present within the Site and surrounding environment and assesses the potential ecological effects associated with the proposed development and associated activities. Measures to avoid, remedy, mitigate and offset or compensate adverse ecological effects are identified where relevant.

The Site has previously been subject to detailed ecological investigation and plan change scrutiny through the Beachlands South Plan Change 88 (PC88) process. Accordingly, this assessment draws upon a range of previous ecological investigations undertaken across the wider Beachlands South structure plan area, including terrestrial, freshwater, wetland and marine ecological assessments prepared by Tonkin & Taylor Limited (T&T 2022a-d). These investigations provide an important baseline understanding of ecological values within the wider receiving environment and have been referenced where relevant to inform the current assessment. The current EcIA builds upon this existing body of work by incorporating updated field investigations, current ecological conditions, and an assessment of the specific activities proposed under the FTAA application.

While the FTAA project area includes land at 620 Whitford-Maraetai Road, ecological field investigations undertaken for this assessment were focused on the primary development areas subject to proposed works. A wastewater disposal field is proposed within 620 Whitford-Maraetai Road and has been considered at a high level where relevant to the assessment; however, this part of the project area was not subject to detailed ecological assessment or field verification by Viridis. Information relating to 620 Whitford-Maraetai Road has otherwise been referenced where relevant to provide context regarding ecological linkages, catchment processes and the wider receiving environment.

In addition, a portion of the Site has previously been subject to ecological assessment (Viridis 2025) and approval under an existing Stage 1 earthworks consent. The extent of the consented earthworks within the Site is shown in Figure 1. Ecological values and effects associated with those previously approved works are not reassessed in detail, except where relevant to understanding the current ecological baseline, cumulative effects, or activities proposed under the FTAA application.

Subsequent to completion of the ecological field investigations, the project area was expanded to include two adjoining land parcels (758 and 770 Whitford-Maraetai Road). These areas were not subject to ecological field verification as part of the investigations undertaken for this assessment. Ecological values within these additional land parcels have therefore been identified based on recent aerial imagery, available ecological information, desktop assessment and interpretation of mapped ecological features. While the level of confidence associated with ecological feature mapping and habitat characterisation within these areas is lower than for the remainder of the Site where field verification was undertaken, sufficient information was available to identify broad ecological features and inform the assessment of ecological effects. Field-verified and non-field-verified areas are shown in Figure 1.

Figure 1. Beachlands South Fast Track project area showing the development site, properties subject to ecological assessment (including field-verified and non-field-verified areas), and the consented earthworks boundaries.

2 METHODOLOGY

2.1 Overview

The ecological assessment comprised a combination of desktop review, field investigations, targeted ecological surveys, and review of previous ecological investigations undertaken within the Site and surrounding area. Survey methodologies varied depending on the ecological feature or taxa being assessed and are described further in Sections 2.2 and 2.3 below.

Field investigations were undertaken by Viridis and other specialist consultants during 2025-2026 to assess terrestrial and freshwater ecological values associated with the Site and surrounding environment.

Previous ecological investigations undertaken across the wider Beachlands South structure plan area during the PC88 process were also reviewed and drawn upon where relevant. These included terrestrial, freshwater and coastal ecology assessments prepared by T&T between 2020 and 2022 (T&T 2022a-d), together with associated specialist avifauna, bat and herpetofauna survey reports. Historical survey information, species records, vegetation mapping and ecological assessments from these reports were used to inform the baseline ecological characterisation of the Site and surrounding environment.

Subsequent expansion of the project area incorporated two adjoining land parcels that were not subject to ecological field verification and were therefore assessed using desktop methods, including review of aerial imagery, topographical information, and existing ecological information.

2.2 Terrestrial Ecology

Terrestrial ecological investigations comprised desktop review, habitat assessment, targeted fauna surveys, and field-based vegetation assessments.

Desktop review included assessment of current and historical aerial imagery, Auckland Council GeoMaps layers (including Significant Ecological Areas (SEAs), ecosystem mapping, hydrology and topography), and review of relevant ecological databases and previous technical reporting. Databases reviewed included the Department of Conservation (DOC) Bioweb herpetofauna database, eBird, iNaturalist NZ, and the DOC bat database.

Previous ecological investigations undertaken across the wider Beachlands South structure plan area during the PC88 process were also reviewed and drawn upon where relevant, including terrestrial vegetation and fauna assessments undertaken by T&T between October 2020 and February 2021 (T&T 2022a). Targeted herpetofauna surveys were undertaken on the Site in March and April 2026 by Bioresearches Group Limited (Bioresearches).

The ecological value of terrestrial habitats and fauna was assessed generally in accordance with the Environment Institute of Australia and New Zealand (EIANZ) Ecological Impact Assessment Guidelines (EcIAG; Roper-Lindsay et al. 2018) (refer Section 2.4).

2.2.1 Vegetation and flora

Vegetation and habitat assessments were undertaken during Site investigations completed by Viridis in December and January 2026. The extent, composition, condition and connectivity of both indigenous and exotic vegetation communities within the Site and surrounding environment were recorded qualitatively based on field observations and aerial imagery review.

Vegetation communities were broadly mapped and categorised according to dominant vegetation composition and structure (Appendix A). The assessment considered factors including vegetation condition, indigenous biodiversity values, habitat connectivity, pest plant presence, and relationship to surrounding ecological features including waterways, wetlands and SEAs.

Vegetation classification was undertaken in general accordance with the Auckland region terrestrial ecosystem classification framework developed by Singers et al. (2017), with communities assigned to the most representative ecosystem type where applicable.

The flora assessment focused on identifying indigenous vegetation communities and recording the presence of species listed as 'Threatened' or 'At Risk' under the New Zealand Threat Classification System (NZTCS), together with any regionally uncommon or otherwise notable flora species observed during field investigations.

2.2.2 Avifauna (birds)

Standardised five-minute bird counts (5MBCs) were undertaken to characterise indigenous and exotic avifauna utilising the Site and surrounding environment. Surveys were undertaken generally in accordance with DOC's Five-minute Bird Counts methodology (Hartley & Green 2012).

A total of seven bird count stations (BC1-BC7) were established across the Site, spaced at least 200 m apart (Figure 2). Surveys were undertaken on 13 April 2026 between approximately 8:00 am and 11:00 am during suitable weather conditions (i.e., fine weather with light wind).

At each station, all birds seen and/or heard within an approximate 200 m radius during a five-minute period were recorded. The total number of individuals observed for each species was noted. Care was taken to avoid knowingly counting the same individual more than once during each count period. Binoculars were used to assist species identification, and the same observers undertook all counts to minimise observer variability.

Opportunistic avifauna observations recorded during broader site investigations were also documented and incorporated into the assessment.

Figure 2. Map showing the locations of 5MBCs undertaken on site on 13 April 2026.

2.2.3 Herpetofauna (lizards)

Targeted lizard surveys were undertaken by Bioresearches during March-April 2026 within areas of potentially suitable habitat across the Site. Surveys targeted habitat types considered potentially suitable for indigenous skinks and geckos, including indigenous scrub, rank exotic grassland, ground cover vegetation, woody debris and vegetated gully margins associated with the EPAN. The lizard survey memorandum is provided in Appendix B (Bioresearches 2026).

Surveys included artificial retreat (AR) monitoring, opportunistic hand-searching and targeted nocturnal spotlight surveys for arboreal geckos. AR surveys were undertaken generally in accordance with Lettink and Hare (2016). Survey design comprised 37 survey stations, each containing four ARs (148 ARs total), installed across representative habitat areas throughout the Site. ARs were installed approximately four weeks prior to monitoring to allow acclimatisation. Five survey checks were subsequently undertaken during suitable weather conditions. Opportunistic hand-searching of suitable refugia, including logs, rocks, debris and leaf litter, was undertaken concurrently with AR inspections.

Targeted nocturnal spotlight surveys for arboreal geckos were undertaken across suitable habitat edges using high-powered headlamps and binoculars. Surveys were completed over two nights (2 and 8 April 2026) during suitable weather conditions, with a total survey effort of approximately eight person-hours.

Additional lizard search and salvage works were also undertaken by Bioresearches within the adjacent Stage 1 earthworks area during early 2026. These works included deployment of approximately 100 detection and trapping devices (80 ARs and 20 funnel traps), manual searches, and machine-assisted destructive searches through dense grassland habitat using toothed excavator buckets.

2.2.4 Chiroptera (bats)

Potential bat activity was assessed using automated acoustic monitoring undertaken by Viridis, with technical support from The Ecology Studio Limited (TES)[1].

Eight Song Meter Mini Bat 2 automated bat monitors (ABMs) were deployed across the Site on 3 March 2026 (Figure 3). Monitoring locations targeted likely bat flyways and foraging habitats, including riparian margins, mature shelterbelts, vegetation edges and open pasture interfaces. Monitoring locations were marked in the field using GPS and flagging tape.

Surveys were undertaken generally in accordance with the DOC bat roost guidelines (DOC 2024) and the Bat Inventory and Monitoring Toolbox (Sedgeley et al. 2025). Each ABM was programmed to record from one hour before sunset until one hour after sunrise.

ABMs were deployed for a total of 28 nights. Climatic conditions during the survey period were reviewed using Weather Underground data from the nearest weather station (IAUCKL668) to determine valid survey nights. In general accordance with DOC guidance, valid survey nights were defined as nights with temperatures of at least 8°C during the first four hours after sunset, wind speeds not exceeding 20 km/h, and rainfall not exceeding 2.5 mm during this period.

A total of 22 valid weather nights were available for analysis. A representative subset comprising the first 14 valid weather nights was manually analysed using Kaleidoscope Lite software.

Figure 3. Map showing the locations of ABMs installed on Site in March 2026.

[1] TES personnel involved in the peer review of the survey and analysis hold DOC Bat Recovery Group Competency 3.1 for automated bat monitoring survey and analysis.

2.3 Freshwater Ecology

Freshwater ecological investigations comprised desktop review, field assessment of stream and wetland features, Stream Ecological Valuation (SEV) assessments, and review of previous freshwater ecological investigations undertaken within the Site and surrounding catchments.

Desktop review included assessment of current and historical aerial imagery, Auckland Council GeoMaps layers, topographical and hydrological information, and review of available freshwater ecological datasets and previous technical reporting. This included review of previous freshwater investigations undertaken by T&T during the PC88 process, including fish and macroinvertebrate survey results where relevant.

2.3.1 Watercourses

During site investigations, the presence, extent and condition of streams within the Site were assessed. Watercourses were classified in accordance with Auckland Unitary Plan – Operative in Part (AUP-OP) definitions to determine ephemeral, intermittent or permanent stream status.

Ecological characteristics including hydrological regime, aquatic habitat quality, riparian condition, substrate composition, channel modification and surrounding land use were qualitatively assessed. Modifications to natural flow paths and the presence of artificial drainage features were also recorded.

Potential fish habitat and connectivity were assessed qualitatively in conjunction with review of the NIWA New Zealand Freshwater Fish Database (NZFFD) and previous fish survey results.

2.3.2 Stream Ecological Valuation (SEV)

The SEV methodology (Storey et al. 2011) was used to assess and compare stream ecological function across representative reaches within the Site and proposed offset areas.

The SEV methodology assesses 16 stream functions grouped into four categories:

- Hydraulic function;
- Biogeochemical function;
- Habitat provision; and
- Biodiversity function.

Each function is scored and combined to generate an overall SEV score ranging between 0 (highly degraded stream function) and 1 (pristine stream function).

SEV assessments were undertaken across four representative reaches within the Site on 20 May 2026. Field data collected for SEV assessments included parameters such as stream width and depth, substrate composition, riparian condition, shading, habitat complexity and surrounding land use. Desktop information including catchment imperviousness, riparian vegetation extent, and available historic fish and macroinvertebrate survey data were also considered where relevant. SEV data were entered into the Auckland Council SEV calculator to generate overall stream function scores.

2.3.3 Wetlands

The Ministry for the Environment (MfE) wetland delineation protocols (MfE 2022) were used to determine whether an area met the definition of a 'natural inland wetland' under the National Policy Statement for Freshwater Management 2020 (NPS-FM). Assessments were carried out within the

'growing season' for the Auckland region (MfE 2021). As per the Clarkson (2014) vegetation tool methods, plant species within putative wetlands were identified, and each species was assigned one of the below wetland indicator status ratings (Clarkson et al., 2021):

- Obligate (OBL) – almost always in wetlands, rarely in drylands;
- Facultative wetland (FACW) – usually in wetlands but occasionally found in drylands;
- Facultative (FAC) – commonly occurs in both wetlands and drylands;
- Facultative upland (FACU) – occasionally in wetlands but usually in drylands; or
- Upland (UPL) – rarely in wetlands, almost always in drylands.

Based on the dominance and prevalence of hydrophytic (wetland) species, natural inland wetland presence/absence was determined. Where results of the vegetation assessment remained uncertain or conditions were modified or atypical, hydric soils and hydrological assessments were undertaken.

Value assessments included identifying native and exotic vegetation species, examining the structural tiers within wetland areas, and assessing the quality and abundance of aquatic habitats. Signs of wetland degradation such as pugging and grazing from stock access, structures such as culverts impeding hydrological function, and weed infestation were also noted.

2.3.4 Wetland Ecological Valuation (WEV)

Wetland Ecological Valuation (WEV) assessments were undertaken to quantify the ecological value and condition of wetlands within the Site. The WEV method was developed by RMA Ecology Limited in conjunction with Auckland Council and provides a structured framework for assessing wetland condition and comparing ecological values between impact and compensation sites.

The WEV assesses 29 components across 20 wetland attributes grouped within three broad categories: catchment, wetland and buffer. These components are used to generate a WEV score ranging from 0 to 1, where 0 represents a highly degraded wetland with negligible ecological value and 1 represents a wetland in very high ecological condition.

For the purposes of this assessment, WEV scores were used to provide a quantitative measure of wetland ecological value and to inform the comparison of affected and compensation wetlands.

2.4 Ecological Impact Assessment

The ecological values of the Site, relating to species, communities and systems, were determined as per the EcIAG for use in New Zealand (Roper-Lindsay et al. 2018). This report also identifies statutory guidelines and regulation with respect to ecology (such as watercourses, wetlands, high value vegetation and habitats) where relevant to the proposed development. Using this framework, the EcIAG describes a simple ranking system to assign value to species as well as other matters of ecological importance such as species assemblages and levels of organisation. The overall ecological value is then determined on a scale from '*Negligible*' to '*Very High*'.

Criteria for describing the magnitude of effects are given in Chapter 6 of the EcIAG. The level of effect can then be determined through combining the value of the ecological feature/attribute with the score or rating for magnitude of effect to create a criterion for describing level of effects (Table 1). A moderate level of effect requires careful assessment and analysis of the individual case. For moderate levels of

effects or above, measures need to be introduced to avoid through design, or appropriate mitigation needs to be addressed (Roper-Lindsay et al. 2018).

Table 1. Criteria for describing the level of effects (from Roper-Lindsay et al. 2018).

Magnitude of Effect	Ecological Value				
	Very High	**High**	**Moderate**	**Low**	**Negligible**
Very High	*Very High*	*Very High*	*High*	*Moderate*	Low
High	*Very High*	*Very High*	*Moderate*	Low	Very Low
Moderate	*High*	*High*	*Moderate*	Low	Very Low
Low	*Moderate*	Low	Low	Very Low	Very Low
Negligible	Low	Very Low	Very Low	Very Low	Very Low
Positive	Net Gain	Net Gain	Net Gain	Net Gain	Net Gain

Notes: Where text is italicised, it indicates 'significant effects' where mitigation is required.

3 SITE DESCRIPTION

3.1 Historical and Ecological Context

The Site is situated within the Hunua Ecological District (ED) of the Auckland Region. Historically (pre-human), the Site would have likely supported the ecosystem types Pōhutukawa, pūriri, broadleaved forest (WF4) and Kauri, podocarp, broadleaved, beech forest (WF12).

Native flora characteristic of the WF4 ecosystem type would have most commonly included pōhutukawa (*Metrosideros excelsa*), pūriri (*Vitex lucens*) and kohekohe (*Dysoxylum spectabile*), together with other broadleaved tree species such as karaka (*Corynocarpus laevigatus*), tawa (*Beilschmiedia tawa*), taraire (*B. tarairi*), and tawāpou (*Planchonella costata*). These coastal forests would have provided important habitat and food resources for frugivorous avifauna, while forest productivity would have been enhanced through nutrient deposition from seabirds.

Native flora characteristic of the WF12 ecosystem type would have included podocarp-dominated ridges containing hard beech (*Fuscospora truncata*), tānekaha (*Phyllocladus trichomanoides*), thin-barked tōtara (*Podocarpus laetus*) and kauri (*Agathis australis*), with species such as rimu (*Dacrydium cupressinum*), miro (*Prumnopitys ferruginea*), tawa, hīnau (*Elaeocarpus dentatus*), northern rātā (*Metrosideros robusta*), and rewarewa (*Knightia excelsa*) more common within gullies and lower slopes. These ecosystem types would have supported a diverse assemblage of indigenous invertebrates, amphibians, reptiles, birds and bats (Singers et al. 2017).

A review of historical aerial imagery indicates that the Site, and much of the surrounding landscape, was largely cleared for agricultural purposes (Figure 4). The Site was subsequently subject to extensive landform modification during construction of the Formosa Golf Resort in the mid-1990s, including widespread earthworks, drainage modification and establishment of managed golfing landscapes.

Large areas of indigenous vegetation within the Hunua ED have historically been cleared for agriculture, forestry and urban development. However, relatively high indigenous forest cover remains within the wider region, due in part to the protected Hunua Ranges which comprise approximately 250 km² of mature native forest located approximately 22 km south-east of the Site. An additional approximately 700 ha area of contiguous indigenous forest occurs approximately 3 km east of the Site between Clevedon and Maraetai, providing regionally significant indigenous habitat and ecological connectivity within the wider Hunua ED.

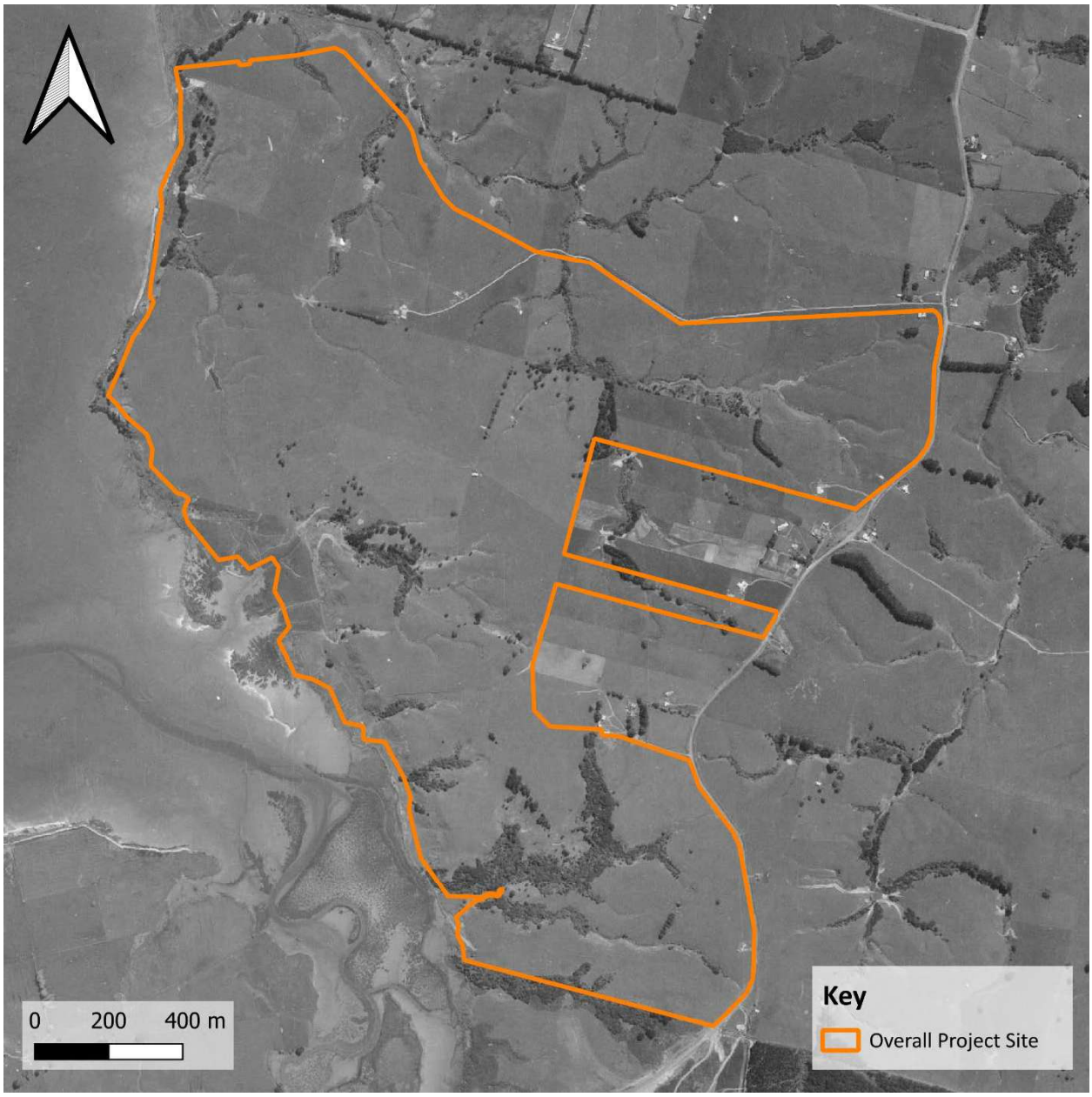

Figure 4. Historical aerial imagery of the Site, dated 1968 (aerial source: Retrolens).

3.2 Current Local and Site Context

The Site is generally bounded by Jack Lachlan Drive to the north, Whitford-Maraetai Road to the east, the Tāmaki Strait and Hauraki Gulf to the west, and undeveloped land to the south. Established residential development occurs immediately north of the Site, while Pine Harbour Marina and ferry terminal are located adjacent to the Site's north-western corner. The western boundary adjoins the coastal marine area of the Tāmaki Strait within the Hauraki Gulf.

The Formosa Golf Resort forms a large portion of the Site, and this area is primarily comprised of actively and highly managed grass areas utilised for golfing activities. Buildings associated with the golf course and accommodation units are located toward the southern part of the Site.

The Site's terrestrial and freshwater environments have been substantially modified through historical agricultural activities and subsequent development of the golf course. Despite this, remnant indigenous vegetation persists within gullies and along portions of the coastal margin, including small areas

identified as terrestrial and marine SEAs under the AUP-OP. These areas may provide important indigenous habitat and ecological connectivity within the wider modified landscape.

The key ecological features present within the Site and surrounding environment are described further in Sections 4 and 5 below.

4 TERRESTRIAL ECOLOGY

4.1 Vegetation

4.1.1 Overview

Vegetation mapping undertaken by Viridis identified six broad vegetation types within the Site: kānuka-dominated regeneration (VS2), exotic forest and treeland (EF), exotic-dominated scrub (ES), exotic grassland (EG), small areas of native planting (PL), and isolated amenity species. Pōhutukawa treeland (CL1) was also noted along the coast, outside of the Site but directly adjacent to the western property boundary. The distribution of these vegetation types is shown in Appendix A.

Vegetation distribution and composition across the Site reflects a long history of modification associated with agricultural land use and subsequent development of the Formosa Golf Resort. Ecological condition varies considerably between vegetation types and individual patches, reflecting differences in historical disturbance, restoration planting, hydrology, management practices and weed invasion. Indigenous vegetation is primarily associated with gullies, riparian margins, constructed pond margins and coastal environments, while the wider site is dominated by managed exotic grassland associated with golfing activities.

4.1.2 Native-dominant Vegetation

Kānuka-dominated regeneration (VS2) and native planted areas (PL) comprise the primary indigenous vegetation communities within the Site and are predominantly associated with gullies, riparian margins, constructed pond margins and other areas incorporated within the EPAN.

Kānuka-dominated vegetation is characterised by a canopy dominated by kānuka (*Kunzea robusta*) and occurs primarily in association with riparian margins and gully systems (Figure 5). Historical aerial imagery suggests these areas are of mixed origin, comprising both naturally regenerating vegetation and historical revegetation planting. Understorey composition is variable and commonly includes indigenous species such as māhoe (*Melicytus ramiflorus*), karamū (*Coprosma robusta*), mapou (*Myrsine australis*), cabbage tree/tī kōuka (*Cordyline australis*), tree ferns and other indigenous shrub species. However, listed pest plant[2] invasion is common, with woolly nightshade (*Solanum mauritianum*), privet (*Ligustrum* spp.), pampas (*Cortaderia selloana*) locally dominant (Figure 6a).

Native planting areas are limited in extent and primarily comprise riparian revegetation planting and amenity planting established around freshwater features within the golf course site and riparian planting at 712 Whitford-Maraetai Road in the southeast of the project area (Figure 6b). These areas generally contain a mixture of common indigenous species such as cabbage tree, māhoe, mānuka (*Leptospermum scoparium*), kānuka, tōtara (*Podocarpus totara*) and kāpuka (*Griselinia littoralis*) and contribute to ecological connectivity and habitat diversity within the wider site.

T&T identified several indigenous flora species that, at the time of their assessment (2021-2022), were classified as 'Threatened' due to the potential adverse effects of myrtle rust (*Austropuccinia psidii*). These included pōhutukawa, kānuka and mānuka. However, all three species have subsequently been reclassified as 'Not Threatened' (de Lange et al. 2024).

[2] As per the Auckland Regional Pest Management Plan 2020-2030.

Ecological condition within these native-dominant vegetation communities is variable, reflecting differing ages of revegetation planting, historical disturbance and pest plant abundance. Kānuka-dominated regeneration provides the majority of existing indigenous vegetation cover within the Site and contributes to indigenous fauna habitat, riparian buffering and ecological connectivity, particularly within gullies and EPAN areas. Accordingly, kānuka scrub areas are considered to provide **moderate** ecological value.

In contrast, native planting areas are generally limited in extent and comprise planted riparian or amenity vegetation established within a highly modified landscape. While these areas contribute to local habitat diversity and connectivity, they are largely artificial in origin and generally provide lower ecological values than the kānuka-dominated vegetation. Accordingly, the native planting areas are considered to provide **low** ecological value.

Figure 5. Examples of kānuka and native-dominant riparian vegetation within the eastern catchment.

a) **b)**

Figure 6. a) Listed pest plants dominated the understorey beneath kānuka canopy in some areas of the Site and b) Planted native riparian vegetation in the east of the golf course site.

4.1.3 Exotic Forest and Treeland

Exotic forest and treeland (EF) occurs throughout parts of the Site, generally in association with gullies, and is commonly characterised by a canopy of mature radiata pine (*Pinus radiata*) (Figure 7). Scattered eucalyptus (*Eucalyptus* spp.) and other exotic and deciduous amenity species are also occasionally present.

Understorey composition varies considerably across the Site. Some stands support indigenous regeneration beneath the exotic canopy, including māhoe, karamū and other common indigenous shrub species, while other areas are largely open or heavily dominated by pest plants such as woolly nightshade, privet, blackberry (*Rubus fruticosus* agg.) and exotic grasses (Figure 7).

Although these areas are highly modified and dominated by exotic canopy species, they provide structural diversity, local habitat for avifauna and potentially marginal habitat for bats (refer Section 4.2), and contribute to ecological connectivity across the Site. However, ecological values are constrained by the dominance of exotic tree species and limited native diversity, weed invasion and the modified nature of the vegetation present.

Overall, the ecological value of these areas is considered to be **low**.

a) **b)**

Figure 7. Examples of exotic-dominant forest and treeland within the Site.

4.1.4 Exotic-dominated Scrub

Areas of exotic-dominated scrub (ES) occur intermittently throughout the Site, particularly along gully and coastal margins, and other unmaintained slopes and areas associated with the golf course (Figure 8 & Figure 9).

These areas are generally characterised by dense exotic shrubland, dominated by listed pest plants[3] including gorse (*Ulex europaeus*), woolly nightshade, Chinese privet and pampas. Localised indigenous

[3] As per the Auckland Regional Pest Management Plan 2020-2030.

regeneration comprising common species such as karamū and māhoe is occasionally present amongst pest plant vegetation.

While the dense vegetation structure may provide some refuge and dispersal opportunities for common fauna species across the landscape (Section 4.2), habitat values are generally marginal and many areas are isolated, resulting in limited ecological function.

Ecological values associated with these areas are constrained by their pest plant dominance, fragmented distribution, limited indigenous species composition, and association with historically disturbed land. While these areas are generally of low ecological value, they provide opportunities for ecological enhancement where they occur within the EPAN and can be integrated with wider revegetation, riparian enhancement and ecological management initiatives proposed across the Site.

Overall, the botanical and ecological value of these areas is considered **low**.

a) **b)**

Figure 8. Riparian areas of exotic-dominated scrub in the a) northeast, and b) south of the Site.

a) **b)**

Figure 9. Examples of exotic-dominated scrub within the a) south and b) northwest of the Site.

4.1.5 Ecological Protected Area Network (EPAN)

The EPAN comprises the primary ecological network within the Site and generally follows vegetated gullies and coastal margins, as identified in the Beachlands South Precinct (Precinct Plan 2; Figure 10). The 74.75 ha EPAN incorporates a mosaic of exotic and indigenous vegetation, revegetation planting, wetlands, riparian habitats and modified vegetation communities.

At present, much of the EPAN is comprised of exotic forest, exotic-dominated scrub, and fragmented regenerating native vegetation communities of varying ecological condition. Pest plant invasion is abundant throughout parts of the network, and many areas have been historically modified through agricultural activities, golf course development and associated earthworks.

Despite the modified and often exotic-dominant nature of the vegetation currently present, the EPAN contributes to ecological connectivity across the wider landscape and provides habitat for indigenous fauna, while also linking surrounding freshwater, coastal and terrestrial environments.

The EPAN areas also provide substantial ecological restoration and enhancement opportunities due to their size and ecological connectivity. Through ongoing revegetation, weed management and habitat enhancement, these areas have the potential to support increased indigenous vegetation cover and improved ecological function over time.

Overall, the EPAN is currently considered to provide **low to moderate** terrestrial ecological value within the context of the wider modified landscape. Ecological values are primarily associated with connectivity across the Site, as well as restoration potential. However, these values are currently highly constrained by fragmentation, pest plant invasion, historical landform modification, and the prevalence of exotic-dominated, planted and regenerating vegetation communities.

Figure 10. Map showing the extent of the EPAN across the Beachlands South Site.

4.1.6 Significant Ecological Areas (SEAs)

A narrow strip of coastal cliff vegetation and several smaller areas of coastal wetland vegetation have been identified as SEA_T_4556 under the AUP-OP (Figure 11). The coastal cliff component is located immediately adjacent to the western Site boundary and predominantly comprises remnant pōhutukawa treeland (CL1; Singers et al. 2017). Approximately 159 m² of SEA_T_4556 extends into the Site boundary across four small areas within the south-western portion of the Site. However, these areas are comprised of exotic-dominant coastal sedgeland.

Two additional terrestrial SEAs are located within 620 Whitford-Maraetai Road. SEA_T_1140 (11.1 ha) and SEA_T_1141 (4.6 ha) comprise indigenous gully vegetation associated with the wider Beachlands South Precinct area. SEA_T_1140 contains taraire, tawa, podocarp forest (WF9) and mānuka, kānuka forest (VS3), and SEA_T_1141 comprises tawa, kohekohe, rewarewa, hīnau, podocarp forest (WF13) (T&T 2022a; Singers et al. 2017). Both SEAs were identified primarily based on vegetation diversity values.

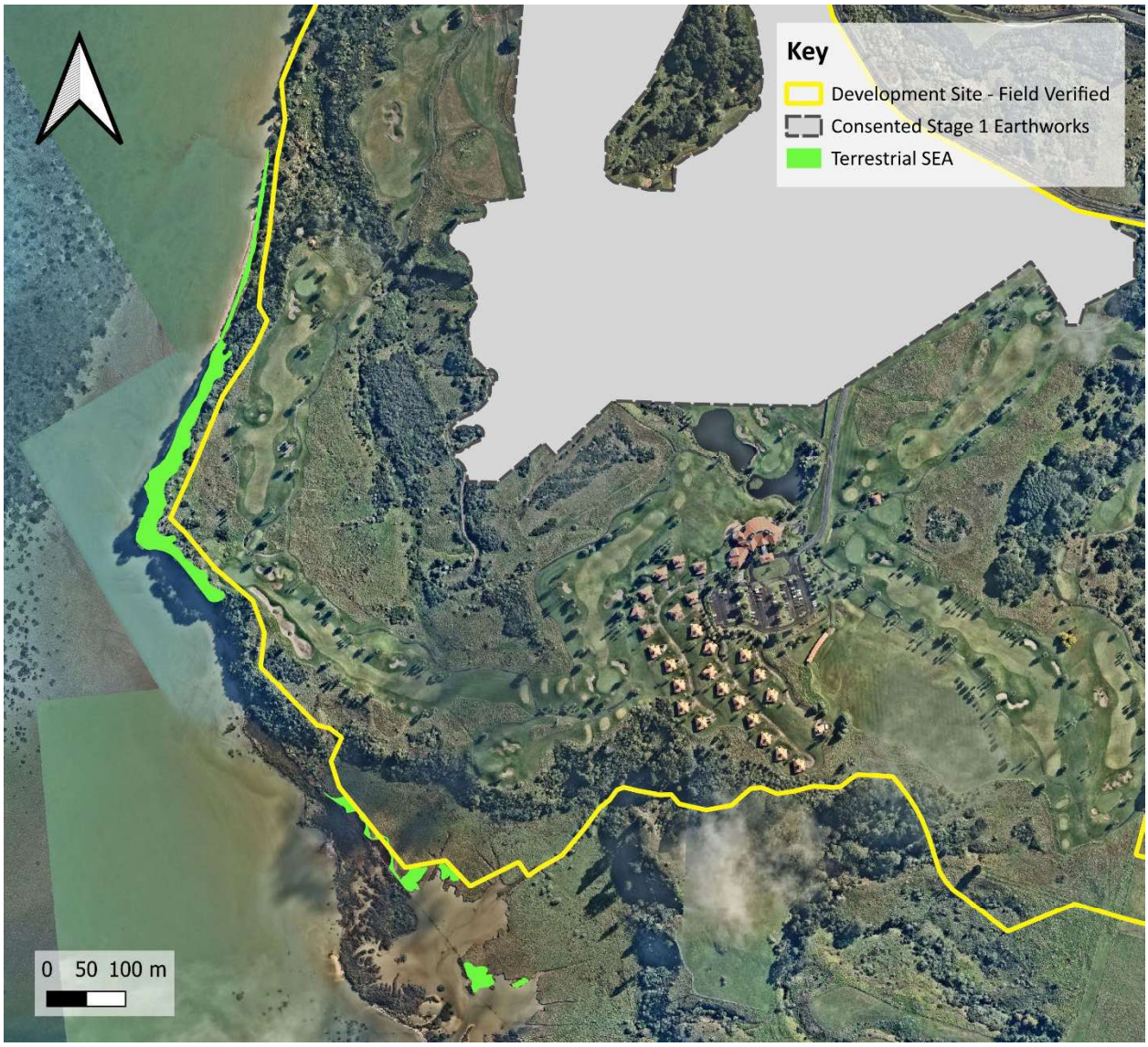

Figure 11. Map showing the terrestrial SEA vegetation within and adjacent to the western and south western boundaries of the development Site.

4.1.7 Exotic Grassland and Amenity Species

The majority of the Site is comprised of actively managed exotic grassland associated with the Formosa Golf Resort. These areas include maintained fairways, rough grassland, landscaped areas and access corridors associated with golfing activities (Figure 12).

Vegetation within these areas is dominated by regularly maintained exotic pasture grasses and turf species. Common grass species recorded include kikuyu (*Cenchrus clandestinus*), cocksfoot (*Dactylis glomerata*), perennial ryegrass (*Lolium perenne*), dallis grass (*Paspalum dilatatum*) and creeping bent (*Agrostis stolonifera*). Indigenous vegetation is generally absent from these areas due to regular mowing and maintenance. Occasional rank grass areas persisted in areas that had been left unmanaged, generally associated with steeper slopes and pond/riparian edges. Rank grass areas may provide limited and localised habitat opportunities for common avifauna and, where suitable refuge habitat is present, indigenous skinks.

Isolated amenity trees and ornamental plantings occur throughout parts of the golf course and surrounding landscaped areas. Amenity species include both exotic and indigenous trees, including phoenix palm (*Phoenix canariensis*), Chinese fan palm (*Livistona chinensis*), pine (*Pinus* spp.) and other ornamental species associated with golf course landscaping.

The ecological value of these areas is **low** due to their highly modified nature, ongoing mowing and maintenance, limited indigenous species diversity, isolated distribution, and lack of structural and compositional complexity.

a)

b)

c)

d)

Figure 12. Examples of isolated exotic amenity trees and exotic managed grassed areas within the golf course.

4.2 Fauna Habitat

4.2.1 Avifauna (birds)

The Site supports avifauna communities typical of modified rural, coastal fringe and urban-edge environments within the Auckland region. Existing habitat within the Site is dominated by maintained exotic grassland associated with the Formosa Golf Resort, together with scattered exotic trees, exotic-dominated scrub, constructed ponds and remnant vegetated gullies associated with the EPAN. These habitats provide varying degrees of nesting, roosting, refuge and foraging habitat for both indigenous and exotic bird species.

The highest-quality bird habitat within the Site is associated with vegetated gullies, remnant and planted tree vegetation within the EPAN, constructed pond margins, and areas of rank grassland and wetland vegetation. These habitats provide opportunities for nesting, shelter and foraging, including feeding on fruiting trees, seeds and invertebrates. Open grassland areas also provide habitat for species adapted to modified open environments.

Avifauna surveys undertaken by T&T during 2020/2021 and supplemented by Viridis in April 2026 recorded a total of 34 bird species within the wider Site and surrounding environment, including 20 indigenous species. Additional five-minute bird counts undertaken by Viridis in April 2026 confirmed ongoing utilisation of the Site by a range of indigenous and introduced bird species. A table detailing all bird species observed within and adjacent to the Site is provided in Appendix C.

Common indigenous and exotic species known to utilise the Site and surrounding environment include kererū (*Hemiphaga novaeseelandiae*), tūī (*Prosthemadera novaeseelandiae*), riroriro/grey warbler (*Gerygone igata*), pīwakawaka/fantail (*Rhipidura fuliginosa*), kōtare/sacred kingfisher (*Todiramphus sanctus*), pūkeko (*Porphyrio melanotus*), kāhu/swamp harrier (*Circus approximans*), welcome swallow (*Hirundo neoxena*), white-faced heron (*Egretta novaehollandiae*), paradise shelduck (*Tadorna variegata*) and ruru (*Ninox novaeseelandiae*). Common introduced species such as myna (*Acridotheres tristis*), blackbird (*Turdus merula*), house sparrow (*Passer domesticus*), Australasian magpie (*Gymnorhina tibicen*) and eastern rosella (*Platycercus eximius*) are also common throughout the Site.

Several species classified as 'Threatened' or 'At Risk' under the NZTCS have also been recorded within the wider Site or are considered likely to intermittently utilise habitats within the Site. New Zealand pipit/pihoihoi (*Anthus novaeseelandiae*, At Risk – Declining) have previously been recorded within open grassland habitats across the wider PC88 area (to the south of the Site) (Robertson et al. 2021). Given the extensive maintained grassland habitat present, small numbers of pipit may intermittently utilise parts of the Site, although habitat quality is generally reduced by regular mowing and ongoing disturbance associated with golf course operations and surrounding urban activity.

Long-tailed cuckoo/koekoeā (*Urodynamis taitensis*; Threatened – Nationally Vulnerable) were detected incidentally during acoustic surveys undertaken by T&T (2022a; Robertson et al. 2021)). However, this species is expected to only occur intermittently during seasonal movements, and breeding within the Site is considered unlikely due to the apparent absence of key host species, namely whitehead/pōpokotea (*Mohoua albicilla*).

North Island kākā (*Nestor meridionalis septentrionalis*; At Risk – Recovering) were not observed during Site investigations, but may occasionally traverse or temporarily utilise tree vegetation within the Site while moving through the wider landscape. However, the Site is not considered to provide significant habitat for the species due to the fragmented and highly modified nature of the vegetation present.

Constructed ponds and associated wetland vegetation within the Site also provide habitat for wetland-associated avifauna, including pāteke/brown teal (*Anas chlorotis*; Threatened – Nationally Increasing), weweia/New Zealand dabchick (*Poliocephalus rufopectus*; Threatened – Nationally Increasing), pied shag/kāruhiruhi (*Phalacrocorax varius*; At Risk – Recovering), and black shag/kawau (*Phalacrocorax carbo novaehollandiae*; At Risk – Naturally Uncommon). Several of these species have been previously recorded within the Site and wider Precinct area by T&T and through online records.

Due to the Site's proximity to the coastal environment and associated estuarine habitats, a range of coastal and shorebird species also utilise adjacent beach and intertidal habitats (T&T 2022c). Coastal bird surveys undertaken by T&T in 2021 identified several 'Threatened' and 'At Risk' species utilising intertidal feeding habitat, sandbar roosting habitat and nearshore coastal waters. Notable species recorded included Caspian tern (*Hydroprogne caspia*; Threatened – Nationally Vulnerable), New Zealand dotterel/tūturiwhatu (*Charadrius obscurus*; Threatened – Nationally Increasing), banded dotterel/pohowera (*Charadrius bicinctus bicinctus*; At Risk – Declining), banded rail/moho pereru (*Gallirallus philippensis assimilis*; At Risk – Declining), lesser knot (*Calidris canutus*; At Risk – Declining), bar-tailed godwit/kuaka (*Limosa lapponica baueri*; At Risk – Declining), South Island pied oystercatcher/tōrea (*Haematopus finschi*; At Risk – Declining), variable oystercatcher/tōrea pango (*Haematopus unicolor*; At Risk – Recovering), royal spoonbill/kōtuku ngutupapa (*Platalea regia*; At Risk – Naturally Uncommon) and little shag/kawaupaka (*Phalacrocorax melanoleucos brevirostris*; At Risk – Relict) (Robertson et al. 2021).

Overall, the Site itself provides **moderate** ecological value habitat for avifauna. While much of the Site is highly modified and dominated by managed exotic grassland, the Site still provides a mosaic of terrestrial and freshwater habitats capable of supporting a range of indigenous bird species, including several 'Threatened' and 'At Risk' species on an intermittent or localised basis. Habitat value is enhanced by the Site's proximity to the coastal environment, surrounding freshwater habitats, and larger indigenous vegetation remnants within the wider landscape.

The adjacent coastal environment and associated intertidal habitats support **high** ecological values for coastal and shorebird species, including several species classified as 'Threatened' or 'At Risk' under the NZTCS. However, these habitats are generally located outside the proposed development footprint.

4.2.2 Herpetofauna (lizards)

Herpetofauna comprise a significant component of New Zealand's terrestrial biodiversity. There are currently 159 recognised endemic reptile and amphibian taxa in New Zealand, 129 of which are classified as 'Threatened' or 'At Risk' (Hitchmough et al. 2026). All indigenous reptiles and amphibians are legally protected under the Wildlife Act 1953, and habitat supporting indigenous herpetofauna is recognised as a matter of ecological significance under the Resource Management Act 1991.

Targeted lizard surveys undertaken by Bioresearches during March-April 2026, together with search and salvage works undertaken within the adjacent Stage 1 earthworks area during early 2026, did not detect indigenous lizards within the Site. Records of indigenous lizards within 10 km of the Site include copper skink (*Oligosoma aeneum*, At Risk – Declining), ornate skink (*Oligosoma ornatum,* At Risk – Declining), elegant gecko (*Naultinus elegans*, At Risk – Declining), forest gecko (*Mokopirirakau granulatus*, At Risk – Declining) and Pacific gecko (*Dactylocnemis pacificus*, Not Threatened). The closest known indigenous lizard record is a forest gecko observation located approximately 2.5 km north-east of the Site (DOC Bioweb database, accessed May 2026; T&T 2022a).

Introduced plague skink (*Lampropholis delicata*) were opportunistically observed during Site investigations and are expected to be common throughout the Site, particularly within areas containing rank grassland, woody debris and exotic vegetation margins.

The highest-quality potential indigenous lizard habitat within the Site is associated with vegetated gullies and EPAN areas containing indigenous scrub, rank grassland, woody debris and leaf litter. However, these habitats are generally fragmented, highly modified, and lack a well-developed indigenous understorey and strong terrestrial connectivity typically associated with higher-quality arboreal gecko habitat. The wider Site is dominated by regularly maintained exotic grassland associated with golfing activities, which generally limits habitat suitability for indigenous lizards due to frequent mowing and disturbance. Nevertheless, unmanaged areas of rank grassland, garden waste, leaf litter and woody debris may provide localised refuge opportunities for small numbers of indigenous skinks, particularly copper skink and ornate skink.

No amphibian habitat was identified within the Site, and indigenous amphibians are not considered likely to be present due to the absence of suitable habitat features and the highly modified nature of the Site.

Overall, the ecological value of the Site for indigenous herpetofauna is conservatively considered to be **low to moderate**. While targeted surveys did not detect indigenous lizards, small numbers of indigenous skinks may still occur intermittently within isolated areas of suitable habitat associated with EPAN vegetation and unmanaged grassland margins.

4.2.3 Chiroptera (bats)

New Zealand has two species of endemic bats on the mainland. The most widespread is the long-tailed bat (*Chalinolobus tuberculatus*, Threatened – Nationally Critical), although colonies are assumed to be small and their health is largely unknown (O'Donnell et al., 2023).

The lesser short-tailed bat has three described subspecies; the northern lesser short-tailed bat (*Mystacina tuberculata aupourica,* Threatened – Nationally Vulnerable), the central lesser short-tailed bat (*Mystacina tuberculata rhyacobia,* At Risk – Declining) and the southern lesser short-tailed bat (*Mystacina tuberculata tuberculata,* Threatened – Nationally Increasing) (O'Donnell et al., 2023). There are no known populations of the short-tailed bat on the mainland in the Auckland region, with the closest known population being the northern lesser short-tailed bat population on Te Hauturu-o-Toi/Little Barrier Island.

Mature trees within the Site, such as the large pines within the EPAN and isolated trees within golf course areas, may provide roosting opportunities for bats. However, these trees are expected to offer low-value roosting habitat due to their exposed and isolated nature. High-quality SEA native bush fragments to the south and east of the Site are expected to provide roosting and foraging habitat of significantly greater value.

Bats typically roost in tree features such as hollows, under split or flaking bark, or within dense epiphytes, and may also use rocky overhangs. During the warmer breeding season, long-tailed bats often form large communal roosts in similar features. They are highly mobile, with extensive home ranges (>5,000 ha) and can travel large distances (up to ~25 km) each night while foraging. Long-tailed bats are known to utilise forest edges and linear landscape features such as vegetated gullies, stream corridors, and road edges as transit routes between roosts and feeding areas.

Acoustic surveys using ABMs undertaken T&T in February 2021 (T&T 2022a) and by Viridis in March 2026 detected no bats. ABMs were deployed in areas where bat activity was considered most likely, including mature trees, near watercourses and wetlands, and along vegetated edges. Acoustic surveys undertaken by Bioresearches in March 2026 during tree clearance supervision works associated with the Stage 1 consented earthworks area also recorded no bat detections (Appendix B). Although no detections were recorded, this does not entirely rule out the occasional use of the Site by long-tailed bats but suggests these habitats are unlikely to be frequently used.

The nearest record of long-tailed bat activity is approximately 8.5 km south of the Site, at the southern end of Clevedon Scenic Reserve (DOC distribution database, accessed 8 June 2026). A matrix of indigenous forest and commercial pine plantation extends to within approximately 700 m of the Site and provides potential landscape connectivity to this area. If long-tailed bats are present within this wider forest matrix, it is possible they may occasionally utilise parts of the Site given their extensive nightly foraging ranges.

However, historical surveys undertaken within Ōmana Regional Park and Maraetai Bush, located approximately 2-3 km northeast of the Site, did not record any bat activity. Similarly, acoustic bat monitors deployed around Brookby Quarry, approximately 5 km south of the Site, between 2017 and 2024 recorded no bat detections.

Although intermittent use of the Site by long-tailed bats cannot be entirely ruled out, the absence of bat detections from multiple surveys undertaken within the wider area, together with the generally marginal suitability of on-site habitat, indicates that the Site provides **low** ecological value for bats.

5 FRESHWATER ECOLOGY

5.1 Freshwater Environment Overview

The freshwater environment within the Site has been extensively modified through historical land use and landscape alteration. Prior to European settlement, the Site likely contained a network of natural streams, seepages and wetlands draining westward toward the Tāmaki Strait and Hauraki Gulf. Subsequent vegetation clearance and agricultural development altered much of the Site's natural hydrology. More recently, extensive earthworks associated with construction of the Formosa Golf Resort (circa 1996) further modified the Site's landforms, drainage patterns and freshwater habitats (Figure 13).

Historical aerial imagery indicates that golf course development involved widespread recontouring of the landscape, construction of artificial drainage channels, excavation of ponds, installation of culverts, modification of natural watercourses, and creation of managed turf and landscaped areas. As a result, many freshwater features within the Site now exhibit varying degrees of modification to their morphology, hydrology and ecological function. The distribution of these features is shown in Appendix D. A summary of freshwater feature classifications is provided in Appendix E.

Due to the highly modified nature of the Site, classification of freshwater features required consideration of historical aerial imagery, topography, hydrology, vegetation communities, evidence of artificial modification, and current ecological characteristics. In many cases, obvious distinctions between natural and artificial freshwater systems are no longer clear. Consequently, the classifications in this assessment represent the best professional interpretation of the feature’s origin, hydrological function and current ecological characteristics, based on field observations, historical aerial imagery, topography, hydrological context and current vegetation/habitat characteristics. Where uncertainty existed, a conservative approach to the naturalness of a feature was taken.

A small number of watercourses also exhibited variable flow regimes, with sections becoming subsurface, discontinuous, or transitioning between intermittent and ephemeral characteristics along their length. In these instances, a conservative approach was adopted whereby the entire reach was classified as intermittent, rather than assigning individual reaches multiple classifications.

It is important to note that classification as a permanent or intermittent stream does not imply a lack of historical modification. Many, if not all of the streams within the Site have been subject to varying degrees of channel modification, culverting, riparian clearance, artificial incision, significant catchment modification or other hydrological alterations. The modified natural stream classification has therefore been assigned to watercourses where historical modification has substantially altered the stream's morphology, hydrology and/or ecological function relative to its likely natural condition.

Figure 13. Historical aerial imagery from 1996 showing extensive earthworks and construction of the Formosa Golf Resort, including creation of artificial ponds, drainage features and modified landforms.

5.2 Watercourses

5.2.1 Permanent and Intermittent Streams

Approximately 18 permanent and intermittent stream reaches were identified within the Site and have been mapped as shown in Appendix D. These features occur across multiple catchments and range from relatively intact, well-shaded permanent streams within vegetated gullies to highly modified intermittent headwater tributaries associated with the managed golf course landscape.

Permanent streams are generally concentrated within gullies and lower catchment areas, and many retain natural stream characteristics including defined channels, permanent flow, riparian shading and diverse instream habitat. Stream substrates vary throughout the Site and include soft sediment, gravel and cobble-dominated habitats, although some substrate materials are likely to have been introduced during golf course construction and maintenance activities.

In contrast, many intermittent reaches occur within upper catchment areas and more open parts of the Site. These streams are generally subject to lower levels of riparian shading and are often influenced by surrounding golf course management and historical landform modification. Several intermittent reaches were dry during field surveys undertaken in May 2026 following an extended period of dry autumn weather.

Overall, permanent and intermittent streams within the site are considered to provide **low to moderate** ecological value. Permanent streams and intermittent streams associated with the EPAN generally provide higher ecological value due to greater hydrological connectivity, more established riparian

vegetation, aquatic habitat provision, less historical modification, and potential habitat for indigenous freshwater species. These reaches are considered to provide moderate ecological value.

In contrast, several intermittent streams within the upper catchments and areas outside of the EPAN provide lower ecological value due to historical channel modification, culverting, altered hydrology, limited riparian vegetation, and/or their location within highly modified agricultural and golf course environments. Overall stream values across the site are therefore variable, reflecting the modified nature of the wider landscape.

a) **b)**

Figure 14. Examples of permanent streams within the Site, showing a) Watercourse 23 and b) fish passage barrier along Watercourse 23, showing evidence of historical modification.

a) **b)**

Figure 15. Examples of intermittent streams on site, showing a) a small amount of surface water within Watercourse WC-25's channel during February 2026, and b) the intermittent channel of Watercourse WC-40 showing artificially placed rip-rap.

a) b)

Figure 16. Examples of intermittent upper reaches within more open areas on site, showing the narrow and incised nature of a) Watercourse WC-24 and b) Watercourse WC-16.

5.2.2 Modified Natural Streams

Six watercourses within the Site have been classified as modified natural streams (Appendix D). These features are considered to have originated as natural stream systems but have been substantially altered through historical land modification, drainage works, channel realignment, pond construction, and changes to natural hydrological processes.

While many streams within the Site exhibit some degree of historical modification, the watercourses classified as modified natural streams have undergone more substantial alteration to their morphology, hydrology and ecological function (Figure 17). In some locations, modification has been sufficiently extensive that channels now exhibit wetland-like characteristics, including poorly defined channels and dominance of emergent wetland vegetation such as mercer grass (*Paspalum distichum* – FACW) (Figure 17). Several features have also been heavily influenced by online pond construction and associated drainage infrastructure, resulting in altered flow regimes and hydrological processes.

Despite their modified condition, historical aerial imagery, topographic context, hydrological connectivity and evidence of former channel systems indicate that these features originated as natural streams. Accordingly, they have been conservatively classified as modified natural streams rather than artificial drainage channels.

The ecological values of these features are constrained by altered hydrology, reduced habitat complexity, and the effects of historical disturbance. However, they continue to provide ecological functions including aquatic habitat and hydrological and freshwater ecological connectivity.

Overall, modified natural streams are considered to provide **low-moderate** ecological value.

Figure 17. a) Examples of modified reach of Watercourse WC-20 upstream of a constructed online pond, and b) Watercourse WC-7 located upstream of a constructed pond which has altered the hydrology and resulted in the formation of incidental wetland associated with the channel.

5.2.3 SEV Assessments

SEV assessments were undertaken at four representative intermittent stream reaches within the Site to characterise stream ecological function and inform the assessment of freshwater ecological values. Assessment locations were selected to represent the range of stream conditions present within the Site and freshwater features potentially affected by the proposed development (Figure 18). Macroinvertebrate and fish inputs for the SEV assessments were informed by previous aquatic ecology surveys undertaken by T&T (2022b), using the nearest representative sampling location for each assessed reach.

Overall SEV scores ranged from 0.35 to 0.58, with a mean score of 0.48 (Appendix F). The results indicate a moderate level of ecological function overall, although substantial variation was observed between assessment sites. This variation largely reflects differences in riparian vegetation, shading, habitat complexity, and hydrological condition within individual stream reaches.

Across all assessment sites, hydraulic functions generally scored highest, reflecting the continued ability of the stream network to convey and retain water despite historical modification. Habitat provision and biodiversity functions were generally lower, reflecting limited riparian cover, modified channel form, reduced habitat diversity and the predominance of disturbance-tolerant aquatic communities within parts of the Site.

The SEV results are consistent with field observations and previous freshwater investigations undertaken by T&T (2022b), which identified generally modified stream systems characterised by reduced habitat complexity and predominantly poor to fair macroinvertebrate community condition.

Overall, the assessed intermittent stream reaches were considered to retain generally **moderate** ecological function despite the effects of historical land modification, drainage works and golf course development. However, ecological function and value varied across the site, with some upper catchment and highly modified intermittent reaches exhibiting lower ecological values than more connected stream reaches within the EPAN.

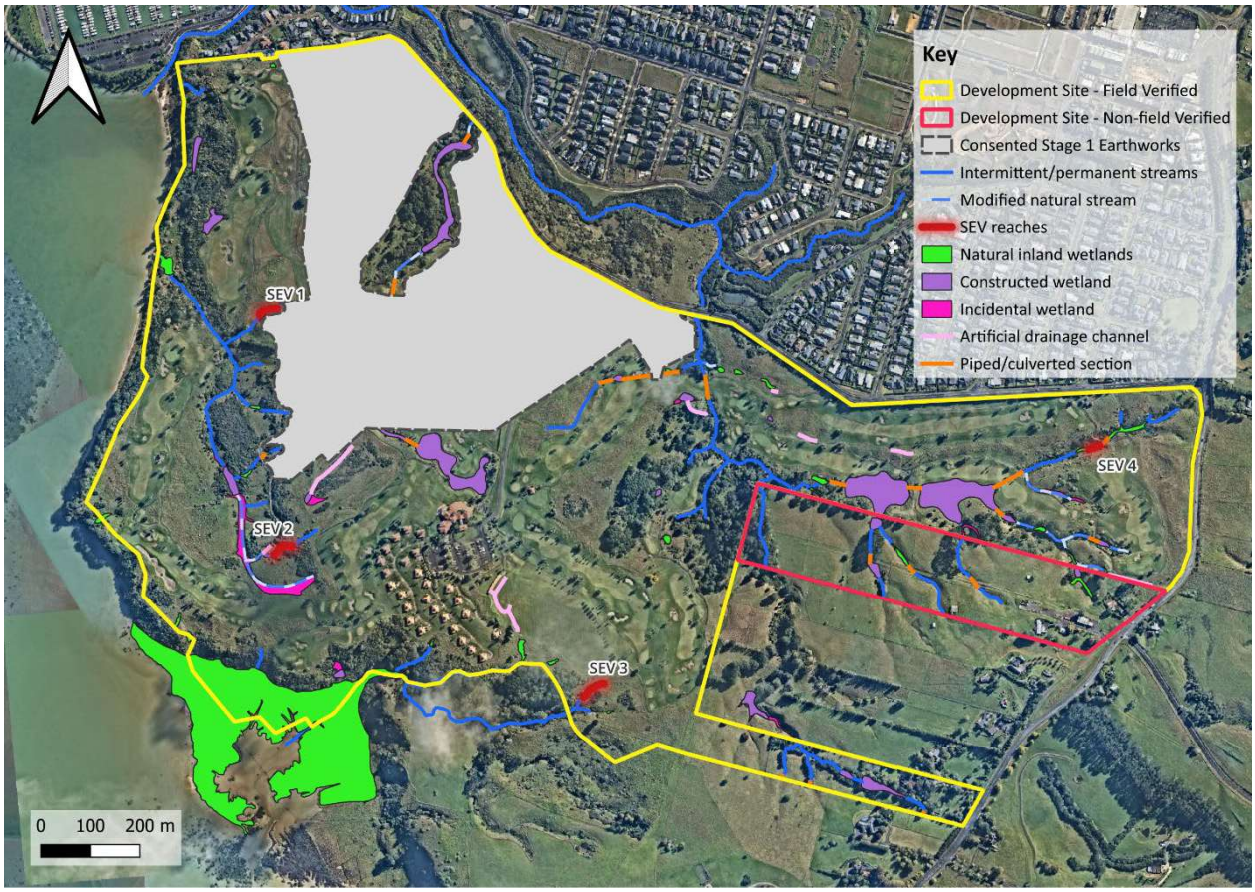

Figure 18. Locations of SEV assessments undertaken by Viridis in May 2026.

5.2.4 Artificial Drainage Channels

Eight artificial drainage channels were identified throughout the Site (Appendix D). These features are entirely artificial in origin and have been constructed to facilitate drainage of the golf course and surrounding modified landscapes. Classification was informed by historical aerial imagery, channel morphology, alignment, topographic context and the absence of evidence indicating a natural stream origin.

Artificial drainage channels are typically characterised by straightened alignments, artificially deepened channels, and limited riparian vegetation (Figure 19). Many occur within actively managed golf course environments and are subject to ongoing maintenance. Several channels are associated with constructed ponds and drainage infrastructure, and in places support incidental wetland habitat and wetland vegetation communities (Section 5.5).

As artificial drainage features, these channels primarily function as golf course drainage and stormwater conveyance infrastructure. Most provide limited aquatic habitat, ecological connectivity or indigenous vegetation values. However, some channels support localised emergent vegetation or contain intermittent wetted habitat and may therefore provide limited habitat opportunities for freshwater species such as shortfin eel.

Overall, artificial drainage channels are considered to provide **negligible to low** ecological value.

Figure 19. Artificial drainage channel (WC-18) within the Site in a managed golf course area.

5.3 Natural Inland Wetlands

A total of 27 natural inland wetlands were identified within the Site (Appendix D). The majority are associated with gully headwaters, seepages, drainage lines and other low-lying areas within the wider catchment network.

All wetlands met the rapid vegetation test for wetland delineation and exhibited hydrological indicators such as saturated ground and/or surface water, in line with Clarkson (2014) and MfE (2022). Wetland extent was delineated based on a clear transition from wetland vegetation dominated by OBL and FACW species to surrounding vegetation communities dominated by FACU and UPL species. All natural wetlands were considered to meet the definition of a 'natural inland wetland' under the NPS-FM.

All other areas assessed were determined to be non-wetland habitats, comprising either actively managed golf course areas or terrestrial vegetation communities, including exotic-dominated scrub.

Most wetlands are highly modified and support vegetation communities dominated by common exotic wetland species, particularly soft rush (*Juncus effusus* – FACW) and mercer grass (Figure 20). Wetlands vary considerably in size; however, with the exception of the coastal fringe wetland, the majority comprise relatively small and localised features. Indigenous wetland vegetation is present within some wetlands, including areas dominated by purua grass (*Bolboschoenus fluviatilis* – OBL) and indigenous *Carex* species such as *C. secta* (OBL), *C. virgata* (FACW), and *C. lessoniana* (FACW) (Figure 21 & Figure 22a). However, indigenous-dominated wetlands are uncommon within the Site and generally occur as small, localised patches.

The majority of wetlands are considered to have formed or persisted within modified landscapes and exhibit varying degrees of hydrological alteration, weed invasion and historical disturbance. While botanical values are generally low due to the predominance of common exotic wetland species and limited indigenous biodiversity, these wetlands continue to provide some freshwater habitat, hydrological functions and ecological linkages within the wider freshwater network.

A notable exception is a large coastal fringe wetland located adjacent to the western margin of the Site (Appendix D; Figure 22b). Although this wetland is also dominated by relatively common wetland vegetation, it is substantially larger than other wetlands present within the Site and contributes to ecological connectivity, habitat provision and freshwater-coastal ecosystem linkages. The wetland also provides opportunities for ecological restoration and enhancement.

Overall, the ecological value of natural inland wetlands within the Site is variable. Most small inland wetlands are considered to provide **low** ecological value due to their modified condition, small size and limited indigenous vegetation values. However, the coastal fringe wetland is considered to provide **moderate** ecological value due to its size, connectivity, ecological function and restoration potential.

Figure 20. Exotic wetlands within the golf course dominated by soft rush, a) Wetland W22 and b) Wetland W30.

a) **b)**

Figure 21. Native-dominant Carex wetlands within the easternmost catchment, a) Wetland W47 and b) Wetland W48.

a) **b)**

Figure 22. a) Wetland W1 dominated by purua grass (OBL), and b) the large coastal fringe wetland (Wetland W14) dominated by exotic Carex divisa (FAC) with scattered native Juncus rushes.

5.3.1 WEV Assessments

WEV assessments were undertaken for Wetland W48 and the proposed compensation wetland (part of W14) within the Site (refer Section 7.4.3 & Appendix G).

Wetland W48 was selected as the representative impact wetland for the purposes of the freshwater compensation assessment, as it represented the highest-value wetland proposed for reclamation. This approach is considered conservative, noting that several of the wetlands proposed for reclamation comprise lower-value exotic-dominated wetland habitats.

Wetlands W48 and W14 achieved WEV scores of 0.612 and 0.64, respectively, indicating low to moderate ecological condition. These scores are not necessarily representative of the average wetland condition within the Site, as W48 was deliberately selected due to its relatively higher ecological values, including its larger size and predominantly indigenous vegetation cover. Higher scores are typically associated with larger wetlands supporting greater indigenous vegetation cover, wider buffers and less modified catchments, whereas lower scores are generally associated with smaller wetlands influenced by surrounding development, drainage modification and exotic vegetation dominance.

The WEV assessments were subsequently used to inform the assessment of wetland effects and the freshwater compensation accounting presented in Section 7.4.3. Full WEV assessment results are provided in Appendix G.

5.4 Constructed Wetlands/Ponds

A total of 16 constructed wetlands/ponds were identified within the Site (Appendix D). Historical aerial imagery confirms that these ponds were created during extensive land modification associated with development of the Formosa Golf Resort and are entirely artificial in origin. Pond size, hydrological connectivity, surrounding vegetation and ecological function vary considerably across the Site. Several ponds are located online within modified stream systems and form part of the wider freshwater network, while others are offline features associated with local drainage, stormwater management and landscape amenity.

Under the NPS-FM, all man-made ponds meet the definition of a deliberately constructed wetland and are excluded from the definition of a natural inland wetland. Accordingly, the Resource Management (National Environmental Standards for Freshwater) Regulations 2020 (NES-F) wetland regulations do not apply to these features. This exclusion also extends to incidental wetlands that have formed in association with deliberately constructed waterbodies, including constructed ponds and other artificial freshwater features (Section 5.5).

The ponds predominantly comprise open water habitat with varying levels of aquatic and marginal vegetation (Figure 23), although some of the smaller offline ponds contained little or no surface water during field surveys undertaken in February and May 2026. Pond margins are commonly dominated by exotic wetland species including mercer grass and water pepper (*Persicaria hydropiper* – FACW), although indigenous wetland vegetation such as raupō (*Typha orientalis* – OBL) is present in places. Vegetated buffers are generally limited around many ponds, particularly within actively managed golf course areas. However, several ponds associated with the EPAN and vegetated gullies support established riparian and wetland vegetation, including indigenous revegetation plantings.

Although artificial in origin, constructed ponds contribute to habitat diversity within the wider Site through the provision of open water habitat and marginal wetland vegetation. T&T (2022b) recorded

wetland-associated avifauna utilising pond habitats within the Beachlands South area, including pāteke and dabchick/weweia (both Threatened – Nationally Increasing). Online ponds and larger permanently inundated ponds also provide greater opportunities for use by freshwater fauna, including mobile species such as shortfin and longfin eel where suitable connectivity is present.

The ecological values of constructed ponds vary depending on their size, hydrological connectivity, vegetation cover and surrounding habitat context. Online ponds and larger permanent ponds generally provide greater habitat provision and freshwater connectivity values, while smaller isolated ponds are typically of lower ecological value and primarily provide localised habitat functions.

Overall, constructed ponds are considered to provide **low to moderate** ecological value. Ecological values are associated with habitat provision for indigenous fauna, open water habitat, and increased habitat diversity within the modified golf course landscape. However, these values are constrained by their artificial origin, generally poor water quality, limited habitat complexity, and variable connectivity to the wider freshwater network.

Figure 23. Examples of the constructed online ponds present within the Site (Wetlands W39 & W40).

Figure 24. Constructed ponds present near the existing golf resort restaurant/bar (Wetland W19).

5.5 Incidental Wetlands

Six incidental wetlands were identified throughout the Site (Appendix D). Constructed waterbodies, including artificial drainage channels and constructed ponds, may develop associated wetland habitat as a result of their construction, operation and ongoing maintenance. As noted above, under the NPS-FM, these wetland habitats, commonly referred to as incidental wetlands, are also not considered natural

inland wetlands and are not subject to the NES-F wetland regulations. Historical aerial imagery and site observations indicate that these wetlands have developed in association with constructed freshwater features and altered hydrological conditions rather than representing remnant natural wetland systems.

In some locations, incidental wetland habitat occurs in association with modified natural stream systems. These areas exhibit both stream and wetland characteristics and are considered to reflect substantial historical modification of former stream channels. Reduced gradients, localised ponding, drainage modification and the influence of downstream online ponds have resulted in the development of wetland vegetation and wetland-like hydrological conditions within parts of these systems. Accordingly, these areas have been mapped as modified natural streams with associated incidental wetland habitat to reflect both their inferred stream origin and current ecological characteristics.

Incidental wetlands are generally small and comprise a mixture of emergent wetland vegetation, shallow ponding and seasonally saturated areas. Vegetation is predominantly comprised of common exotic wetland species including soft rush, *C. divisa*, mercer grass and other disturbance-tolerant wetland plants (Figure 25 & Figure 26). Indigenous wetland species are present in some locations but generally occur as minor components of the vegetation community.

Ecological values are constrained by the artificial origin of these features, modified hydrology, and predominance of invasive exotic wetland vegetation. While incidental wetlands contribute to habitat diversity within the wider freshwater environment, they generally lack the indigenous vegetation composition, ecological function and habitat values associated with less modified wetland systems.

Overall, incidental wetlands are considered to provide **low** ecological value.

Figure 25. Incidental wetland associated with a) a constructed swale in the east of the Site (Wetland W46), and b) a constructed pond within the southern portion of the EPAN (Wetland W15).

a)

b)

Figure 26. Photos showing the exotic-dominant vegetation (C. divisa dominant) present within Wetland W10, which formed in association with a modified natural stream and downstream constructed pond.

5.6 Aquatic Fauna

5.6.1 Fish and Kōura

Freshwater fish surveys were previously undertaken by Tonkin & Taylor (T&T 2022b) using a combination of electric fishing (EFM) and environmental DNA (eDNA) sampling. Survey locations were distributed across representative freshwater habitats within the wider Beachlands South area and included both permanent and intermittent stream systems.

A total of six indigenous freshwater species were detected during surveys, comprising shortfin eel *(Anguilla australis*), longfin eel (*Anguilla dieffenbachii*), banded kōkopu (*Galaxias fasciatus*), giant kōkopu (*Galaxias argenteus*), īnanga (*Galaxias maculatus*) and kōura (*Paranephrops planifrons*). Common bully (*Gobiomorphus cotidianus*) was also detected through eDNA sampling. The fish community was dominated by species tolerant of modified habitats and variable flow conditions, although several At Risk and Threatened species were also detected.

Table 2. Indigenous freshwater fauna recorded within the wider Beachlands South area (adapted from T&T 2022b).

Common name	Survey method	Conservation status*
Banded kōkopu	EFM, eDNA	At Risk – Naturally Uncommon
Common bully	eDNA	Not Threatened
Giant kōkopu	eDNA	At Risk – Declining
Īnanga	eDNA	Threatened – Nationally Vulnerable
Kōura	EFM, eDNA	Not Threatened
Longfin eel	EFM, eDNA	At Risk – Declining
Shortfin eel	EFM, eDNA	Not Threatened

*As per Dunn et al. (2025) and Grainger et al. (2018).

The presence of indigenous fish species throughout the wider Beachlands South area indicates that portions of the Site's freshwater network continue to provide suitable habitat despite extensive historical modification. Permanent stream systems generally provide the highest quality fish habitat, particularly where riparian vegetation, permanent flow and connectivity to downstream receiving environments are maintained. However, fish communities are influenced by historical landform modification, online ponds, culverts and other structures that may restrict fish passage and alter natural stream processes.

Ecological values are associated with the presence of indigenous freshwater fauna, including At Risk and Threatened species, and the continued connectivity of parts of the freshwater network to downstream receiving environments. However, these values are constrained by the modified nature of many freshwater habitats, variable water quality, and the presence of barriers that may limit fish movement throughout the catchment.

Overall, fish habitat within the Site is considered to provide **moderate** ecological value.

5.6.2 Macroinvertebrates

Macroinvertebrate surveys were previously undertaken by T&T (2022b) across representative permanent and intermittent stream reaches within the wider Beachlands South area. Surveys included assessment of Macroinvertebrate Community Index (MCI), Quantitative Macroinvertebrate Community Index (QMCI), Average Score Per Metric (ASPM), and taxonomic diversity.

Macroinvertebrate communities recorded throughout the wider Beachlands South area were generally indicative of modified freshwater systems and were typically characterised by low abundance and diversity of pollution-sensitive taxa. MCI and QMCI scores for permanent stream sites were predominantly within the Poor to Fair quality classes, reflecting degraded habitat quality and the modified nature of the catchments.

Sensitive Ephemeroptera, Plecoptera and Trichoptera (EPT) taxa were generally uncommon or absent from many survey locations. No EPT taxa were recorded from northern, southern or western catchment samples, while the eastern catchment samples contained low proportions of EPT taxa (6.7-15.4%). T&T concluded that habitat quality, rather than water chemistry alone, was likely a key factor influencing macroinvertebrate community composition, with many stream reaches exhibiting limited instream habitat diversity, sediment accumulation, modified channel form, and reduced riparian shading (T&T 2022b).

While freshwater habitats within the Site support functioning macroinvertebrate communities, ecological values are constrained by the modified nature of many stream systems, limited habitat complexity, and the predominance of disturbance-tolerant taxa.

Overall, macroinvertebrate habitat within the Site is considered to provide **low to moderate** ecological value.

6 SUMMARY OF EXISTING ECOLOGICAL VALUES

The ecological values identified within the Site range from low to moderate and reflect the highly modified nature of the landscape, which has been subject to extensive historical vegetation clearance, agricultural use and golf course development. Despite this modification, the Site continues to support a range of terrestrial and freshwater habitats, including indigenous vegetation, freshwater ecosystems, and indigenous fauna. A summary of the ecological values identified within the Site is provided in Table 3.

Detailed assessments of terrestrial vegetation, terrestrial fauna and freshwater ecological values against the EcIAG ecological value matters are provided in Appendix H.

Table 3. Summary of the terrestrial and freshwater ecological values within the Site.

Ecological Feature	Ecological Value
Terrestrial features	
Exotic forest and treeland (EF)	Low
Exotic-dominated scrub (ES)	Low
Kānuka scrub (VS2)	Moderate
Native planting (PL)	Low
Exotic grasslands (EG) & isolated amenity trees	Low
Terrestrial avifauna (birds)	Moderate
Herpetofauna (lizards)	Low-moderate
Chiroptera (bats)	Low
Freshwater features	
Natural permanent and intermittent streams	Low-moderate
Modified natural streams	Low-moderate
Artificial drainage channels	Negligible-low
Natural inland wetlands (excluding coastal fringe wetland)	Low
Coastal fringe wetland	Moderate
Constructed wetlands (ponds)	Low-moderate
Incidental wetlands	Low
Freshwater fish	Moderate
Macroinvertebrate communities	Low-moderate

7 ASSESSMENT OF ECOLOGICAL EFFECTS

7.1 Project Overview

BSLP is proposing the subdivision and development of the Site into an approximately 2,000-lot residential development and including a commercial local centre supported by employment opportunities comprising of approximately 27,000m^2 of commercial GFA and 30,000m^2 of light industrial GFA and education facilities. To facilitate the development, a range of activities with the potential to affect ecological values are proposed including vegetation removal, bulk earthworks, stream diversions and reclamations, wetland reclamation, construction of stormwater management devices, installation of transport and utility infrastructure, establishment of water supply and wastewater infrastructure, and associated changes to land cover, hydrology and freshwater habitats. The development also incorporates substantial ecological restoration, revegetation and enhancement measures within EPANs and riparian margins. A full description of the proposal is provided within the Assessment of Environmental Effects for the application. The potential ecological effects associated with these activities are assessed in the following sections.

7.2 Effects on Terrestrial Vegetation

7.2.1 Vegetation Removal

Implementation of the proposal will require removal of indigenous and exotic vegetation to facilitate bulk earthworks, residential development, roading, infrastructure, stormwater management devices, and associated works. Vegetation proposed for removal comprises a mixture of managed and rank exotic grassland, exotic-dominated scrub, isolated amenity trees and indigenous-dominant vegetation.

While vegetation removal will occur throughout the Site, the primary ecological consideration relates to vegetation removal within areas identified as EPANs under Precinct Plan 2 of the Beachlands South Precinct. While the EPAN is a primary consideration for assessment of vegetation effects, the ecological values associated with fauna habitat both within and outside the EPAN are assessed separately in Sections 7.3 and 7.4. The EPAN encompasses approximately 74.75 ha of land across the Site and is intended to provide for the long-term protection, restoration and enhancement of ecological values. Accordingly, the ecological effects of vegetation removal have been assessed not only in terms of the ecological values of the vegetation affected, but also in relation to the extent to which the proposal maintains the overall function and objectives of the EPAN network.

The proposal will result in approximately 1.89 ha of vegetation removal within the EPAN areas (approx. 2.5% of the total EPAN extent), including approximately 0.018 ha (181 m²) of indigenous kānuka scrub vegetation (Appendix I). The remaining 1.87 ha within the EPAN comprises exotic-dominated scrub and managed and rank exotic grassland. Approximately 0.76 ha of the proposed vegetation removal will be temporary, with affected areas reinstated and replanted following completion of construction works.

Almost all vegetation proposed for removal is of low ecological value. These vegetation communities are common throughout the Site and wider receiving environment and are generally characterised by high levels of pest plant invasion, limited indigenous biodiversity values and a history of disturbance associated with agricultural activities and golf course development.

Removal of indigenous-dominant vegetation is limited to two very small areas of kānuka scrub in the northern part of the Site. While this vegetation provides moderate ecological value and contributes to

habitat provision and ecological connectivity, the extent affected is minimal in the context of both the Site and wider receiving environment.

Proposed encroachment into EPAN areas is primarily associated with construction of a stormwater management pond, bulk earthworks and associated development activities. While these works will result in the removal of some EPAN vegetation, the proposal also incorporates reinstatement planting within temporarily disturbed areas and expansion of ecological restoration areas adjoining the existing EPAN network. Additional restoration planting adjoining the EPAN, together with long-term enhancement and management of the wider EPAN network, is proposed to maintain the overall ecological function and restoration objectives of the EPAN framework. These measures are discussed further in Section 7.2.2.

Overall, the magnitude of effect associated with vegetation removal is considered to be **low** prior to additional planting and enhancement.

7.2.2 EPAN and Ecological Enhancement

The Beachlands South Precinct establishes an approximately 74.75 ha EPAN to protect significant terrestrial, freshwater and wetland habitats and improve ecological values through restoration and enhancement measures (Figure 10, Appendix I). The EPAN forms a key component of the Precinct framework and is intended to contribute to addressing residual ecological effects associated with urban development through long-term ecological restoration, revegetation and management.

As outlined in Section 7.2.1, the proposal includes limited encroachment into existing EPAN areas associated primarily with construction of a stormwater management pond, bulk earthworks and associated development activities. This comprises approximately 1.13 ha of permanent vegetation removal within the EPAN and 0.76 ha of temporary disturbance, resulting in a total disturbance footprint of approximately 1.89 ha within the EPAN. Temporary disturbance areas will be reinstated following completion of construction works.

To address the effects of vegetation removal within the EPAN, the proposal incorporates approximately 2.60 ha of additional restoration planting adjoining the existing EPAN network (Appendix I). Together with reinstatement of approximately 0.76 ha of temporary removal within the EPAN, these measures substantially exceed the approximately 1.13 ha of permanent EPAN vegetation loss. Consequently, the proposal will result in a net increase of approximately 1.47 ha of land subject to ecological restoration, long-term management and legal protection. The additional planting areas have been located adjacent to the existing EPAN to strengthen ecological connectivity across the Site and establish vegetated buffers that reduce edge effects and enhance the resilience of retained ecological habitats.

The proposal incorporates extensive ecological restoration and enhancement measures within the EPAN, including native revegetation, riparian planting, wetland margin planting, weed management, pest animal control and long-term ecological protection and management. These measures are outlined in the Biodiversity Management Plan (BMP; Appendix J), which has been prepared in general accordance with Special Information Requirement I458.9(1-2) and provides a framework for restoration and management of ecological values within the EPAN and riparian margins. Areas subject to restoration and enhancement will be legally protected and managed in perpetuity through covenant mechanisms and implementation of the BMP. As such, they are expected to increase habitat diversity within the EPAN, support establishment of wetland vegetation, provide potential habitat for wetland-associated fauna, and enhance the overall ecological function and heterogeneity of the restored landscape.

The EPAN network will comprise approximately 36.12 ha of protected and restored ecological land, including approximately 33.51 ha of existing EPAN and 2.60 ha of additional restoration planting areas incorporated into the proposal. In addition, approximately 0.81 ha of riparian restoration planting is proposed outside the EPAN. Collectively, these areas will be legally protected and managed in perpetuity through covenant mechanisms and implementation of the BMP, providing a substantial increase in the extent of land subject to ecological restoration and long-term ecological management within the Site. Additional restoration and enhancement of approximately 2.943 ha of wetland habitat is also proposed as part of the freshwater compensation package described in Section 7.4.3.

Consistent with the Precinct framework and Open Space Strategy (Studio Pacific & Jasmax 2026a), the EPAN incorporates a managed network of walking tracks, shared paths, boardwalks and lookouts alongside ecological restoration areas. While implementation of this public access infrastructure will require some additional vegetation clearance, these activities have been anticipated since development of the Precinct framework and are not expected to adversely affect the long-term ecological function and restoration objectives of the EPAN network.

In addition to the EPAN enhancement programme, the proposal incorporates extensive indigenous planting throughout the wider development area, including streetscape planting, neighbourhood parks, stormwater parks and other public open spaces. The Open Space Strategy also provides for retention of a modified nine-hole golf course and a network of parks and green spaces integrated with ecological restoration areas. Collectively, these measures will increase indigenous vegetation cover, improve landscape connectivity and contribute to ecological resilience across the wider Site (Studio Pacific & Jasmax 2026a).

Table 4. Summary of EPAN disturbance, restoration and ecological enhancement outcomes.

Component	Area (ha)	Description
Existing EPAN retained	33.51	Existing EPAN area retained and protected.
Permanent EPAN vegetation removal	1.13	Permanent vegetation removal associated with development works.
Temporary EPAN vegetation removal (excluding pathways)	0.76	Temporary disturbance, planting to be reinstated within these areas following construction.
Additional EPAN restoration planting	2.60	New restoration planting adjoining the existing EPAN network.
Total EPAN and restoration areas	**36.12**	**Existing EPAN plus additional restoration planting areas.**
Riparian restoration outside EPAN	0.81	Additional riparian enhancement planting outside the EPAN.
Freshwater compensation works	2.943	Restoration of exotic wetland – refer to Section 7.4.3.
Total ecological restoration and enhancement areas	**39.06**	**Existing EPAN plus additional restoration planting areas and restoration works associated with freshwater compensation package.**

Overall, the proposed EPAN enhancement, riparian restoration and freshwater compensation programme is expected to generate substantial ecological benefits through a net increase in the extent of land subject to ecological restoration, protection and long-term management. The proposal will

increase indigenous vegetation cover, improve habitat quality, strengthen ecological connectivity, enhance freshwater margins and support restoration of wetland and riparian habitats across the Site. While adverse ecological effects associated with vegetation clearance and habitat modification have been assessed elsewhere in this report, the scale of ecological restoration, compensation and long-term protection proposed as part of the development is expected to result in a net positive ecological outcome for the Site over the long term.

7.2.3 EPAN Slip Remediation and Future Land Instability Works

A slip has been identified within the EPAN in the north of the Site (between Sub-precincts A and C) and is proposed to be remediated in accordance with the slip remediation plan by Harrison Grierson Consultants Limited (HGC 2026, plan A2314380.00-SK02). Proposed works include removal of vegetation within the immediate slip area, excavation and regrading of slumped material, installation of geotechnical stabilisation measures, including geotextile matting and localised rock riprap protection at the toe of the batter, and reinstatement planting following completion of works.

The vegetation affected by the proposed remediation works is limited in extent and is exotic scrub dominated by listed pest plant species. This vegetation is already identified for removal as part of the wider EPAN restoration programme under the BMP. While a small number of common indigenous understorey species may also be affected, the vegetation proposed for removal is of low ecological value.

The proposed slip remediation works will result in localised vegetation clearance, earthworks and temporary disturbance to ecological features within the EPAN. However, the affected area is limited in extent and the works are intended to stabilise an existing instability feature rather than facilitate additional development. Subject to implementation of appropriate erosion and sediment controls, minimisation of vegetation clearance, and reinstatement planting with suitable indigenous species in accordance with the BMP, adverse ecological effects associated with the slip remediation works are expected to be low and temporary in nature.

Where any future land slips or land instability issues are identified within the EPAN, remediation works should be subject to preparation of a site-specific remediation plan and methodology for Council certification prior to works commencing. The remediation plan should identify the extent of works, erosion and sediment controls, vegetation clearance requirements, reinstatement planting and any maintenance required to ensure affected ecological values are appropriately reinstated.

7.3 Effects on Terrestrial Fauna

7.3.1 Avifauna (birds)

Vegetation clearance and construction activities have the potential to result in direct adverse effects on indigenous birds, including the disturbance, injury or mortality of nesting adults, eggs and chicks. These effects are most likely to occur where vegetation is removed during the breeding season, when nests may be present within trees, shrubs or pond-margin vegetation. Nesting birds are particularly vulnerable as they are unable to readily relocate from active nests.

While these direct effects may occur at a local scale, most bird species recorded within the Site are highly mobile and able to utilise alternative habitat within the wider landscape. The Site is connected to a range of surrounding terrestrial, freshwater and coastal habitats, allowing birds to relocate to nearby suitable habitat where required.

Further, the clearance of rank grasses and edge vegetation associated with areas of open water during the bird breeding season has the potential to result in direct mortality of birds, eggs and chicks of 'Threatened' species. Dabchicks/weweia are known to nest year-round in association with freshwater ponds, utilising floating aquatic vegetation or overhanging vegetation on pond edges. Pāteke typically breed July to October and typically build their nests at the bases of clumps of vegetation such as rushes, sedges, grasses and ferns on the edges of freshwater ponds.

In addition, New Zealand dotterel have been recorded within the wider coastal environment and are known to utilise open, sparsely vegetated areas for nesting. While the Site does not currently provide extensive suitable nesting habitat, earthworks activities may temporarily create areas of bare ground that could attract nesting dotterels during the breeding season. Consequently, there is a potential risk of nest establishment within active earthworks areas if suitable habitat develops during construction.

The loss of, and disturbance to, habitat within the Site will not permanently displace the bird community. There is unaffected habitat of both similar and significantly higher-quality to be retained within the EPAN areas across the Site and in the immediate surroundings for birds to utilise. The following measures will be implemented through the Fauna Management Plan (FMP) provided in Appendix K to minimise the potential effects of vegetation removal on indigenous avifauna:

- Removal of any tree/shrub vegetation occurs outside of the main terrestrial bird nesting season (September to February, inclusive). If tree clearance is unable to occur outside of breeding season, it is recommended that a condition of consent requires an ecologist to inspect the affected vegetation within 24 hours of clearance. If active native bird nests are identified, a minimum 10 m buffer must be maintained around the nesting site until an ecologist deems it to be inactive; and
- Vegetation proposed to be cleared around the margins of constructed ponds should be inspected for indigenous bird nests by a suitably qualified ecologist no more than 24 hours prior to clearance. If active indigenous bird nests are identified, a minimum buffer of 20 m should be maintained for At Risk or Threatened species, and 10 m for Not Threatened species, until the nest is confirmed inactive by a suitably qualified ecologist.
- Earthworks areas should be managed in accordance with the FMP to minimise the risk of New Zealand dotterels establishing nests within active construction areas. Where suitable nesting habitat develops during the breeding season, appropriate deterrence measures and monitoring should be implemented, and any nests identified should be managed in consultation with a suitably qualified ecologist.

The magnitude of effect of the proposed works on birds is considered to be low, reducing to **very low** following implementation of the avifauna management measures outlined in the FMP.

7.3.2 Herpetofauna (lizards)

Vegetation removal, earthworks and associated construction activities within the Site have the potential to result in direct mortality and/or injury to indigenous lizards, should they be present within areas proposed for disturbance. As indigenous lizards are generally small and relatively cryptic with limited dispersal ability, they are vulnerable to injury or mortality during vegetation clearance, earthworks and machinery movement. Indirect effects may also occur through removal or degradation of habitat features such as rank grassland, woody debris, leaf litter and scrub vegetation.

Targeted lizard surveys undertaken by Bioresearches during March-April 2026, together with search and salvage works undertaken within the adjacent Stage 1 earthworks area, did not detect indigenous lizards within the Site. This suggests indigenous lizards are likely absent or present at very low densities within the highly modified habitats present across the Site.

The majority of grassed areas within the Site are regularly maintained for golfing activities and generally provide limited habitat suitability for indigenous lizards due to frequent mowing and disturbance. Continued management of regularly maintained grass areas during pre-construction phases will assist in discouraging establishment of suitable skink habitat within these areas prior to works commencing.

Nevertheless, localised habitat potentially suitable for indigenous skinks is present within areas of unmanaged vegetation margins containing rank grassland and exotic scrub vegetation and any areas of dense leaf litter. The proposal will result in the removal of some potential lizard habitat within both EPAN and non-EPAN areas. However, the majority of affected habitat is highly modified and of limited suitability for indigenous lizards. Accordingly, the proposal is not expected to adversely affect any significant indigenous lizard populations should they occur within the Site.

Special Information Requirement I458.9(6) of the Beachlands South Precinct provisions requires the preparation and implementation of a Lizard Management Plan for bulk earthworks activities. A FMP is provided in Appendix K, which incorporates the required lizard management measures. Vegetation clearance within identified potential lizard habitat areas should be supervised by a suitably qualified and experienced herpetologist/ecologist. Management measures should include pre-clearance habitat assessment, staged vegetation removal where practicable, manual searching of suitable refugia, and salvage and relocation of any indigenous lizards encountered to a suitable receptor site identified within the management plan.

A Wildlife Approval Checklist and Information Requirements document has also been prepared (Appendix L) to support the associated Wildlife Approval application for indigenous lizards. Appendix L summarises the relevant Wildlife Act approval requirements and demonstrates how the information requirements under clause 2 of Schedule 7 of the FTAA have been addressed.

Given the absence of indigenous lizard detections during targeted surveys and associated vegetation clearance activities, together with the generally low suitability and highly modified nature of habitat present across much of the Site, the magnitude of effect on indigenous lizards is considered to be low. With implementation of appropriate lizard management measures where applicable, residual effects are considered to reduce to **very low**.

7.3.3 Chiroptera (bats)

Tree felling when bats are utilising them for roosts or refugia has the potential to result in mortality and/or injury to any bats present. Special Information Requirement I458.9(6) of the Beachlands South Precinct provisions requires the preparation and implementation of a Bat Management Plan for bulk earthworks activities. A FMP is provided in Appendix K, which incorporates the required bat management measures. It is recommended that pre-clearance monitoring of potential roost trees as per DOC's Bat Roost Protocols (DOC 2024) is undertaken to minimise the risk of trees being felled that contain bats.

The minor proposed tree clearance will not result in significant habitat loss or population displacement of a potential bat population, as the affected habitat within the Site is of low quality and has poor

terrestrial connectivity. Additionally, no bats have been detected on-site or in the immediate surrounding area. However, the occasional presence of bats within the Site cannot be ruled out.

The level of effect on bats is considered to be low, mitigated to **very low**.

7.4 Effects on Watercourses and Wetlands

7.4.1 Erosion and Sedimentation

Bulk earthworks across approximately 118.6 ha are proposed to facilitate the development, comprising approximately 756,000 m³ of cut and 588,000 m³ of fill material undertaken across six construction stages (HGC 2026).

Earthworks have the potential to generate elevated sediment discharges to downstream freshwater environments if not appropriately managed. Increased suspended sediment concentrations can adversely affect freshwater ecosystems through reduced water clarity, smothering of stream substrates and aquatic habitat, and impacts on fish and macroinvertebrate communities. Freshwater features potentially affected by sediment discharges include streams, wetlands, ponds and associated aquatic habitats within and downstream of the Site.

An Erosion and Sediment Control Plan (ESCP) has been prepared by HGC and outlines erosion and sediment control measures in accordance with Auckland Council's GD05 (HGC 2026). Proposed controls include stabilised construction entrances, clean and dirty water diversion systems, oversized flocculated sediment retention ponds, decanting earth bunds, silt fences, progressive stabilisation of exposed earthworks areas and chemical treatment of sediment control devices (plans A2515591.00-2150 – 2166). Earthworks will be staged to minimise the extent of exposed soils at any one time, with clean water diverted around active work areas and sediment-laden runoff directed to treatment devices prior to discharge. An Adaptive Management Plan and water quality monitoring programme, including turbidity monitoring at selected discharge locations, is also proposed to enable ongoing assessment of erosion and sediment control performance throughout the construction period (HGC 2026).

Without mitigation, sediment discharges associated with bulk earthworks have the potential to result in significant adverse effects on downstream freshwater environments. However, implementation of the proposed erosion and sediment control measures is expected to substantially reduce sediment generation and discharge from the Site.

Overall, the magnitude of effect associated with erosion and sedimentation is considered to be high prior to mitigation, reducing to **low** following implementation of the proposed erosion and sediment control measures.

7.4.2 Stream and Wetland Reclamation

The proposal will require the reclamation of streams and natural inland wetlands, and will also result in changes to the surface water catchments of some retained natural inland wetlands. These effects are associated with the proposed bulk earthworks, roading, infrastructure, stormwater devices, development platforms and associated works.

A summary of the proposed freshwater loss is provided in Table 5 and the details described in the remainder of this section. A full feature-by-feature reclamation schedule and a map of features to be reclaimed is provided in Appendix M.

Table 5. Summary of proposed freshwater feature loss.

Freshwater feature / effect type	Proposed loss	Notes
Direct full reclamation of natural inland wetlands	12 wetlands, totalling 2,001.2 m²	Includes nine exotic rush-dominant, one exotic grass-dominant and two native sedge-dominant wetlands.
Direct partial reclamation of natural inland wetlands	2 wetlands, totalling 336.7 m²	Part of wetland removed, remainder retained (both exotic rush-dominant)
Conservative partial drainage of retained natural inland wetlands	6 wetlands, totalling 568.94 m²	Based on proportional reduction in modelled surface water catchment area.
Total natural inland wetland loss accounted for	**2906.84 m²**	Includes direct reclamation and conservatively assessed hydrological loss.
Streams	18 stream sections, totalling 646 linear metres	Includes intermittent and modified natural stream reaches.
Streambed area	330.3 m²	Based on representative wetted widths from SEV reaches.

Wetland reclamation

The natural inland wetlands proposed for direct reclamation are summarised in Table 6. The majority of the affected wetlands are dominated by common exotic wetland vegetation, particularly exotic rush species (i.e. soft rush). Three native sedge-dominant (purua grass) wetlands are also affected.

Table 6. Natural inland wetlands proposed for reclamation via direct (full or partial) removal.

Wetland vegetation type	Number of wetlands	Area proposed for reclamation
Exotic rush-dominant	10	1,402.1 m²
Exotic grass-dominant	1	77.2 m²
Native sedge-dominant	3	858.6 m²
Total	**14**	**2,337.9 m²**

In addition to direct reclamation, some retained wetlands are predicted to experience reductions in contributing surface water catchment area following development. Potential hydrological effects have therefore also been considered.

For the purposes of this assessment, a conservative approach has been taken to assessing potential hydrological effects on retained wetlands, including the following:

- The stormwater catchment assessment assumes that all residential lots and open space areas are 100% impervious, and that all stormwater within those areas will be collected and piped to stormwater outlets. In reality, the post-development catchments are expected to contain pervious surfaces, and some surface water will continue to infiltrate or flow naturally toward the wetlands.
- The assessment also does not account for groundwater contributions to wetland hydrology. All retained wetlands are expected to receive some groundwater contribution, and for some wetlands groundwater may be the dominant hydrological input.

Notwithstanding these conservative assumptions, where the post-development surface water catchment to a wetland is predicted to reduce, the same proportional reduction has been applied to the retained wetland extent. For example, where a wetland's surface water catchment is predicted to reduce by 95%, it has been conservatively assumed that 95% of that wetland's retained extent may be lost through partial drainage. This approach is considered conservative and is likely to overestimate the actual hydrological effect on retained wetland extent, as groundwater recharge and detailed pervious surface areas within each catchment are currently unknown.

To ensure potential hydrological effects are appropriately accounted for, the conservatively estimated wetland losses arising from catchment reduction have been incorporated into the freshwater compensation assessment.

The retained natural inland wetlands predicted to experience reductions in contributing surface water catchment are summarised in Table 7. Wetlands with predicted increases in catchment area are not discussed further, as the assessment focuses on potential adverse hydrological effects.

On a conservative basis, a further 568.94 m² of wetland extent has been assumed to be affected by hydrological change and has been incorporated into the compensation assessment.

Table 7. Conservative assessment of potential wetland loss from reduced surface water catchments.

Wetland ID	Retained wetland extent	Pre-development surface catchment	Post-development surface catchment	Change in catchment	Assumed proportional wetland loss
W28	229.0 m²	38,195 m²	1,720 m²	-95.50%	218.69 m²
W8	149.7 m²	18,466 m²	2,041 m²	-88.95%	133.15 m²
W5	115.8 m²	12,711 m²	4,094 m²	-67.79%	78.50 m²
W22	199.0 m²	59,708 m²	34,864 m²	-41.61%	82.80 m²
W13	90.0 m²	3,491 m²	2,544 m²	-27.13%	24.41 m²
W11	290.0 m²	12,578 m²	11,217 m²	-10.82%	31.38 m²
Total	**1,073.5 m²**				**568.94 m²**

Stream reclamation

The stream reaches proposed for reclamation are all intermittent or modified natural stream reaches. These reaches are generally located in the upper parts of catchments, are typically narrow and shallow, and have been affected by historical channel modification, golf course drainage, pond construction, modified land use and contain limited riparian vegetation. Many were dry or had minimal surface flow during the May 2026 SEV assessments, consistent with their intermittent hydrological regime.

Four representative SEV reaches were used to characterise stream systems affected by the proposal, as summarised in Table 8. Summarised SEV outputs are provided in Appendix F. Representative reaches were selected to capture the range of stream conditions present within affected stream systems and generally comprise stream reaches of equal or greater ecological function than those proposed to be reclaimed. Accordingly, the approach is considered conservative and provides an appropriate basis for quantifying stream ecological values for the purposes of the compensation assessment. This approach recognises that ecological function varies across the Site, while avoiding the need to undertake detailed valuation of every affected stream reach.

All affected stream sections were then grouped with the SEV reach that most closely reflected their current ecological condition and likely potential condition. This provides a transparent and proportionate basis for quantifying stream values, while avoiding a false level of precision that could arise from applying separate SEV assessments to very short or discontinuous reaches. The use of representative reaches is also conservative where the selected SEV reach has equal or higher ecological function than the smaller affected stream sections it represents.

Table 8. Stream reclamation summary by representative SEV reach.

Representative SEV	Number of affected stream sections	Length proposed for reclamation	Streambed area affected	Current SEV	Potential SEV*
SEV 1	2	54 m	34.56 m²	0.350	0..454
SEV 2	4	252 m	123.48 m²	0..474	0.506
SEV 3	5	138 m	51.06 m²	0.528	0.555
SEV 4	7	202 m	121.20 m²	0.575	0.579
Total	**18**	**646 m**	**330.30 m²**		

*Used in Biodiversity Compensation Model (BCM)

Avoidance and minimisation

Reclamation of streams and wetlands has been avoided where practicable through the proposed scheme plan, bulk earthworks design, infrastructure layout and retention of freshwater features within the EPAN. The proposal retains a substantial proportion of the stream network within the Site, with direct stream reclamation limited to those intermittent and modified natural stream reaches that cannot practicably be retained while achieving the proposed development layout and associated infrastructure requirements.

In relation to natural inland wetlands, 27 wetlands have been identified within the Site. Of these, 12 wetlands are proposed to be fully reclaimed and two wetlands are proposed to be partially reclaimed. In addition, six retained wetlands, including the remaining portions of the partially reclaimed wetlands, are predicted to experience reductions in surface water catchment. As set out above, a conservative approach has been taken by assuming that reductions in contributing surface water catchment may result in an equivalent proportional reduction in wetland extent. Accordingly, while wetland reclamation and potential hydrological effects have been avoided where practicable, residual adverse effects on natural inland wetland extent remain and are addressed through the proposed aquatic compensation package.

The extent of proposed stream and wetland reclamation has been minimised through consultation with the project planners, engineers and landscape architects. The following measures have also been incorporated to minimise adverse freshwater effects:

- retention and enhancement of stream reaches and wetlands within the EPAN;
- riparian, wetland and wetland buffer planting within retained freshwater corridors;
- stormwater design to maintain stream water conveyance and hydrological management functions, where practicable;

- erosion and sediment controls to minimise sediment discharge to downstream freshwater and coastal receiving environments;
- native fish capture and relocation prior to streamworks or dewatering of aquatic habitats (refer Section 0); and
- staging of works to minimise the duration of exposed earthworks and disturbance near freshwater habitats.

These measures will reduce construction-related effects and improve the ecological condition of retained freshwater habitats. However, they do not fully address the permanent loss of stream and wetland extent and associated freshwater values resulting from reclamation and conservatively assessed hydrological effects. Residual loss of these features is addressed below.

Residual freshwater effects

The proposed works will result in the permanent loss of 646 m of intermittent and modified natural stream reaches, 330.3 m² of streambed, and 2337.9 m² of natural inland wetland through direct reclamation. In addition, a further 568.94 m² of retained natural inland wetland extent has been conservatively assumed to be lost through partial drainage as a result of reduced surface water catchments. On that basis, the total natural inland wetland loss accounted for in this assessment is 2906.84 m², conservatively.

These residual effects are considered to be high because stream and wetland extent, and associated freshwater values, will either be permanently lost or may be substantially reduced within the impact areas.

Although the affected freshwater features are generally modified and of low to moderate ecological value, they continue to provide freshwater functions including water conveyance, local aquatic habitat, wetland habitat, organic matter processing, hydrological connectivity and, in some locations, habitat for indigenous freshwater fauna. These residual effects therefore require compensation in accordance with the effects management hierarchy.

Aquatic Compensation Rationale

Aquatic offsetting was considered by the project team, but is not proposed for the residual stream and wetland effects for the following reasons.

In relation to stream values, the 10 m riparian margins of retained streams within the live-zoned site are already required to be planted and enhanced through the Precinct requirements and the proposed EPAN restoration programme. As a result, there are limited additional retained stream reaches within the Site that could be relied on to provide a separate and additional stream offset for the values lost through reclamation.

In relation to stream extent, an offset would require either creation of new stream length or daylighting of existing piped or culverted stream reaches. Creation of a new stream is not considered technically feasible or ecologically appropriate in this context because it would require a reliable source of water, substantial landform manipulation and likely diversion of water from an existing catchment or flow path, with associated risks to retained freshwater systems. There is also insufficient piped or culverted stream length within the Site that could be daylighted to replace the stream extent proposed for reclamation.

In relation to wetlands, enhancement of existing wetland habitat can improve wetland values, but it does not replace lost wetland extent. New wetland creation was considered but has not been relied on

as an aquatic offset because of the Site's development constraints, hydrological uncertainty, space requirements, and the difficulty of demonstrating like-for-like replacement of natural inland wetland extent and function within an acceptable timeframe. In particular, successful wetland creation would require a suitable long-term hydrological regime, appropriate landform levels, compatible surrounding land use, and sufficient buffer and maintenance areas. These requirements are difficult to secure within the developable parts of the Site without creating additional conflicts with infrastructure, earthworks and stormwater design.

Accordingly, aquatic compensation is proposed as the appropriate residual effects management response. This approach recognises that offsetting cannot be demonstrated with sufficient confidence for the affected stream and wetland extent and values, but that a substantial freshwater compensation package can provide positive ecological outcomes that are commensurate with, and expected to outweigh, the residual adverse effects.

7.4.3 Freshwater Compensation

Compensation site

The proposed freshwater compensation site comprises approximately 2.943 ha of wetland habitat located within the Site and within the wider Waikōpua Creek catchment (Figure 27).

The compensation site is currently dominated by invasive exotic wetland vegetation and provides a substantial opportunity for ecological enhancement. The proposed compensation works will focus on improving wetland condition, indigenous vegetation dominance, structural diversity, habitat quality and ecological connectivity.

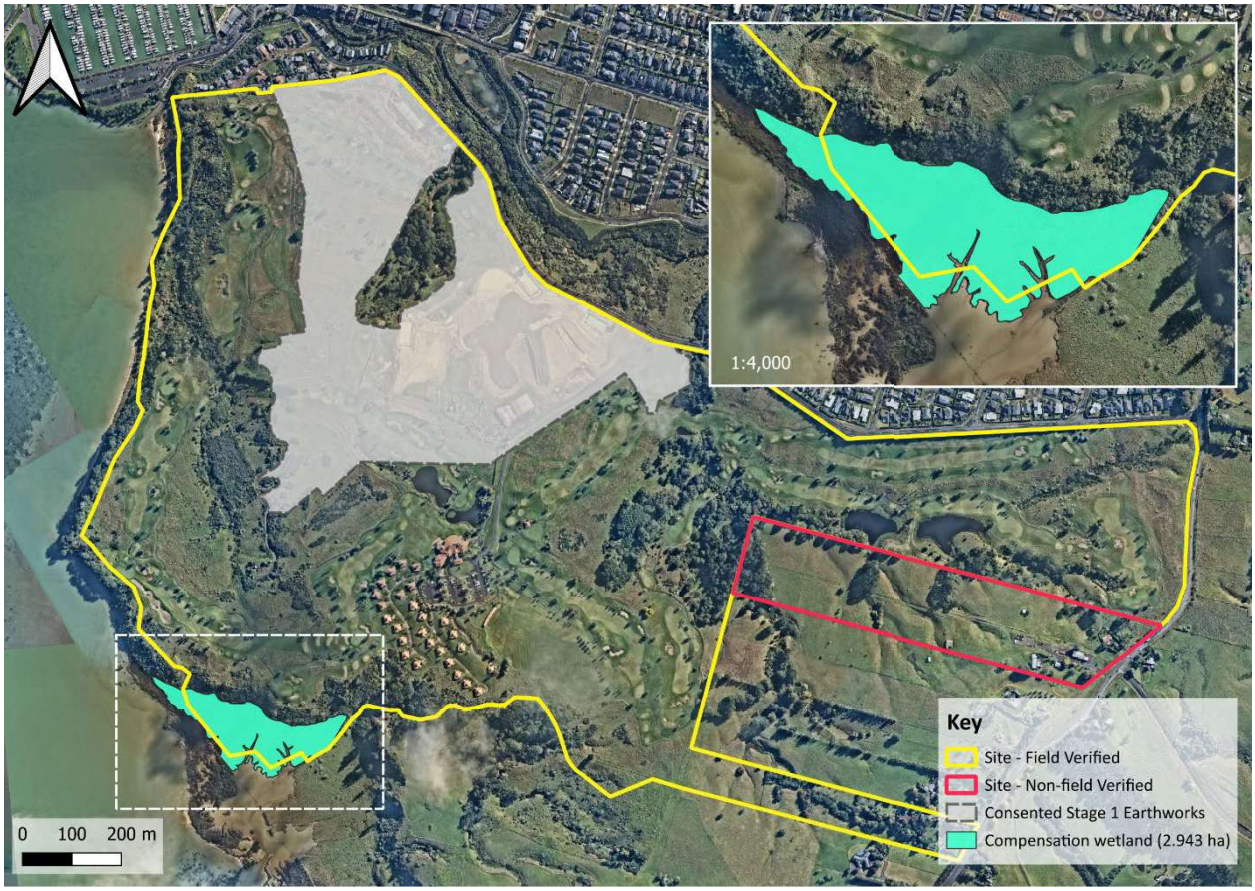

Figure 27. Map of the 2.943 ha compensation wetland in the south-west of the Site.

The site is well suited for aquatic compensation because it:

- is located within the same development site and wider catchment as the affected freshwater features;
- forms part of a larger contiguous wetland system rather than a small isolated compensation area;
- is contiguous with the EPAN and will be integrated with wider restoration and revegetation works;
- is connected to stream habitat and terrestrial restoration areas;
- is located near saltmarsh, tidal flats and coastal habitats that support threatened and at-risk indigenous fauna;
- occupies an ecotone between tidal flats, saltmarsh, wetland, stream and terrestrial vegetation; and
- provides a large, practical and ecologically coherent area for long-term wetland restoration and management.

The compensation site will be subject to weed control, native wetland planting, wetland buffer enhancement, pest animal control where required, monitoring, maintenance and adaptive management. Detailed implementation requirements are provided in the BMP (Appendix J).

Compensation accounting approach

A Biodiversity Compensation Model (BCM; Baber et al. 2021) was used to assist with evaluating the likely adequacy of the proposed compensation package. The BCM was developed as a decision-support tool to provide guidance on the type and amount of compensation required for a project to achieve predicted net gain outcomes for biodiversity in a New Zealand context (Baber et al. 2021). The BCM has been used in this assessment to complement professional judgement and provide a transparent basis for evaluating the scale of aquatic compensation proposed, rather than as a biodiversity offset model.

The SEV method was used to represent stream values, and the WEV method was used to represent wetland values. The BCM typically uses ecological value scores from the EcIAG framework on a scale from 1 to 5. For this assessment, SEV and WEV scores were converted to a value out of 5 for use in the BCM to provide a more transparent and quantified basis for the BCM inputs.

Potential SEV and WEV scores were used for the impact features rather than current scores. This is a conservative approach because it assumes the affected features could achieve improved ecological condition under best-practice management, rather than relying only on their current modified or degraded state.

The compensation wetland was assessed using its current and potential WEV scores. The difference between the current and potential WEV scores represents the predicted ecological gain associated with the proposed wetland restoration and enhancement works. For wetlands, the highest-value wetland proposed to be reclaimed was used as the representative impact wetland. This approach is conservative, noting that the selected wetland was still assessed as having low ecological value, and that several of the wetlands proposed for reclamation comprise lower-value exotic-dominant wetland habitats.

Summarised SEV and WEV outputs are provided in Appendix F and G, respectively. Table 9 presents a summary of value scores used in the BCM.

Table 9. Summary of value scores used in the BCM.

Biodiversity type	Metric used	Score used in BCM	Value score out of 5	Basis
Impact wetlands	WEV potential score	0.691	3.455	Conservative representative wetland value.
Impact stream group SEV 1	SEV potential score	0.454	2.27	Potential condition of representative affected stream group.
Impact stream group SEV 2	SEV potential score	0.506	2.53	Potential condition of representative affected stream group.
Impact stream group SEV 3	SEV potential score	0.555	2.775	Potential condition of representative affected stream group.
Impact stream group SEV 4	SEV potential score	0.579	2.895	Potential condition of representative affected stream group.
Compensation wetland current	WEV current score	0.612	3.06	Existing compensation site condition.
Compensation wetland potential	WEV potential score	0.802	4.01	Predicted condition following restoration and management.

The BCM applies the affected freshwater habitat areas to the converted SEV and WEV value scores. Impacted streambed and wetland areas were converted to hectares for the BCM, totalling 0.033 ha and 0.322 ha, respectively. The compensation action was based on 2.943 ha of wetland restoration and enhancement. Table 10 presents the summary of BCM inputs and outputs, and further detailed inputs and outputs are provided in Appendix N.

Table 10. Summary of BCM inputs and outputs.

BCM component	Area used in BCM	Value score before impact / compensation	Value score after impact / compensation	BCM score
Wetland impact	0.290684 ha	3.455	0.001	-0.21084
SEV 1 stream impact	0.003456 ha	2.27	0.001	-0.00165
SEV 2 stream impact	0.012348 ha	2.53	0.001	-0.00656
SEV 3 stream impact	0.005106 ha	2.775	0.001	-0.00297
SEV 4 stream impact	0.012120 ha	2.895	0.001	-0.00737
Total	**0.323714 ha**			**-0.22939**

BCM component	Area used in BCM	Value score before impact / compensation	Value score after impact / compensation	BCM score
Compensation wetland enhancement	2.943 ha	3.06	4.01	0.34326
Net Present Biodiversity Value (NPBV)				**0.11387**
Modelled compensation outcome				**49.6% above impact score**

Note: Negative values represent impact scores and positive values represent compensation gains. The NPBV is the compensation score minus the absolute total impact score: 0.34326 - 0.22939 = 0.11387. The modelled compensation outcome is the NPBV divided by the absolute total impact score: 0.11387 ÷ 0.22939 = 49.6% above the modelled residual impact.

The BCM output indicates that the proposed compensation package is expected to generate positive freshwater ecological gains that outweigh the residual adverse effects of the proposed stream and wetland reclamation. The calculated compensation outcome exceeds the 10% net gain target used in the BCM. However, because the proposal is compensation rather than offsetting, this result should be interpreted as support for the scale and adequacy of the proposed compensation package, rather than as demonstrating a like-for-like aquatic offset.

Key assumptions and limitations

The compensation accounting is based on the assumptions summarised in Table 11. Further assumptions are presented in Appendices F, G and M.

Table 11. Key assumptions used in compensation accounting.

Assumption	Applied to	Basis	Effect on assessment
Potential SEV scores were used for impact streams	Stream impacts	SEV potential calculator	Conservative, it assumes affected streams could improve under best-practice management, it avoids undervaluing stream losses based only on current condition.
Potential WEV score was used for impact wetlands	Wetland impacts	WEV calculator	Conservative, it assumes affected streams could improve under best-practice management, it avoids undervaluing wetland losses based only on current condition.
Representative native-dominant wetland used for WEV impact value	Wetland impacts	WEV assessment	Conservative, because several reclaimed wetlands are exotic-dominant and lower value.
Stream impact value represented by four SEV reaches	Stream impacts	Representative SEV data	Appropriate because affected reaches are similar in intermittency, modification and upper-catchment context.
Compensation wetland potential condition is achievable	Compensation site	WEV assumptions	Requires successful weed control, planting, pest management, monitoring and adaptive management.
Time lag set at 10 years	Compensation gains	BCM input	Accounts for the period required for wetland restoration outcomes to develop.

Assumption	Applied to	Basis	Effect on assessment
Discount rate of 3% applied	Compensation gains	BCM input	Accounts for temporal delay between impact and compensation gain.
Compensation confidence contingency of 2 applied	Compensation gains	BCM input	Reflects uncertainty in achieving predicted compensation outcomes.

The main limitation of the compensation approach is that stream extent is not replaced on a like-for-like basis. There will therefore be a residual net loss of intermittent stream length and streambed area. The compensation package instead provides freshwater ecological gains through restoration and enhancement of a large wetland system within the same catchment and development Site. This is considered appropriate in this instance because stream offsetting is not technically feasible, the affected streams are modified intermittent upper-catchment reaches, and the proposed compensation site provides a substantial and coherent opportunity to improve freshwater ecosystem condition, habitat diversity, indigenous vegetation dominance and ecological connectivity.

Assessment against NPS-FM aquatic compensation principles

The proposed freshwater compensation package has been assessed against the NPS-FM aquatic compensation principles in Table 12.

Table 12. Assessment against aquatic compensation principles.

Principle	Assessment
Effects management hierarchy	Avoidance and minimisation have been applied through scheme design, retention of freshwater features within the EPAN, reduction of reclamation where practicable, fish salvage, erosion and sediment controls, stormwater design and enhancement of retained freshwater features. Offsetting was considered but is not practicable for the reasons set out above. Aquatic compensation is therefore proposed for the residual ecological effects.
When aquatic compensation is not appropriate	The affected freshwater features are not considered irreplaceable or unable to be compensated for. The affected stream reaches are modified intermittent upper-catchment streams and most affected wetlands are modified and exotic-dominant. The compensation site provides a technically feasible opportunity to secure substantial freshwater gains within an acceptable timeframe.
Scale of aquatic compensation	The BCM indicates that the proposed 2.943 ha wetland compensation package is expected to generate positive freshwater ecological gains that outweigh the residual stream and wetland impacts.
Additionality	The compensation site is not otherwise required to be restored to the proposed standard. The gains are additional to avoidance, minimisation, general EPAN restoration and other freshwater mitigation measures.
Leakage	The compensation works will occur within an existing degraded wetland system and are not expected to displace adverse effects to other freshwater or terrestrial habitats.
Long-term outcomes	Outcomes will be secured through the BMP, ongoing wetland management, monitoring, maintenance, adaptive management and legal protection mechanisms.
Landscape context	The compensation site is close to the impact areas, within the same development site and wider Waikōpua Creek catchment, and forms part of an ecologically connected wetland, stream, saltmarsh, tidal flat and terrestrial restoration sequence.

Principle	Assessment
Time lags	The BCM applies a 10-year timeframe and 3% discount rate to account for the time lag between impact and predicted compensation gains. Implementation timing should be linked to development staging to minimise delay between freshwater loss and restoration gains.
Trading up	The package may be considered to include an element of trading from modified intermittent stream habitat to enhanced wetland habitat. However, trading up has not been relied on as the primary justification. The package is instead justified on the basis that offsetting is not practicable and that the compensation site provides substantial freshwater ecological gains within the same catchment.
Financial contribution	No financial contribution is relied on. The package consists of direct ecological restoration and enhancement works.
Science and mātauranga Māori	The assessment is based on field investigations, SEV, WEV, BCM accounting and professional ecological judgement.
Tangata whenua or stakeholder participation	BSLP has undertaken consultation with mana whenua and stakeholders through the wider project process.
Transparency	The reclamation schedule, SEV calculations, WEV calculations, BCM inputs, assumptions and outputs are provided in the EcIA and appendices so that reviewers can assess the compensation rationale. The FTAA application material will be publicly available.

Residual freshwater effects conclusion

Notwithstanding the avoidance, minimisation and mitigation measures described above, residual adverse freshwater effects remain as a result of stream and wetland reclamation and potential hydrological effects on retained wetlands. For the reasons outlined above, aquatic offsetting is not considered practicable and a compensation approach has been adopted.

The proposed compensation package comprises restoration and enhancement of approximately 2.943 ha of wetland habitat within the Site and wider Waikōpua Creek catchment. Based on the BCM assessment and professional ecological judgement, the proposed compensation package is considered to provide an appropriate and proportionate response to the residual freshwater effects of the proposal, subject to implementation of the BMP, monitoring, maintenance, adaptive management and long-term protection measures.

7.4.4 Freshwater Fish and Fish Passage

Indigenous freshwater fish habitat within the Site is associated with permanent and intermittent streams, modified natural streams, constructed ponds, and artificial drainage channels where surface water or wetted sediment persists.

Without mitigation, stream diversion, reclamation, culvert works, and pond removal could result in injury or mortality of indigenous fish, as well as temporary disruption to fish passage. To address these effects, a Native Fish Capture and Relocation Plan (NFCRP) will be prepared and implemented prior to works occurring within affected freshwater habitats. The NFCRP will provide for the rescue and relocation of indigenous fish from streams, ponds and other aquatic habitats where fish may be present.

The proposal includes installation of four new culverts associated with a new accessway in the southeastern part of the Site within 712 Whitford-Maraetai Road (HGC 2026a; drawing A2515591.00-

4260). Based on surveys and assessment of upstream habitat availability, no fish habitat is present, or expected to be seasonally present, upstream of the proposed culvert locations. Accordingly, the proposed culverts are not expected to affect fish passage or result in any loss of habitat connectivity for indigenous fish species. Fish passage is therefore not considered a significant ecological constraint for the proposal. Notwithstanding this, the culverts will be designed in accordance with relevant NPS-FM and AUP-OP requirements.

Construction-related effects will be temporary and can be minimised through implementation of erosion and sediment controls, timing works to periods of low flow where practicable, and undertaking fish salvage prior to disturbance of aquatic habitats. Streambeds at culvert inlets and outlets should also be stabilised as required to minimise scour and erosion.

The magnitude of effect on indigenous freshwater fish is considered moderate prior to mitigation, reducing to low following implementation of the NFCRP and associated construction management measures. Overall, the residual effect on freshwater fish and fish passage is considered **low**.

7.4.5 Stormwater Management and Discharge

The proposal includes a comprehensive stormwater management network comprising gross pollutant traps, communal stormwater wetlands and ponds, conveyance infrastructure and associated discharge structures. The stormwater management system has been designed to provide treatment, retention and attenuation of post-development runoff prior to discharge to receiving environments (HGC 2026a).

Without mitigation, urban development has the potential to adversely affect freshwater environments through increased contaminant loads, altered flow regimes and localised erosion associated with stormwater discharges. Potential ecological effects may include reduced water quality, degradation of aquatic habitat and adverse effects on freshwater biota.

Stormwater treatment devices proposed throughout the development are intended to reduce contaminant loads and moderate post-development runoff prior to discharge. The stormwater management network incorporates a series of communal wetlands and ponds and associated spillways distributed throughout the development area.

Detailed stormwater design and assessment are provided separately within the Infrastructure Report (HGC 2026a). Subject to implementation of the proposed stormwater treatment, attenuation and discharge management measures, adverse ecological effects associated with stormwater discharges are expected to be **low**.

7.4.6 Wastewater Discharge to Land

An indicative Stage 1 treated wastewater land application area (approximately 150,000 m²) is proposed within the 620 Whitford-Maraetai Road landholding. As discussed in Section 1.1, this area was not subject to ecological field verification as part of the current assessment. However, extensive terrestrial and freshwater ecological assessments previously undertaken by T&T (2022a-b) did not identify any wetlands within the indicative disposal area. In addition, modelled overland flow path mapping on Auckland Council GeoMaps indicates that the proposed disposal area is located outside of mapped freshwater features. Notwithstanding this, the location and extent of ecological features within the landholding should be regarded as indicative pending field verification.

GWE Consulting Engineers Limited (GWE) have proposed a wastewater disposal system that comprises a communal pressure compensating dripper irrigation (PCDI) system discharging treated wastewater to

land (GWE 2026). The indicative disposal area has been conceptually located to achieve the minimum separation distances recommended by Auckland Regional Council Technical Publication 58 (TP58) for tertiary treated wastewater (generally 5-10 m), although final setbacks will be confirmed during detailed design.

Potential ecological effects are therefore expected to be primarily indirect and may include changes in groundwater or surface water quality, nutrient enrichment, and effects on vegetation communities receiving treated wastewater. The wastewater assessment prepared by GWE concludes that adverse effects on receiving environments are expected to be low, subject to implementation of the proposed treatment, monitoring and management measures (GWE 2026). The use of surface-laid PCDI and timer dosing represents accepted best practice for land disposal systems and is intended to minimise the potential for surface runoff. Vegetation within the disposal area will also assist with the retention, uptake and treatment of applied wastewater, further reducing the potential for discharge to surface water environments.

On the basis of the information currently available, significant adverse ecological effects are not anticipated. However, ecological field verification and confirmation of freshwater feature locations within the 620 Whitford-Maraetai Road landholding should be undertaken during detailed design to ensure wastewater infrastructure and disposal areas avoid direct impacts on streams, wetlands and other ecological features where practicable.

7.5 Summary of Level of Ecological Effects

The overall level of effect for the proposed works is generated using Table 13, taking the ecological value and expected magnitude of the effect on that value. Expected levels of effect for the proposal are given in Table 13. Generally, mitigation is only required when the level of effect is expected to be moderate or higher. However, in line with best practice, a number of mitigation measures are recommended to ensure the level of effect of the proposal remains low.

Table 13. Overall level of effect of the project on the identified ecological values.

Effect	Feature Ecological value	Magnitude of effect before mitigation/compensation	Magnitude of effect after mitigation/ compensation	Level of effect
Effect on botanical and habitat values	Low-Moderate	Low	Low	Positive – extensive revegetation planting, enhancement and long-term protection proposed, resulting in net gain
Effect on birds	Moderate	Moderate	Low	Low
Effect on lizards	Low-Moderate	Low	Very Low	Very Low
Effect on bats	Low	Low	Very Low	Very Low
Effects of erosion and sedimentation	Low-Moderate	High	Low	Low

Effect	Feature Ecological value	Magnitude of effect before mitigation/compensation	Magnitude of effect after mitigation/ compensation	Level of effect
Effects on stream value	Low-moderate	Moderate	Moderate	Moderate – Residual effects managed through freshwater compensation
Effects on stream extent	Low-moderate	Moderate	Moderate	Moderate – Residual effects managed through freshwater compensation
Effects on wetland value (excluding coastal fringe wetland)	Low	Moderate	Low	Positive – net gain through proposed restoration of 2.943 ha of exotic wetland
Effects on wetland extent (excluding coastal fringe wetland)	Low	Moderate	Moderate	Moderate – Residual effects managed through freshwater compensation
Effects on freshwater fish	Moderate	Moderate	Low	Low
Effects on freshwater fish passage	Low-Moderate	Low	Negligible	Negligible
Effects of stormwater management	Moderate	Moderate	Low	Low
Effects of wastewater discharge to land	Low-Moderate	Low	Low	Low

8 ASSESSMENT AGAINST RELEVANT NATIONAL POLICY STATEMENTS

8.1 NPS for Freshwater Management 2020 (NPS-FM)

The proposal has been assessed against the relevant objectives and policies of the NPS-FM. The proposal will result in stream and wetland reclamation and associated freshwater effects. These effects have been assessed and, where practicable, avoided or minimised through scheme design, implementation of erosion and sediment controls, stormwater management measures, fish salvage, and restoration of retained freshwater habitats.

Residual adverse freshwater effects have been addressed through a freshwater compensation package comprising restoration and enhancement of approximately 2.943 ha of wetland habitat within the Waikōpua Creek catchment. The proposal's consistency with the relevant objectives and policies of the NPS-FM is summarised in Table 14.

Table 14. Assessment of the proposal against the NPS-FM objectives and policies relevant to this EcIA.

NPS-FM Provision	Summary	Assessment
Objective 2.1	Prioritises the health and wellbeing of freshwater ecosystems, followed by human health needs and community wellbeing.	The proposal will result in some stream and wetland loss; however, freshwater values have been identified and assessed, effects have been avoided or minimised where practicable, and residual effects addressed through restoration, enhancement and compensation. Collectively, these measures are intended to maintain and improve freshwater ecosystem function while enabling urban development and associated community outcomes.
Policy 1	Gives effect to Te Mana o te Wai.	The proposal recognises freshwater ecosystems as a key ecological value and incorporates measures to avoid, minimise and manage adverse effects on streams and wetlands where practicable. While some stream and wetland loss is proposed, the assessment has considered effects on freshwater ecosystems throughout the wider catchment and includes restoration, enhancement and compensation measures intended to maintain and improve freshwater ecosystem function and condition.
Policy 3	Requires integrated management of freshwater effects at a catchment scale, including receiving environments.	The assessment has considered stream and wetland reclamation, wetland hydrology, stormwater management, wastewater disposal and downstream receiving environments across the wider catchment.
Policy 5	Requires maintenance or improvement of freshwater ecosystem health and wellbeing.	The proposal includes extensive freshwater restoration, riparian planting, wetland enhancement and long-term management measures that will improve the condition of retained freshwater habitats.
Policy 6	Seeks no further loss of natural inland wetlands and promotes wetland restoration.	The proposal will result in permanent wetland loss. These effects have been quantified and addressed through avoidance, minimisation and a compensation package comprising restoration and enhancement of approximately 2.943 ha of degraded wetland habitat.

NPS-FM Provision	Summary	Assessment
Policy 7	Seeks to avoid loss of river extent and values to the extent practicable.	Some stream reclamation is proposed, and has been minimised where practicable. Adverse effects have been assessed and addressed through freshwater compensation and restoration measures.
Policy 9	Protects the habitats of indigenous freshwater species.	Freshwater fish habitat has been assessed, fish salvage is proposed for all wetted habitats, and restoration and enhancement measures will improve habitat quality within retained freshwater ecosystems.

Overall, while the proposal will result in adverse effects on some freshwater values, these effects have been avoided, minimised and addressed through a combination of design measures, restoration, freshwater compensation measures and long-term management. Subject to implementation of the proposed mitigation and compensation measures, the proposal is considered to be generally consistent with the relevant objectives and policies of the NPS-FM.

8.2 National Policy Statement for Indigenous Biodiversity 2023 (NPS-IB)

The proposal has been assessed against the relevant objectives and policies of the NPS-IB. The proposal will result in some minor loss and modification of indigenous biodiversity values, and these effects have been assessed and, where practicable, avoided or minimised through scheme design, retention of higher-value habitats, implementation of ecological management measures, and long-term protection of ecological values.

The proposal also incorporates substantial ecological restoration and enhancement measures, including restoration and expansion of the EPAN, riparian and wetland planting, freshwater compensation, pest animal control, weed management, and implementation of a BMP. Collectively, these measures are intended to maintain and enhance indigenous biodiversity values across the Site and wider receiving environment. The proposal's consistency with the relevant objectives and policies of the NPS-IB is summarised in Table 15.

Table 15. Assessment of the proposal against the NPS-IB objectives and policies relevant to this EcIA.

NPS-IB Provision	Summary	Assessment
Objective 2.1	Maintain indigenous biodiversity and achieve an overall no net loss whilst enabling social, economic and cultural wellbeing.	The proposal results in some very small-scale indigenous vegetation and habitat loss; however, extensive restoration, enhancement and long-term protection measures are proposed. The EPAN enhancement programme results in a significant net increase in land subject to ecological restoration and management.
Policy 3	Adopt a precautionary approach when considering adverse effects on indigenous biodiversity.	Potential effects have been assessed conservatively, including use of representative SEV/WEV assessments, conservative wetland hydrology assumptions and precautionary compensation accounting.
Policy 4	Indigenous biodiversity is managed to promote	The proposal incorporates substantial ecological restoration and enhancement measures that will increase indigenous vegetation cover, improve habitat connectivity and habitat diversity, and

NPS-IB Provision	Summary	Assessment
	resilience to the effects of climate change.	contribute to the resilience of indigenous biodiversity to the effects of climate change over time.
Policy 5	Manage indigenous biodiversity in an integrated way.	The proposal integrates terrestrial, freshwater and coastal ecological management through the EPAN, BMP, freshwater compensation package and restoration planting.
Policy 6	Significant indigenous vegetation and significant habitats of indigenous fauna are identified as SNAs using a consistent approach.	Significant indigenous biodiversity and habitats of indigenous fauna within and adjoining the Site has been identified through the AUP-OP SEA overlay and supporting ecological investigations.
Policy 7	Significant indigenous biodiversity is protected by avoiding or managing adverse effects from development.	Areas of highest indigenous biodiversity value have generally been retained within the EPAN network. Residual effects on indigenous biodiversity have been assessed and addressed through avoidance, minimisation, restoration, enhancement and long-term management measures.
Policy 8	Indigenous biodiversity outside SNAs is recognised and provided for.	The majority of vegetation affected by the proposal occurs outside SNA/SEA areas and comprises modified exotic-dominated habitats. Notwithstanding this, these habitats have been assessed, and the proposal incorporates extensive restoration, enhancement and management measures throughout the wider Site.
Policy 10	Recognise activities contributing to social, economic, cultural and environmental wellbeing.	The proposal provides for urban development while incorporating substantial biodiversity restoration, enhancement and management measures.
Policy 13	Promote restoration of indigenous biodiversity.	The proposal incorporates extensive restoration planting, riparian enhancement, wetland restoration, weed control and pest animal management in areas that are currently degraded by exotic species dominance and a history of modification.
Policy 14	Promote increased indigenous vegetation cover.	Extensive EPAN and riparian restoration planting is proposed to restore exotic-dominated areas, as well as an additional 2.6 ha of indigenous planting adjoining the EPAN, and incorporated throughout parks and public open spaces.
Policy 15	Areas supporting specified highly mobile fauna are identified and managed to maintain their populations across their natural range.	The Site and surrounding coastal environment provide potential habitat for a number of highly mobile fauna listed in Appendix 2 of the NPS-IB, including northern NZ dotterel, banded dotterel, Caspian tern, bar-tailed godwit, banded rail and long-tailed bat. These values have been assessed through targeted ecological investigations and are addressed through habitat retention, ecological restoration, pest management, freshwater enhancement measures and species-specific management where required. The proposal is not anticipated to adversely affect the ability of these species to utilise habitats across their wider natural range.

Overall, while the proposal will result in some loss and modification of indigenous biodiversity and habitats, the scale of ecological restoration, enhancement, protection and long-term management proposed within the EPAN is expected to maintain and enhance indigenous biodiversity values across the Site over the long term. Accordingly, the proposal is considered to be generally consistent with the relevant objectives and policies of the NPS-IB.

9 SUMMARY AND RECOMMENDATIONS

Viridis was engaged by BSLP to undertake an EcIA for the approximately 165 ha Beachlands South Site, which is proposed for development under the FTAA. Terrestrial ecological values within the Site were generally associated with areas of indigenous vegetation, streams, wetlands, coastal SEA habitats and the wider EPAN. Much of the Site comprises modified habitats associated with historical agricultural and golf course land uses, including managed grassland, exotic-dominated scrub and amenity vegetation. Notwithstanding this, the Site supports a range of indigenous biodiversity values, including habitat for indigenous fauna and several At Risk and Threatened species.

The Site contains permanent and intermittent streams, natural inland wetlands, constructed ponds and artificial drainage features that contribute to freshwater habitat diversity and ecological connectivity within the wider receiving environment. While many freshwater features are modified and of low to moderate ecological value, they provide habitat for indigenous freshwater species and contribute to the ecological functioning of the Site.

Implementation of the proposal will require bulk earthworks, vegetation removal, installation of transport and utility infrastructure, stream diversions and reclamations, wetland reclamation, culvert installation, stormwater and wastewater management works and associated development activities. These works will result in adverse effects on terrestrial and freshwater ecological values, including permanent loss of some stream and wetland habitats and vegetation communities.

The proposal has incorporated a range of measures to avoid, minimise and address ecological effects, including retention and enhancement of the EPAN network, restoration planting, riparian and wetland enhancement, freshwater compensation, pest animal control, weed management, fish salvage, erosion and sediment controls, and long-term ecological management through implementation of a BMP. In particular, the proposal will result in a net increase in land subject to ecological restoration and long-term protection within the EPAN, together with restoration and enhancement of approximately 2.943 ha of wetland habitat as aquatic compensation for residual freshwater effects.

Residual adverse effects have been appropriately addressed through the proposed mitigation, restoration and compensation measures, such that they are not considered to be of a scale or significance that would outweigh the ecological benefits associated with the proposal. Overall, the proposal is expected to deliver a net positive ecological outcome over the long term through the enhancement, restoration and protection of indigenous biodiversity values across the Site, subject to the following recommendations:

- The FMP (Appendix K) should be implemented prior to and during vegetation clearance works to minimise potential adverse effects on indigenous fauna, including management measures for indigenous birds (including pond-associated nesting species), lizards and bats;
- The BMP (Appendix J) should be implemented prior to and during development works to ensure proposed ecological restoration, enhancement planting, pest management and protection measures are appropriately undertaken;
- The proposed EPAN slip remediation works should be undertaken in accordance with the relevant engineering plans. Any future land instability works required within the EPAN should be subject to preparation of a site-specific remediation plan and methodology prior to works commencing. The plan should identify the extent of works, erosion and sediment controls, vegetation clearance

requirements, reinstatement planting and maintenance measures required to ensure affected ecological values are appropriately reinstated in accordance with the final BMP;

- Erosion and sediment control measures should be implemented in accordance with the ESCP prepared by HGC (2026) and GD05 (or any subsequent replacement document), including implementation of the proposed monitoring and adaptive management measures;
- Construction activities should be managed to ensure that sediment, concrete washwater, fuels, chemicals, rubbish and other contaminants do not enter streams, wetlands, ponds or other freshwater environments;
- Prior to commencement of stream, wetland or pond works, a NFCRP should be prepared and implemented by a suitably qualified and experienced freshwater ecologist to minimise adverse effects on indigenous freshwater fish;
- The proposed freshwater compensation package, including restoration and enhancement of approximately 2.943 ha of wetland habitat, should be implemented in accordance with the BMP and associated consent conditions;
- Ecological field verification should be undertaken within the 620 Whitford-Maraetai Road landholding during detailed design of the proposed wastewater disposal field to confirm the location and extent of streams, wetlands and other ecological features. This information should be used to inform the final design and location of wastewater infrastructure and disposal areas to avoid direct ecological impacts where practicable;
- A wetland monitoring programme should be implemented to assess the establishment and performance of the freshwater compensation site and inform adaptive management where required; and
- All ecological restoration, enhancement and compensation areas should be legally protected and subject to long-term management, maintenance, weed control and pest animal control in accordance with the BMP.

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