Appendix G

Stormwater Management Plan

Bell Road Limited Partnership

Wairakei South

Bell Road

Pāpāmoa

Stormwater Management Plan

PROJECT INFORMATION

CLIENT	Bell Road Limited Partnership
PROJECT	Wairakei South
MAVEN PROJECT REF	BOP 0749

DOCUMENT CONTROL

DATE OF ISSUE	8/05/26
REVISION	Draft
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CONTENTS

1. EXECUTIVE SUMMARY

The Wairakei South Development (the Site) is a transformative, privately funded urban development project which will play a critical role in addressing the Western Bay of Plenty sub-region's growing housing and business land shortfalls. The site is approximately 350 hectares within the high-growth Eastern Corridor between Pāpāmoa, Te Tumu, and Te Puke, Wairakei South is positioned to become a vibrant, integrated and connected mixed-use community. The project will deliver approximately 2,750 new homes alongside 50 hectares of industrial, 4 hectares of commercial centres, and a 4 hectare primary school over the next 10–20 years.

The existing site presented significant flood engineering challenges to overcome and an innovative solution has been arrived at to allow its development.

This Stormwater Management Plan (SMP) demonstrates that the proposed design successfully achieves the following key objectives:

1. Adoption of the best practicable stormwater management approach considering hydrological and environmental characteristics of the site and surrounding area;
2. Effective management of the 100-year Average Recurrence Interval (ARI) floodplain to avoid adverse effects on the proposed development or downstream areas;
3. No increase in flood risk upstream or downstream for storm events up to and including the 100-year ARI;
4. Incorporation of climate change effects through the application of a 3.68°C temperature increase and 1.59 m sea level rise by 2130 under a high-emissions scenario (SSP5-8.5), in accordance with Bay of Plenty Regional Council modelling parameters and the BOPRC Hydrological and Hydraulic Guidelines.

The Stormwater Management Plan has been prepared in accordance with:

- Western Bay of Plenty District Council's ("WBOPDC") and BOPRC policies and plans;
- Best practice stormwater management techniques to meet BOPRC guidelines and industry standards;
- National Policy Statements;
- Consultation with Mana Whenua.

This Stormwater Management Plan has been prepared by Maven BOP Limited (Maven) to support the Wairakei South development at Bell Road, Papāmoā "The Project" under the Fast Track Approvals Act 2024.

The information provided herein outlines the methodology associated with the proposed stormwater management strategy onsite.

This report is to be read in conjunction with the Engineering Drawings, Infrastructure Report, Flood Modelling Report and Calculations and is to accompany the Fast Track Approval application

2. INTRODUCTION

2.1. PURPOSE OF REPORT

The primary objective of a Stormwater Management Plan (SMP) is to establish the best practicable option for long-term stormwater management, focusing on water sensitive design and a treatment train approach to treat runoff as close to the source as possible, using nature-based systems.

The purpose of this SMP is to outline the proposed stormwater management strategy for the Wairakei South development, south of Pāpāmoa East and The Sands Town Centre, and to support the Fast-track Approvals Act ("FTA") substantive application.

2.2. SITE DESCRIPTION

The site is located immediately south of State Highway 2 (SH2)/Tauranga Eastern Link and the Wairakei North and 'The Sands' developments. Comprising 349.12 hectares across 12 titles (Table 1), the site is situated within a predominantly rural area zoned WBOPDC Rural. The site is bounded by State Highway to the north and east, the Kaituna River to the east, and the Kopuaroa Canal to the south. Bell Road bisects the development and currently provides the only site access, with a future link to be provided via the Pāpāmoa East Interchange (PEI). The site's location within the wider Tauranga City/Western Bay of Plenty Subregion is illustrated in Figure 1 below.

The land to the north of Bell Road herein is referred to as the 'North Block' and the land to the south of Bell Road is referred to as the 'South Block'.

The area is largely flat and low lying, with a very gentle slope to the east. It is in pasture and is presently grazed by stock and seasonally is cropped in maize. Farm drains, scattered trees and hedges, houses, and farm buildings are present across multiple properties within the site.

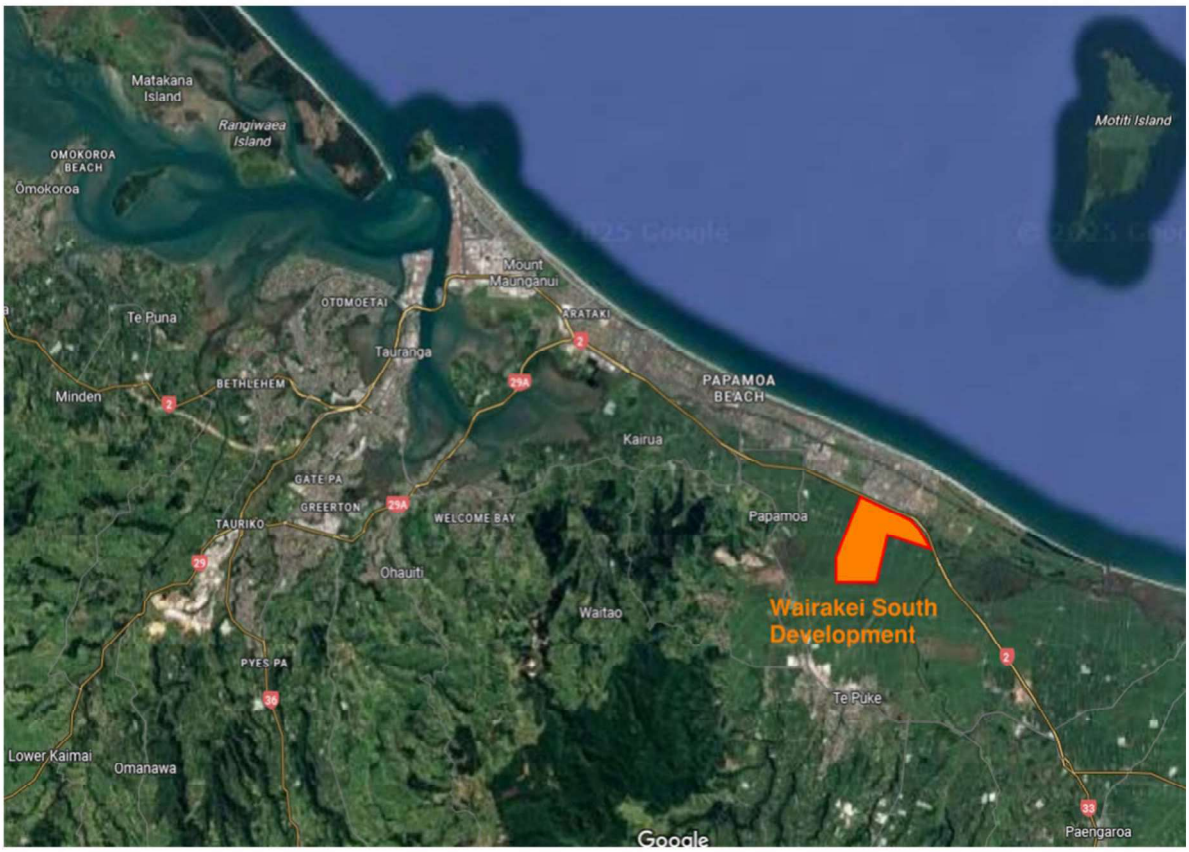

Figure 1 - Wairakei South Development Location (Source: Google Maps)

The site is legally described in Table 1 below and comprises an area of 349.12 ha.

Table 1: Legal Description of Site

Address	Record of Title	Appellation	Area (Ha)
	SA64B/396	Lot 2 DPS 81677 & Lot 1 DPS 54113	24.323
285 Bell Road, Papamoa	SA64B/395	Lot 1 DPS 81677	2.694
	624307	Lot 1 DPS 69524 & Section 26 SO 427562	21.4595
285A Bell Road, Pāpāmoa	SA55D/202	Lot 2 DPS 69524	0.9815
311 Bell Road, Pāpāmoa	893643	Lot 1 DP 537375	15.2909
	893644	Lot 2 DP 537375	3.5277
339 Bell Road, Pāpāmoa	687138	Section 1 SO 457222	4.179
	606872	Section 13 SO 458365	59.9413
	605743	Section 12 SO 458365	1.7884
250, 252 Bell Road, Pāpāmoa	SA7A/206	Part Lot 1 DP 29530	113.7622
314D Bell Road, Pāpāmoa	960662	Lot 2 DP 553506	99.1095
314 Bell Road, Pāpāmoa	960661	Lot 1 DP 553506	2.0626
		Total	349.1196

2.3. THE PROPOSAL

The proposed development of Wairakei South by Bell Road Limited Partnership is a large-scale master-planned community, consisting of approximately 2,700 residential lots, and approximately 55 ha of industrial/employment land. In addition to residential and industrial use, other uses to support a new community of this size are proposed, such as commercial/retail hubs, a school, parks/open space, stormwater reserves and green connections/shared pathways. Figure 2, below, depicts the proposed Masterplan.

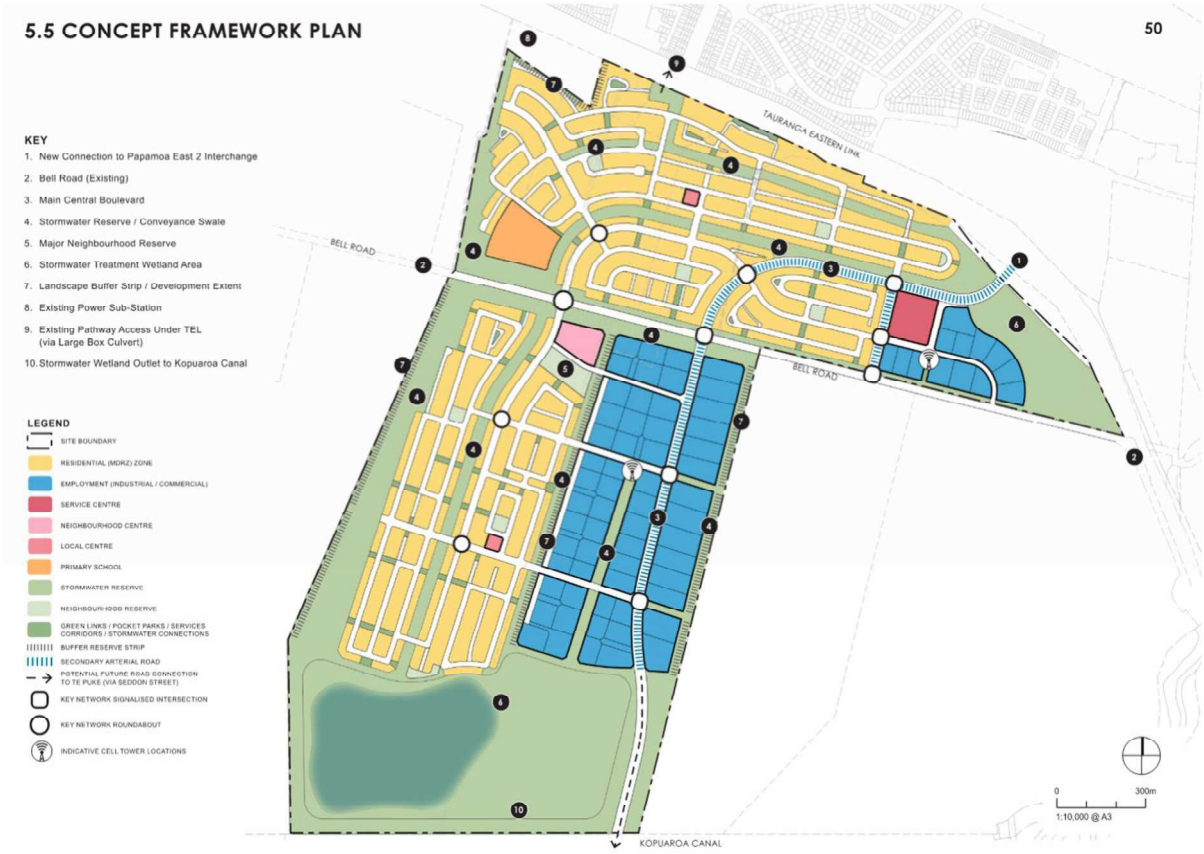

Figure 2 – Masterplan (Development Context) – Boffa Miskell

2.4. SUMMARY OF PROPOSED STORMWATER MANAGEMENT

Please refer to the Maven drawings **(C-400s - Appendix D of the AEE)** set for details of the proposed stormwater infrastructure associated with this development, within the application documents.

Stormwater will be managed using industry best-practice methods. Runoff will be attenuated within swales and basins prior to discharge into the Kopuaroa Canal and Kaituna River via new and upgraded pump stations. Conveyance will primarily occur through a network of wetland swales, which will also provide treatment to meet council requirements for total suspended solids (TSS), nutrients, and heavy

metals. The stormwater treatment design follows the treatment train approach outlined in the Bay of Plenty Regional Council Stormwater Management Guidelines (2012). Treatment performance will be monitored in accordance with the Stormwater Monitoring Plan prepared by Ecological Solutions (Appendix AI of the AEE), with monitoring results compared against ANZECC trigger values and relevant receiving environment water quality standards to demonstrate compliance with BOPRC's effects-based assessment framework.

Flood risk has been addressed by designing the wetland swales and attenuation basins to accommodate the 1% Annual Exceedance Probability (AEP) storm, ensuring that any flood levels remain controlled. These measures provide the required freeboard for residential, industrial, and commercial areas.

The below drawing prepared by Maven provides an overview of the development and its proposed stormwater infrastructure. Green areas represent stormwater conveyance swales and wetlands, with the Kopuaroa Canal shown to the south.

Figure 3 – Stormwater Management Overview **(C400s - Appendix D of the AEE)**

2.5. STORMWATER DEVELOPMENT STAGING

Consideration of staging when developing in a flood plain is important and must be managed carefully to ensure that there are no stormwater management issues as the development progresses.

The site will be developed to facilitate early stages for stormwater treatment, discharge and flood mitigation. A staging plan has been developed to anticipate a practical staging sequence; however, it is likely that this will evolve as the development progresses in the future.

Stages 1 – 8 and 17 – 18 are comprised in the North Block (north of Bell Road) with the remaining stages comprising the South Block (south of Bell Road).

Figure 4 – Proposed Staging Plan (**C100s - Appendix D of the AEE**)

Based on the above staging plan, the stormwater features for the site will be developed in the following sequence:

Stage 1

Pāpāmoa East Interchange link road construction, associated causeway for stormwater conveyance beneath PEI link, stormwater reticulation and partial construction of the North Block wetland swales to provide stormwater quality treatment/flood mitigation/conveyance to the PEI link, and basin and low flow channel to provide attenuation/conveyance to the Bell Road drain. Bell Road A Pump station will have an additional 3m³/s upgrade with backup power.

Stages 2 - 3

Construction of reticulation and extension of wetland swales to provide treatment and conveyance. Strategic excavation of peat and poor-quality soil which provides offset flood displacement storage for northern half of the North Block. The second new pump is to be added to the Bell Road A Drain Pump Station, adding 3m³/s capacity and a total of 6m³/s capacity added. A flap gate is to be added to the existing culvert outlet immediately east of the Stage 1 attenuation basin and TEL.

Stage 4

Construction of the South Block pump station discharging to the Kopuaroa Canal and the installation of a 2.5m³/s Archimedes screw pump and 0.3m³/s groundwater dewater pump with 24-hour backup power. Giving a total Stage 4 capacity of 2.8m³/s.

Construction of Bell Road causeway providing stormwater conveyance link to the South Block. Western conveyance swale construction from causeway to South Block pump station. Further strategic removal of peat soils or excavation and use of good quality soils, creating the South Block basin to provide flood storage.

Stages 5 - 8

Remainder of North Block construction to be completed. Reconstruction of the Bell Road Drain and Bell Road upgrade progressively completed as required. Flood storage provided within the South Block basin. Additional pumps installed at the South Block pump station:

- Stage 6: South Block Pump Station will have an additional 2.5m³/s upgrade, giving a total capacity of 5.3m³/s
- Stage 8: South Block Pump Station will have an additional 2.5m³/s upgrade, giving a total capacity of 7.8m³/s

Stage 9 - 11

South Block construction begins, as well as reticulation and wetland swales for conveyance and treatment. Additional pumps are progressively installed in the South Block pump station as follows:

- Stage 9: South Block Pump Station will have an additional 2.5m³/s upgrade, giving a total capacity of 10.3m³/s
- Stage 11: The final 2.5m³/s pump will be installed, completing 12.8m³/s total pump station capacity

Stages 12 - 16

Reticulation and wetland swale construction progresses, completing South Block infrastructure with the completion of Stage 16.

Stages 17 - 18

Final development of stormwater infrastructure in the North Block.

3. SUMMARY OF DATA SOURCES AND REGULATORY CONTEXT

3.1. SUMMARY OF DATA SOURCES

This section provides a summary on key datasets used in the writing of this report, including those that have been used to generate supporting figures provided as part of this application.

Table 2 - Data Sources

Site Characteristics	Data Source
Topography	Maven Drone and topographical site survey LINZ Data Service Public Digital Elevation Model data
Existing Stormwater Network & Hydrological Features	WBOPDC Mapi BOPRC Maps BOPRC Bell Road Catchment Model Kaituna River Modelling reports DHI Jan 2020, Bell Road, Hydraulic Modelling River Edge Consulting Limited June 2025, Bell Road Hydraulic Modelling Update Rivers and Drainage Asset management Plan 2024-2074 Final REC2 (River Environment Classification, v2.0) NEH 630 Chapter 9 Hydrologic Soil-Cover Complexes LCDB v5.0 – Land Cover Database version 5.0, Mainland, New Zealand, from LRIS Portal Public imagery (Google Maps, Bing Maps, New Zealand Imagery from Eagle Technology) Maven (2025) Bell Road flood modelling ENGEO Geotechnical Interpretive Report (Appendix P of the AEE) ENGEO Hydrogeological Assessment Report (Appendix R of the AEE)
Stream, River, coastal erosion	WBOPDC Mapi TCC Mapi
Flooding and Flow Paths	Bell Road Catchment Model (BORPC) Kaituna River Modelling reports DHI Jan 2020, Bell Road, Hydraulic Modelling River Edge Consulting Limited June 2025, Bell Road Hydraulic Modelling Update WBOPDC Mapi TCC Mapi REC2 (River Environment Classification, v2.0)
Coastal inundation	ENGEO Natural Hazards Assessment Report (Appendix Q of the AEE) The 2021 update to New Zealand's National Tsunami Hazard Model Modelling of the tsunami risk to Papamoa, Wairakei and Te Tumu and implications for the SmartGrowth strategy December 2011. WBOPDC Mapi TCC Mapi

3.2. REGULATORY CONTEXT

The stormwater management approach has been developed with reference to the following statutory and technical documents:

Table 3 - Regulatory Context

Level	Document
National	Resource Management Act 1991 (RMA)
	Fast Track Approvals Act 2024
	National Policy Statement for Freshwater Management 2020 (NPS-FM)
	National Stormwater Modelling Guideline – Water NZ
	NIWA HIRDS (High Intensity Rainfall Design System V4)
Regional	Bay of Plenty Regional Natural Resources Plan
	Bay of Plenty Regional Council – Guidelines for Stormwater Management
	Bay of Plenty hydraulic modelling guidelines, Guideline 2024/03
District	Western Bay of Plenty District Plan
	Western Bay of Plenty District Council – The Development Code 2009
Site Specific	Project specific investigations as highlighted in Section 4 and as noted above in Table 2 - Data Sources.

This SMP is intended to demonstrate how the development will manage stormwater runoff in a manner that aligns with both local and regional objectives, mitigates adverse effects, and supports sustainable stormwater outcomes. The strategy addresses peak flow management, water quality treatment, and integration with existing infrastructure.

4. EXISTING SITE

This section of the report summaries the existing site characteristics and conditions within the Site, as they relate to stormwater management.

4.1. TOPOGRAPHY AND CATCHMENTS

4.1.1. TOPOGRAPHY

To the south and west of the State Highway 2 and Bell Road, the landscape is an expansive and exceptionally flat agricultural plain. This low-lying area, which extends southwards beyond the Kopuaroa Canal, has almost no natural relief or undulation. Its topography is dominated by significant man-made features: the embankment of the highway on its eastern boundary, and the Kopuaroa Canal, which is incised into the level ground at the southern boundary, as well as Bell Road through the middle of the site and a series of drains and stop banks within the site. Aside from these structures, the entire region is a vast, uniform floodplain with a consistently flat profile, with elevations ranging from RL 1m to RL 2m across the development site.

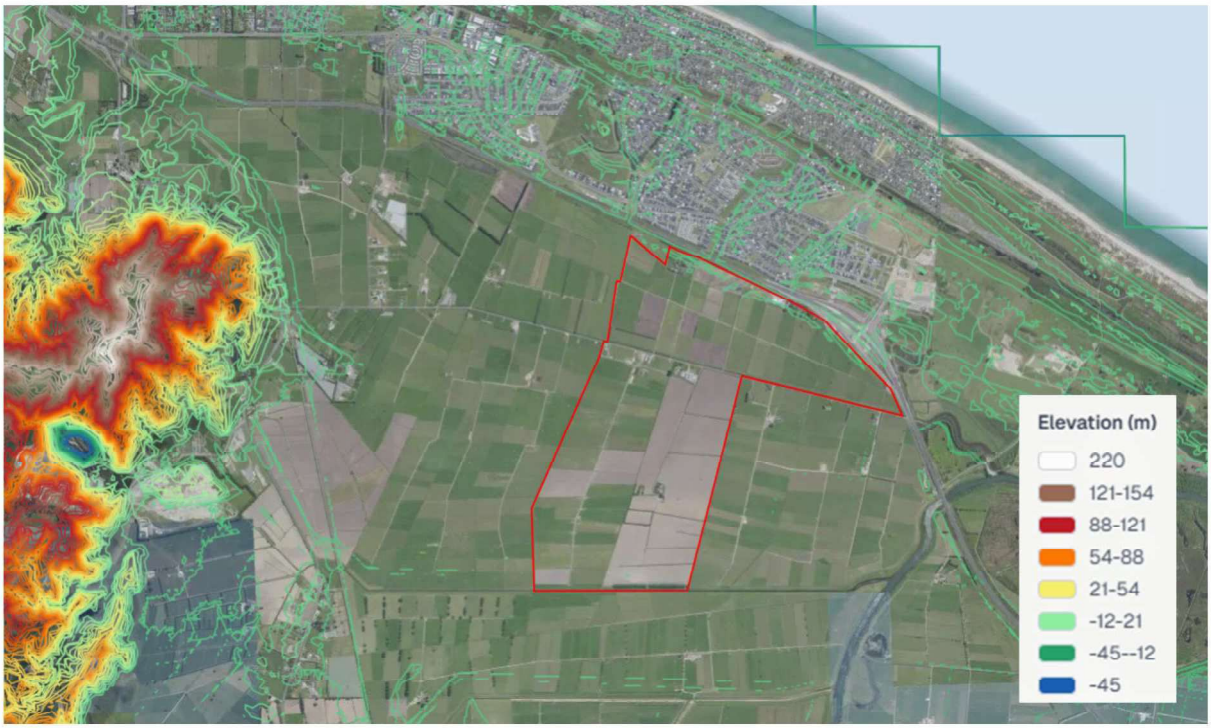

Figure 5 – Topographic Map of Area (NZ Elevation Tools)

4.1.2. CATCHMENTS AND EXISTING DRAINAGE FEATURES

Kaituna Catchment

The Bell Road Stormwater Catchment is a large, heavily modified and critically important drainage system designed to manage water across the low-lying rural land. The Bell Road catchment sits within the wider Kaituna River catchment and is managed under the Kaituna Catchment Control scheme.

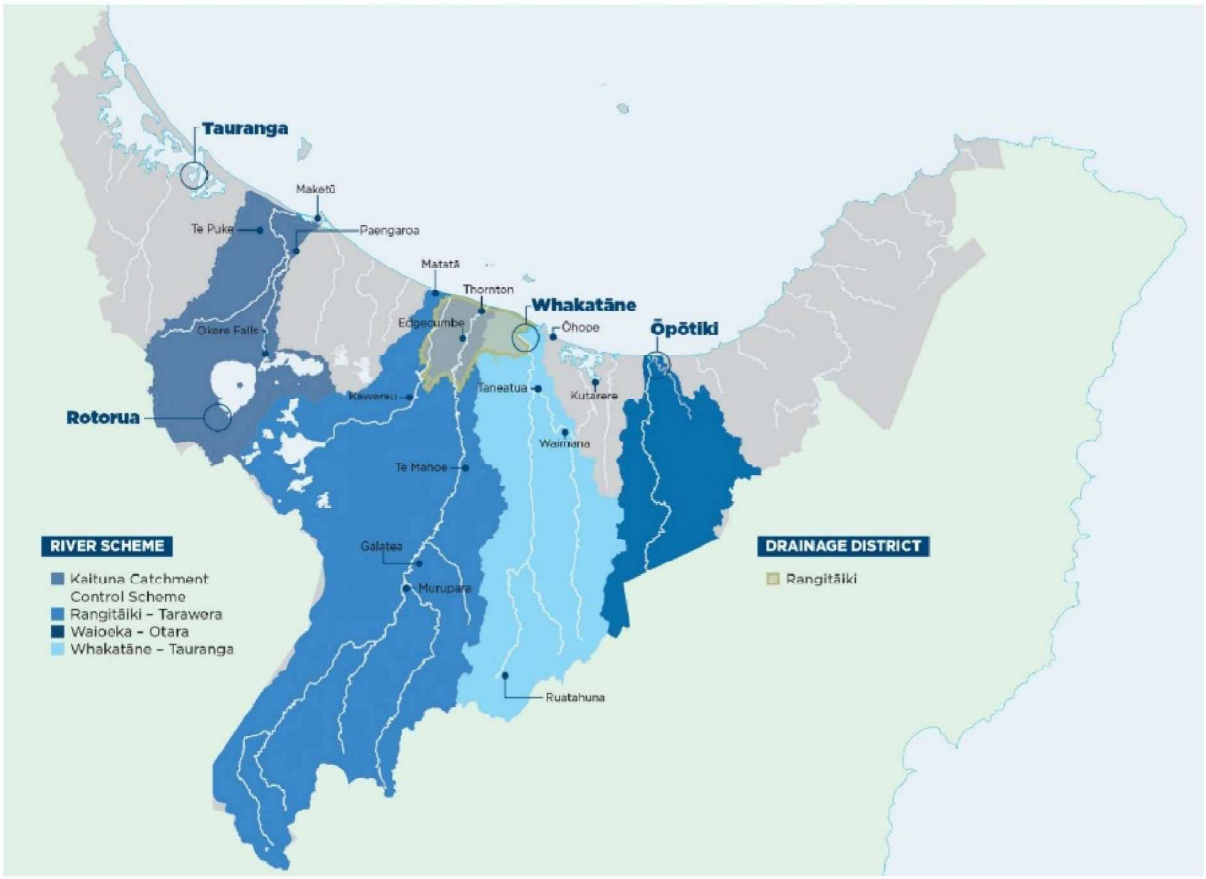

Figure 6 – Bay of Plenty Major River Catchments - BOPRC

The Kaituna River Catchment is a vast area, covering approximately 1,250 km² (125,000 ha) in the Bay of Plenty Region, stretching from Lakes Rotorua and Rotoiti down to the Ongatoro/Maketu Estuary and the Pacific Ocean. This region is characterized by its volcanic and geothermal features. The river itself is about 53 km long, transitioning from a fast-flowing gorge in its upper 25 km to slower, broader stretches in the lower 28 km leading to the sea at Te Tumu. Historically prone to flooding, the catchment's landscape now features both horticulture (especially kiwifruit) and productive dairy farming on drained river flats in its lower sections, alongside the Te Puke Township.

Major tributaries such as the Mangorewa River, Waiari, and Raparapahoe Streams contribute to the Kaituna River's flow, with Lakes Rotorua and Rotoiti being key sources for its daily water levels. The river's outlet to the sea has seen changes over time, including the creation or blockage of channels like the Ford Cut, leading to its current primary discharge point at Te Tumu.

The Bay of Plenty Regional Council is actively developing a strategy for the management of the Kaituna River and Maketu Estuary, a collaborative effort with Iwi, Tauranga City Council, Western Bay District Council, and Rotorua Lakes District Council.

Flood protection within the broader Kaituna River system is primarily delivered through the Kaituna Catchment Control Scheme (KCCS), which aims to provide comprehensive flood protection, drainage, and soil conservation, as well as managing lake levels for Lakes Rotorua and Rotoiti. Key assets of the KCCS include approximately 67 km of stop banks in the Lower Kaituna area, designed to protect against 100-year, 10-year, and 5-year Annual Recurrence Interval (ARI) flood events. These stop banks are maintained to specific design flood levels, requiring reinforcement or reconstruction if settlement exceeds 50% of the freeboard.

The scheme also incorporates about 88 km of canals and drains, seven operational pump stations (equipped with a total of 14 pumps) designed for a 5-year ARI event, and various other structures like weir and floodgates, and riverbank erosion protection.

The Kaituna Catchment Control Scheme, overseen by the Bay of Plenty Regional Council, is identified as one of the major river and drainage schemes that the River Scheme Sustainability Project is considering for long-term sustainable management. This project aims to reduce long-term flood hazards, encourage sustainable land-use practices, and raise community awareness.

Bell Road Catchment

The Bell Road man-made drainage system is a critical component of the stormwater management strategy for the Pāpāmoa Catchment, particularly significant given the ongoing urban expansion in the Wairakei area and the construction of the Tauranga Eastern Link (TEL).

The Bell Road Drain extends eastward from Parton Road to the Kaituna River Oxbow, collecting water from numerous lateral drains. Stormwater from the Wairakei North area's Western and Eastern Employment Zones flows into existing treatment ponds (Ponds G and H) before being discharged into the Bell Road Drain. An important aspect of the drainage network is the Wairakei Stream diversion in Papamoa, which involves mechanical pumping to manage increased flows from residential development.

This pump station is designed to pump up to 0.2 m^3/s of non-flood flow into Pond G, which then drains into the Bell Road Drain, aiming to restore the Wairakei Stream's water levels to their pre-development state, and notably, it is not intended for use during flood events. Consent conditions specify that stormwater management should prioritize ground soakage where practicable, especially for residential buildings, and encourage it for commercial ones.

Figure 7 – Catchment affecting Bell Road **(Source: QGIS combined with HEC-HMS)**

Central to flood management in the Bell Road area are the Bell Road Pump Stations. The main Bell Road Pump Station is a key flood protection asset, designed to manage water levels and discharge within the Bell Road Drain, particularly during significant flood events.

According to the Flood Modelling Report by Maven (Appendix H of the AEE), the Bell Road Main Drain Pump Station has a capacity of 3 m^3/s, while the adjacent Bell Road B Pump Station has a capacity of 0.57 m^3/s. During high tides, these pumps regulate flood levels, while at low tides, a 2 m × 2 m gravity flap gate operates automatically to open or close when the Kaituna River's water level exceeds that of the drain. The pump stations are expected to operate approximately two to three times per year following heavy rainfall, ceasing once water levels fall below RL – 0.2 m (Moturiki Datum).

Within the Hurst Block, the existing Bell Road A Pump Station has a current capacity of 2.37 m^3/s (with future capacity of 8.37 m^3/s) to assist in draining the southern portion of Bell Road.

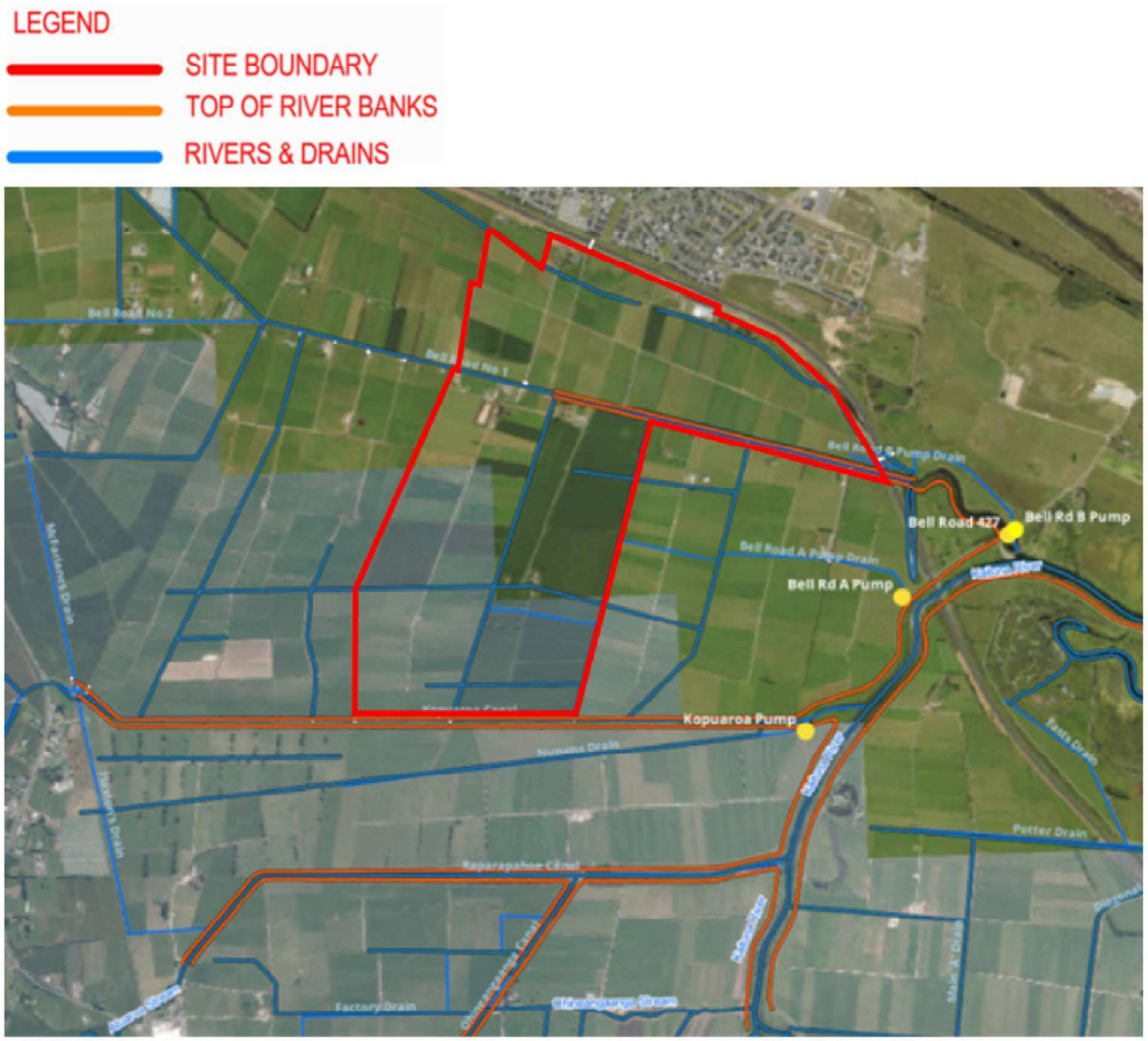

Figure 8 – Existing Bell Road Drainage Scheme (BOPRC)

Supporting the main Bell Road pump station is the Bell Road A Pump Station, which is located on the adjoining site to the east of the Wairakei South development. This pump station assists to discharge flood waters after substantial rainfall into the Kaituna River.

The Wairakei South development land presently drains to the east via a series of farm drains, to the existing box culvert under State Highway 2 (TEL). It regularly floods during and after heavy rain, as the culvert and downstream pump system do not have capacity for heavy storm events.

In summary, the Bell Road Stormwater Catchment is a highly engineered system comprising man-made canals, mechanical stormwater pumps and flap gates to manage flood controls. The Wairakei South stormwater scheme proposes to leverage and enhance the existing infrastructure using a similar philosophy of natural conveyance and mechanical pumping, with the addition of significant water quality enhancing swales and wetlands.

4.2. RECEIVING ENVIRONMENT

4.2.1. KOPUAROA CANAL

The catchment primarily relies on mechanical pumping of stormwater from the development area into the Kopuaroa Canal to the south.

The Kopuaroa Canal, which is the downstream section of the Kopuaroa Stream, is a highly modified, low-gradient waterway draining a predominantly agricultural catchment before discharging into the Kaituna River. It functions primarily as an agricultural drain. It was formed mid-20th century to drain the Kopuaroa Stream and surrounding swamp land, to enable the farming of the area. It is typically low and slow flowing and is subject to minor tidal influences. The canal is approximately 55m wide between the bank crests.

Figure 9 - The Kopuaroa Canal, the Southern End of the Development Site Looking East (Source: Maven)

Ecological Health: The ecological health of the Kopuaroa Canal is considered poor to very poor. Its channelized form, lack of habitat diversity (e.g., riffle-run-pool sequences), and poor water quality severely limit its ability to support healthy aquatic ecosystems. It is a classic example of a degraded lowland stream system.

Water Quality Issues: The canal is subject to significant non-point source pollution. Key issues include:

- Eutrophication: Elevated levels of nitrogen (primarily nitrate-nitrogen) and phosphorus from pastoral farming runoff and fertiliser application. This leads to excessive aquatic plant and algal growth.
- Faecal Contamination: High concentrations of E. coli are common, particularly after rainfall events, indicating contamination from livestock.
- Low Dissolved Oxygen: During summer, warm water temperatures combined with the decomposition of organic matter (decaying aquatic plants) can lead to hypoxic or anoxic conditions, stressing or killing aquatic life.

Riparian Vegetation: Riparian margins are generally in poor condition. Vegetation is often limited to pasture grass extending to the water's edge, with some sections containing invasive weeds like blackberry or willow. There is a distinct lack of a dense, native riparian buffer, resulting in minimal shading, bank stabilisation, or filtration of contaminants from runoff.

Fish and Macroinvertebrates: The fauna is dominated by pollution-tolerant species.

Fish: The community typically consists of shortfin eel (Anguilla australis) and common bully (Gobiomorphus cotidianus). Migratory species like inanga may be present but struggle due to poor habitat and barriers to passage.

Macroinvertebrates: The Macroinvertebrate Community Index (MCI) score is consistently low, indicating poor water quality. The community is dominated by tolerant taxa such as snails (Potamopyrgus), oligochaete worms, and chironomids.

Stormwater Management: The canal acts as a primary conduit for agricultural and stormwater runoff. Its design facilitates rapid water removal from land, but this efficiency means there is minimal retention or treatment time, leading to the direct transfer of contaminants into the Kaituna River.

Erosion and Sedimentation: While the low gradient limits widespread channel erosion, bank slumping ("pugging") from livestock access is a significant source of fine sediment. Runoff from surrounding farmland also carries a high suspended sediment load, which contributes to turbidity in the canal and is subsequently delivered to the Kaituna River.

The Kopuaroa Canal is actively managed by the BOPRC and protected via the BOPRC Flood Protection and Drainage Bylaws.

4.2.2. BELL ROAD DRAIN

The Bell Road Drain is another small, channelized waterway in the lower Kaituna catchment, similar in character and function to the Kopuaroa Canal. It drains horticultural and pastoral land before flowing into the Kaituna River.

Figure 10 - The Bell Road Drain, Looking West (Source: Maven)

Ecological Health: Its ecological health is classified as poor. The physical habitat has been engineered for drainage efficiency, featuring a uniform channel, soft sediment bed, and a lack of natural features like woody debris or varied substrates. This severely limits its ecological function and resilience.

Water Quality Issues: Water quality is consistently poor and is characterized by:

- Nutrient Enrichment: High levels of nitrogen and phosphorus are present due to intensive land use in the catchment (e.g., kiwifruit orchards, dairy farming).
- Contaminants: There is potential for pesticide and herbicide residues from horticultural operations to enter the drain via spray drift or runoff, although monitoring data may be limited.
- Turbidity: Runoff after rain results in high turbidity from suspended sediment.

Riparian Vegetation: Riparian vegetation is largely absent or unmanaged. Margins are typically grassed or weedy, offering negligible ecological benefits. The lack of shading exacerbates high summer water temperatures, which contributes to low dissolved oxygen levels.

Fish and Macroinvertebrates: The aquatic community reflects the degraded conditions.

Fish: The community is restricted to the most tolerant species, primarily shortfin eels. Its value as a habitat or corridor for more sensitive native fish is extremely low.

Macroinvertebrates: Dominated by pollution-tolerant invertebrates like worms, leeches, and snails, resulting in very low MCI scores. The community lacks sensitive EPT taxa (Ephemeroptera, Plecoptera, Trichoptera).

Stormwater Management: The drain is a key piece of local stormwater and land drainage infrastructure. It effectively lowers the water table and removes surface water from productive land, but in doing so, it provides a fast-track for pollutants to enter the Kaituna River with little to no attenuation. It discharges into a box culvert, constructed in the last decade by NZTA during the construction of the adjoining State Highway 2 (TEL) upgrade.

Erosion and Sedimentation: The primary sediment source is surface runoff from the surrounding catchment rather than channel erosion. The slow-flowing nature of the drain allows some sediment to accumulate on its bed, which can be periodically re-suspended during high-flow events or cleared during drain maintenance, creating downstream sediment pulses.

The Bell Road Drain is crossed periodically by farm bridges.

Figure 11 - The Bell Road Drain TEL Culvert, Looking Northeast (Source: Maven)

4.2.3. KAITUNA RIVER

The Kaituna River is one of the major rivers in the Bay of Plenty, flowing from Lake Rotoiti and Lake Rotorua to the Maketu Estuary. Its lower reaches, which receive inflow from the Kopuaroa Canal and Bell Road Drain, are heavily influenced by surrounding land use.

Figure 12 - Kaituna River Downstream of the SH2 Bridge, Looking East (Source: Maven)

Ecological Health: The river's health is variable. The upper reaches are in relatively good condition, supporting recreational activities like whitewater rafting. However, the lower reaches are ecologically degraded due to historical modifications (including its diversion away from the Maketu Estuary in 1956) and ongoing pressures from the agricultural catchment. The recent Te Awa o Ngātoroirangi / Kaituna River Re-diversion project aims to improve the health of its lower reaches and the estuary.

Water Quality Issues: The primary issues in the lower Kaituna are nutrient and sediment enrichment.

Nutrient Load: The river carries a significant load of nitrogen and phosphorus from its large catchment, contributing to eutrophication pressure in the Maketu Estuary.

Clarity and Turbidity: Water clarity is often poor due to high levels of suspended fine sediment originating from bank erosion and catchment runoff.

Riparian Vegetation: Riparian management is mixed. While there are extensive areas dominated by pasture and managed willows (used for flood control and bank stabilisation), significant restoration efforts by the regional council and community groups have re-established native planting in key areas. These initiatives aim to improve shading, habitat, and filtration.

Fish and Macroinvertebrates: The Kaituna River supports a diverse fish community, although it is under pressure.

Fish: It is an important habitat for native migratory species, including longfin and shortfin eels, inanga, kōaro, and banded kōkopu. It also supports an introduced trout fishery. The health of these populations is a key driver for restoration.

Macroinvertebrates: MCI scores in the lower river are typically in the "fair" range, reflecting the moderate level of enrichment and sedimentation. The community is a mix of sensitive and tolerant species.

Stormwater Management: The river is the primary receiving environment for stormwater from a vast rural and semi-rural area. Flood management schemes, including stop banks and drainage canals, are in place to protect surrounding low-lying land.

Erosion and Sedimentation: The river transports a substantial sediment load to the coast. Bank erosion is an ongoing management issue, particularly in the softer alluvial soils of the lower plains. This sediment load is a primary stressor on the Maketu Estuary, impacting light penetration and smothering benthic habitats.

4.2.4. MAKETU ESTUARY

The Maketu Estuary is the ultimate receiving environment for the Kaituna River and its tributaries, including the Kopuaroa Canal and Bell Road Drain. It is a shallow, bar-built estuary of immense cultural and ecological significance.

Figure 13 - Maketu Estuary (Source: Google Maps)

Ecological Health: The estuary is in a state of managed recovery after decades of severe degradation. The 1956 diversion of the Kaituna River away from the estuary starved it of freshwater flows, leading to hypersalinity, poor flushing, and the loss of 90% of its historical freshwater wetlands.

The partial re-diversion of the river back into the estuary in 2020 was a monumental project designed to restore more natural estuarine processes and improve its ecological health.

Water Quality Issues: Despite the re-diversion, water quality remains a key challenge. The estuary now receives freshwater, but that water is laden with nutrients and sediments from the entire upstream catchment. Managing this "quality" aspect is the new focus. Key issues are:

- Nutrient Enrichment: High nutrient loads from the Kaituna River can trigger algal blooms and affect the health of seagrass and shellfish beds.
- Sedimentation: The influx of fine terrestrial sediment reduces water clarity and can smother sensitive benthic habitats and shellfish beds.

Riparian Vegetation: The estuary is fringed by important saltmarsh and, increasingly, mangrove habitats. Saltmarsh vegetation (e.g., oioi, glasswort) provides critical habitat for fish and invertebrates and helps trap sediment. The expansion of mangroves is a complex issue, offering some ecological benefits but also altering the nature of intertidal flats. Restoration of historical saltmarsh is a key management goal.

Fish and Macroinvertebrates: The estuary is a vital nursery for numerous fish species, including grey mullet, parore, flounder, and kahawai. It is a critical habitat for the national whitebait fishery (inanga). The health and abundance of kaimoana (seafood) such as pipi and cockles are key indicators of estuarine health and are slowly recovering post-re-diversion.

Stormwater Management: The estuary's health is directly and entirely dependent on the management of stormwater and land use across its 1,250 km² catchment. Every land-based activity that impacts water quality in the Kopuaroa Canal, Bell Road Drain, and Kaituna River ultimately expresses itself within the estuary.

Erosion and Sedimentation: Sedimentation is the primary long-term threat. Historically, the estuary was infilling with marine sands due to the lack of river flushing. Now, the main issue is the deposition of fine mud from the river catchment. The re-diversion project was designed to use the river's energy to help flush sediment out of the estuary channels, but reducing the sediment load at its source through catchment-wide erosion control and riparian planting is the ultimate solution.

4.3. FLOODING AND INDICATIVE FLOWPATHS

The site presently experiences significant flooding as described in Maven's Flood Modelling Report **(Appendix H of the AEE)**. In periods of heavy rainfall (approximately 2-3 times a year) the Bell Road Drain overtops due to not being able to drain through the State Highway 2 culvert, resulting in flooding of the site and surrounding area.

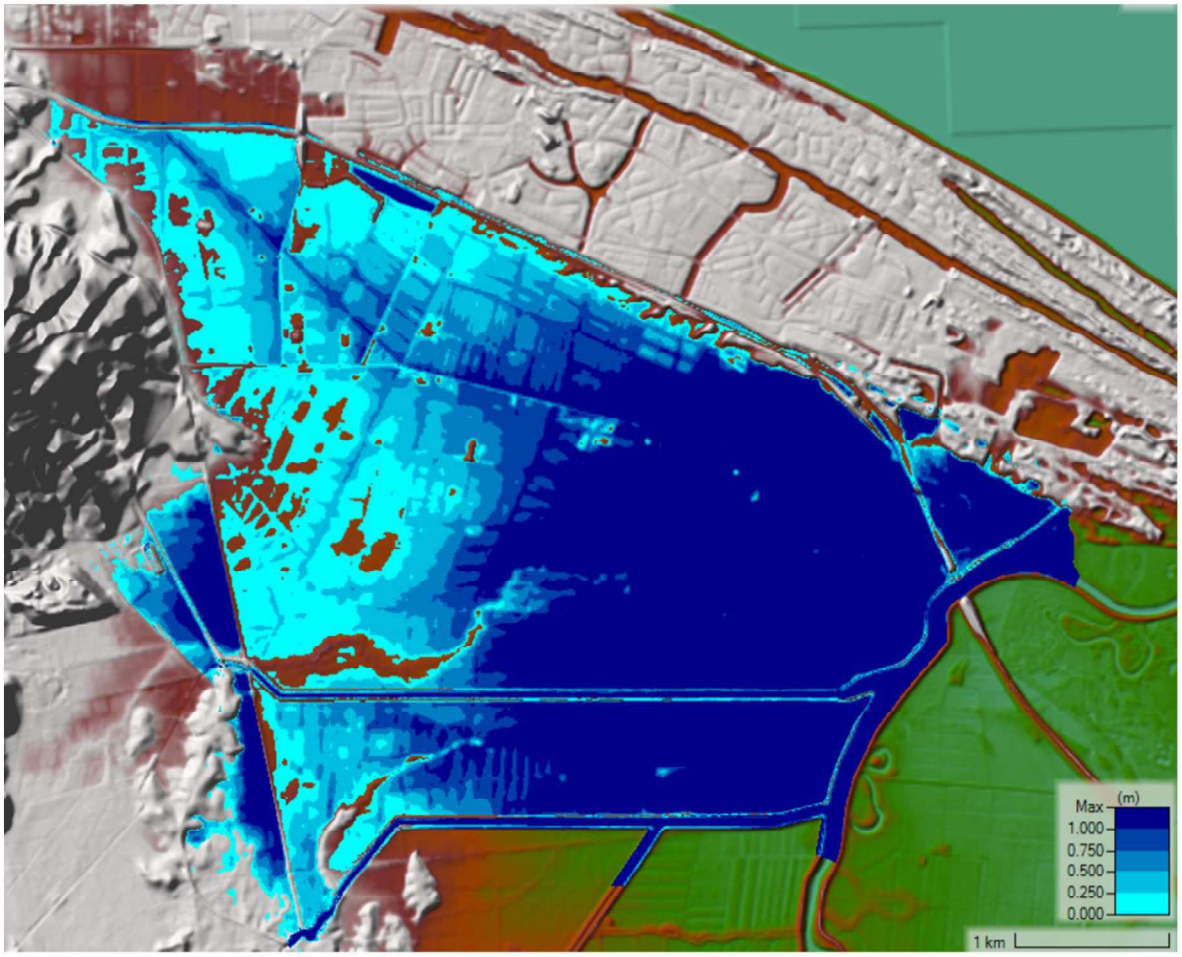

Figure 14 - Existing 100-Year ARI Flooding **(Flood Modelling Report - Appendix H of the AEE)**

4.4. GROUNDWATER

The groundwater within the site sits close to the existing ground level in many areas. ENGEO have undertaken monitoring and developed a hydrogeological model for the development and prepared an extensive report called the 'Hydrogeological Assessment Report' (Appendix R of the AEE).

From their assessment:

Groundwater at the site is typically within 1 metre of land surface on the west of site, reducing to 0.3 m to the east of site, and higher during heavy rainfall events. A direct response to rainfall was observed in the groundwater data. A 10 cm tidal effect was observed in piezometer 06, located near the Bell Road drain.

Groundwater at the site is primarily regulated by the network of agricultural drains discharging groundwater. During a rainfall event, drains are expected to fill up faster than adjacent groundwater levels, potentially providing short term groundwater recharge.

Groundwater has been a key consideration when determining the flood management at Bell Road, as all stormwater and flood management must be undertaken above the groundwater table meaning excavation into it to create opportunities for storage is not supported.

4.5. COASTAL INUNDATION

Along the Bay of Plenty coastline, tsunami risk is a known issue. BOPRC have provided modelling information for the 500-year ARI event. This shows that the site is not affected by tsunami risk, with tsunami only affecting lower parts of the Kaituna River.

Per the ENGEO Hydrogeological Assessment Report (Appendix R of the AEE), sea level rise projections indicate 1.59 meters by year 2130 under high-emission scenarios (SSP5-8.5), which presents a long-term inundation risk to the broader floodplain area. However, the proposed development platform levels (RL 3.5m) have been designed to accommodate future flood levels including this sea level rise allowance, ensuring long-term flood resilience. The development's flood management system, including mechanical pumping and elevated building platforms, has been designed to function effectively under projected future climate conditions.

4.6. BIODIVERSITY

Ecological Solutions Limited prepared an Ecological Impact Assessment (EcIA) for the Wairakei South development (Appendix L of the AEE). The Site has been primarily used for intensive agriculture (dairy stock grazing and maize crops), resulting in limited ecological values on-site.

Terrestrial Ecology

Ecological values of terrestrial features on the Site range from 'negligible' to 'moderate'. The Site is dominated by exotic pasture and cropped areas, with scattered exotic vegetation including Japanese cedar shelterbelts and isolated cabbage trees. No indigenous vegetation of significance was identified within the Site. Bird species present are predominantly common introduced and native species adapted to modified agricultural environments.

Herpetofauna

Potential habitat for indigenous skinks (lizards) exists in areas with suitable cover. A Lizard Management Plan **(Appendix AJ of the AEE)** has been prepared requiring capture and relocation of indigenous lizards prior to vegetation clearance. A Wildlife Act Authorisation will be required to implement these measures.

Freshwater Ecology

Freshwater ecological values within the Site and receiving environment range from 'very low' to 'high'. The on-site farm drain network has poor ecological health, dominated by pollution-tolerant species such as shortfin eels and Gambusia. The receiving waters (Kopuaroa Canal, Bell Road Drain, and Kaituna River) support more diverse communities but are degraded from agricultural inputs. eDNA sampling confirmed presence of shortfin eels (Not Threatened) and longfin eels (At Risk - Declining).

Wetlands

No wetlands were identified within the Site. Several BOPRC-mapped wetlands are located outside the Site and have 'very high' ecological value.

Significance Assessment

According to BOPRC Regional Policy Statement criteria for indigenous vegetation and habitat of indigenous fauna of national importance, the Site is not considered significant with regard to Section 6(c) of the Resource Management Act 1991.

Effects Assessment

The ecological impacts attributable to the proposed development, after application of the effects management hierarchy and implementation of ecological management plans for lizards, birds, and bats, are considered 'very low' to 'low' on terrestrial, freshwater, and wetland ecological values. No significant residual adverse ecological effects are anticipated.

4.7. CULTURAL AND HERITAGE SITES

The Wairakei South site is located within a region of known archaeological significance. Archaeological assessments undertaken by Archaeology B.O.P. for Bell Road Limited Partnership on neighboring properties in the wider Bell Road area have identified pre-European Māori archaeological sites typical of the Rotoiti Breccia formation landscape. These sites are associated with traditional Māori horticulture and settlement patterns, including crop storage pits, occupation platforms, terraces, and potential cultivation areas dating from the 15th-17th centuries.

Regulatory Requirements

Under section 48, 56(1)(b), or 62 of the Heritage New Zealand Pouhere Taonga Act 2014, no person may modify or destroy an archaeological site without obtaining authority from Heritage New Zealand. Given the archaeological sensitivity of the wider Bell Road area, a Heritage New Zealand authority may be required if archaeological sites are identified within the development footprint during pre-construction surveys or earthworks.

4.8. CONTAMINATED LAND

ENGEO prepared a contaminated land detailed site investigation report for the Wairakei South Development **(Appendix S of the AEE)**. The assessment examined contamination risks associated with past and present land use.

Findings

Soil and water analyses reveal localised contamination, predominantly heavy metals (arsenic, copper, lead, zinc), asbestos, and persistent pesticides, primarily confined to near-surface topsoil and fill materials. These contaminants are linked to activities such as sheep dipping, aging building materials, horticulture, fuel storage or spills, and waste disposal. Contaminants are present at levels exceeding NES-CS guideline screening values for residential land use in some locations.

Indicative surface water testing within the Bell Road Drain catchment reports elevated zinc and copper concentrations above ANZG criteria for protection of 80% of freshwater aquatic species, likely arising from agricultural land use within the wider catchment. Sediment samples from the base of the drain report contaminant concentrations below guideline sediment quality criteria for protection of aquatic habitats.

Recommendations

Key recommendations include completion of investigations in currently inaccessible zones and creation of a Contaminated Site Management Plan (CSMP) **(Appendix AK of the AEE)** to ensure safe and sustainable soil and sediment management during construction. Care will be taken to avoid generation of sediment from erosion during construction, and drain sediments will be segregated, dried, and tested prior to end-use decisions.

5. STORMWATER MANAGEMENT

5.1. PRINCIPLES OF STORMWATER MANAGEMENT

The key principles of stormwater management driving the Wairakei South stormwater drainage scheme are as follows:

a. Mimicking natural hydrology, both now and in the future as far as practicable and not adversely impacting adjoining land;
b. Providing a low impact, sustainable water sensitive design that leverages nature based solutions;
c. Achieving effective and efficient flood risk mitigation;
d. Improving the water quality of the site and downstream environment;
e. Reflecting mana whenua values including Te Mana o te Wai, sustaining and restoring the mauri (life force) of water for the environment and current and future generations;
f. Creating an efficient, cost-effective stormwater management scheme, allowing use of as much of the site as is practicable, whilst minimising the construction costs for the developer and also the long-term maintenance costs for the ratepayer.

According to the Ecological Impact Assessment prepared by Ecological Solutions Limited **(Appendix L of the AEE)**, the drainage management scheme, including the Bell Road Drain and Kopuaroa Canal, provides important fish migration pathways for diadromous fish of conservation concern. NZFFD records and eDNA sampling confirm the presence of shortfin eels (Not Threatened) and longfin eels (At Risk - Declining) within these drains. The stormwater design maintains hydraulic connectivity to these existing migration pathways, ensuring continued passage for native migratory fish species including eels.

5.2. PROPOSED STORMWATER MANAGEMENT

To achieve the stormwater outcomes sought above, the following stormwater management principles are proposed for the Site;

5.2.1. WATER SENSITIVE DESIGN

The large scale represents an opportunity to achieve a reasonable level of water sensitive design.

Water Sensitive Design seeks to use natural processes to manage runoff, such as biofiltration swales and wetlands that filter contaminants and enhance urban amenity. It also seeks to minimise runoff by managing the amount of hard surfaces created in a catchment.

Wairakei South achieves a sustainable and large-scale water sensitive design outcome through its use of low to medium density urban development supported by large green swale and wetland networks providing a high level of treatment to the site and broader catchment. Wetland swale networks are present throughout the proposed housing and employment areas, enhancing these by providing passive amenity values along with recreational opportunities.

5.2.2. WATER QUALITY

Water quality for the site will be through multiple wetland swales throughout the development.

Key points are summarized below:

- The wetland swales have been designed in accordance with the relevant standards and codes of practice.
- The proposed swales will meet the treatment requirements for the development site.
- The swales will convey only development site flows during events less than the 5-year rainfall event. During larger storm events the swales will be used to convey internal development and external upstream flows when flood waters overtop stop banks.
- Wetland swales will discharge to attenuation basins where extended detention is to be provided.
- The wetland swales have been designed to accommodate flood storage for large rainfall events.

Treatment performance will be monitored in accordance with the Stormwater Monitoring Plan prepared by Ecological Solutions (Appendix AI of the AEE), which specifies monitoring of TSS, nutrients (TN, TP, NOx-N, DRP), metals (copper, zinc, lead, iron), and other parameters. Monitoring results will be compared against ANZECC trigger values for protection of aquatic ecosystems and relevant receiving environment water quality standards to demonstrate compliance with BOPRC's effects-based assessment framework. Refer to Ecological Solutions' SMP Map for water quality monitoring locations (Appendix AI of the AEE).

Swale dimensions, slope gradients, vegetation specifications, and retention times have been determined in accordance with the BOPRC Stormwater Management Guidelines. Extended detention within northern and southern storage basins provides additional settling time for fine particles and enhanced contact time for biological treatment processes.

As detailed in the Stormwater Monitoring Plan prepared by Ecological Solutions (Appendix AI of the AEE), treatment performance will be verified through ongoing monitoring to confirm compliance with ANZECC trigger values and receiving environment standards. Vegetation shall be planted with appropriate species detailed by Boffa Miskell. Further technical details on swale hydraulic design are provided in Maven's Infrastructure Report. Hydrological Mitigation

Hydrological mitigation is a core driver of the stormwater management scheme of Wairakei South. Given the sensitive flood plain environment around the site, the design ensures that in the full spectrum of rainfall events from a regular rainfall event out to a future 100-Year ARI climate change adjusted rainfall event are managed to avoid increasing flows or flood levels off site.

Significant onsite retention combined with mechanical pumping enables the pre and post development flooding and peak flow scenarios to be consistent over time.

More information on the Hydrological Mitigation strategy is available in the Flood Modelling Report prepared by Maven (Appendix H of the AEE).

5.2.3. FLOODING MANAGEMENT

As the site is located in a flood plain, flood management is central to the success of Wairakei South.

The flood storage that is displaced by the infilling of the flood plain is partially offset by the storage created in the swale and wetland attenuation network on site, with the balance being provided through active mechanical pumping of stormwater into the adjoining Kopuaroa Canal and Kaituna River, leveraging capacity within those water bodies.

Consistent with development in low lying areas both locally in Pāpāmoa and globally, where no practical gravity connection is available, a mechanical pumping solution is the only way to manage flooding risk in the long term while providing for much needed development land in a key location.

The proposed development delivers a net positive outcome for flood management within the Bell Road catchment, with no significant adverse downstream or upstream impacts in regard to flooding generated by this development. Pre-development, the site and surrounding floodplain regularly inundates with diffuse overland flow rather than flow concentrating into defined channels, due to the flat topography and low-capacity open drains. The proposed development concentrates flows and significantly improves the catchment's pumping capacity. This better manages water levels and flows such that the proposed building platforms, critical assets and existing buildings are protected under the assessed design events, including future climate scenarios. The flood modelling undertaken by Maven (Appendix H of the AEE) demonstrates that flood levels and extents in adjacent areas remain consistent or are improved under both existing and future climate scenarios.

5.2.4. CONVEYANCE

For the primary network conveyance of stormwater through the development is via a conventional kerb and channel to a pipe system, draining to the proposed wetland swales and ultimately to the Bell Road/SH2 culvert in normal flow conditions or via the pump systems proposed in latter parts of the development.

The pipe system will be sized to convey the 10-Year ARI event. Industrial sites have an assumed maximum probable development (MPD) of 80% impervious coverage. Sites that exceed this are expected to provide on-site attenuation to mitigate runoff back to an 80% impervious coverage equivalent.

The secondary system will be via kerb and channel which will flow overland to the proposed wetland swales and ultimately to the Bell Road/SH2 culvert in normal flow conditions or via the pump systems proposed in latter parts of the development.

Culverts shall be utilized where the road network crosses swales.

5.3. HYDRAULIC CONNECTIVITY

Hydraulic connectivity is the physical and functional linkage between different components of a water system that enables flow or exchange of water between them. The connectivity can be vertical or lateral, and it influences processes like groundwater recharge, discharge, contaminant transport and ecosystem health. In the context of Wairakei South, what is critical is that the adjoining properties do not experience an adverse impact on groundwater through changes in the hydraulic connections created through the development of Wairakei South.

ENGEO have provided a report titled 'Hydrogeological Assessment Report' (Appendix R of the AEE) which identifies and assesses the impacts on ground water created by Wairakei South. Their findings and conclusions, which are comprehensive, confirm that the offsite effects to downgradient environments from the project are considered to be less than minor.

5.4. ONGOING MAINTENANCE REQUIREMENTS

The design of the stormwater management system at Wairakei South is intended to create relatively minimal ongoing maintenance requirements, balanced against the ultimate population (and rating base) of the development.

The stormwater structures will all require different forms of maintenance and management in the long term, and specific operation and maintenance manuals will be provided during the detailed design phase in consultation with the relevant authorities. It is intended to vest the pipe network, flood management bunds, embankments, and the swale network to WBOPDC who will maintain these under standard maintenance regimes.

The stop banks and the pumps will require management and maintenance from BOPRC, these will be vested with operation and maintenance manuals on completion.

5.5. IMPLEMENTATION OF STORMWATER NETWORK

The implementation of the stormwater network will be developed progressively in stages, as laid out in section 2.5 of this report.

5.6. DEPENDENCIES

Consideration of dependencies in the context of a Stormwater Management Plan is important.

There are a number of key dependencies that this SMP relies on as follows:

1. Upkeep and maintenance of the Kaituna River and Kopuaroa Canal downstream of Wairakei South, and associated structures - currently undertaken by BOPRC, the upkeep of these structures is critical for the long-term function of the SMP for Wairakei South.
2. Upgrade and maintenance of the existing Bell Road A and B pumps in the adjoining properties. This is presently undertaken by the BOPRC.

3. The modelling parameters provided by BOPRC including climate change expectations.
4. Geotechnical and hydrological data provided by ENGEO.
5. A robust telemetry network being available for monitoring and reporting water levels in the Kopuaroa and at the site, triggering pumping.
6. Long term maintenance of the swale and wetland network is relied upon to maintain water quality.
7. The staging of the development, generally in the manner proposed will allow efficient, progressive development of the site. As the site is divided into further substages, ongoing updates to the stormwater model will be needed to determine earthworks actions and timing of the construction of flood management devices.

5.7. HAZARDS

This section identifies stormwater related hazards during both construction and operational phases, and describes the measures adopted to avoid, remedy, or mitigate those hazards.

5.7.1. CONSTRUCTION PHASE HAZARDS

During construction the primary stormwater hazards are associated with earthworks activities, exposed soil surfaces, temporary drainage configurations, and the progressive commissioning of permanent infrastructure. These hazards include sediment runoff, temporary ponding in excavations, and uncontrolled overland flow prior to the establishment of permanent drainage paths.

Management of construction phase stormwater hazards is addressed in Maven's Earthworks Management Plan **(Appendix U of the AEE)** and Construction Management Plan **(Appendix AL of the AEE)**, which detail erosion and sediment control measures, staging provisions, and monitoring requirements. These reports should be read in conjunction with this section.

5.7.2. OVERLAND FLOW HAZARD

The hydraulic hazard associated with overland flow paths has been managed in accordance with NZTA P46 (February 2025), Section 6.6(b), which requires hazards to pedestrians and vehicles in public areas be evaluated using depth and velocity, in accordance with Australian Rainfall and Runoff (AR&R), Book 6 - Flood Hydraulics, Figure 6.7.9.

AR&R Book 6, Figure 6.7.9 presents vulnerability curves for pedestrians and vehicles as a function of flow depth and the depth–velocity (dv) product. These curves are derived from research into human and vehicle stability under flood conditions, which established that the combination of depth and velocity govern the onset of instability.

The following thresholds have been adopted:

- $dv \leq 0.3\ m^2/s$ Low hazard; acceptable for pedestrian areas and private accessways
- $dv \leq 0.6\ m^2/s$ Moderate hazard; upper limit for vehicle stability on public roads.
- $dv \leq 1.0\ m^2/s$ High hazard; flow considered dangerous to both pedestrians and vehicles.
- $dv > 1.0\ m^2/s$ Very High hazard; risk to buildings and structures.

The design intent is for overland flow paths to remain within the low hazard threshold ($dv \leq 0.3\ m^2/s$) for the 100-year ARI storm event at all locations where public or pedestrian access is expected. Where

flows are directed along road carriageways, the moderate hazard threshold (dv ≤ 0.6 m^2/s) has been applied. The high hazard threshold (dv ≤ 1.0 m^2/s) is not expected to be triggered under the design event, however, any locations where this threshold is approached would require specific safety design to restrict public access. Preliminary flood modelling indicates that the design aligns with these thresholds. See Maven's Flood Modelling Report for more information (Appendix H of the AEE).

5.7.3. WETLAND SWALES AND ATTENUATION BASINS

The wetland swales and attenuation basins are located within publicly accessible reserve areas. The following measures have been adopted to manage public safety in and around these features:

Batter slopes on all ponds and attenuation areas have been designed such that the slope from the edge down to the pond invert does not exceed 4 horizontal to 1 vertical, in accordance with the Stormwater Management Guidelines for the Bay of Plenty Region. This gradient ensures that any person who enters the water can safely exit without assistance. Consistent with these guidelines, fencing of reserves is not proposed as vegetation buffers are considered to provide an equivalent level of protection by limiting uncontrolled access to deeper water.

Maintenance access tracks are provided along the wetland swales. These tracks are 3 m wide, designed for light vehicle access, and are positioned above the 50-year ARI flood level as required by Section 5.3.1 of the Western Bay of Plenty Development Code. The tracks also serve as emergency access routes during storm events.

5.7.4. PUMP STATIONS

Pump station compounds shall be fenced to restrict public access. Pump inlets are protected by screens to prevent entrapment.

5.7.5. CULVERTS

Culvert entry points are present throughout the development at road crossings and discharge locations. During flood events flow velocities at culvert inlets are expected to remain low due to the nature of the site's flood behaviour. Where detailed design identifies culvert locations that exceed the high hazard dv threshold, measures to restrict public access shall be incorporated.

5.8. RISKS AND BENEFITS

In the context of a development such as Wairakei South, consideration of risks and benefits in regard to stormwater and flood management is important.

Below is a table summarizing key risks and benefits of the stormwater management approach to Wairakei South.

Table 4 - Risks and Benefits

Category	Typical Risks	Typical Benefits	Mitigation Strategies
Ecological	Erosion, sedimentation and contamination degrading waterways and habitats.	Improved water quality, habitat restoration and biodiversity enhancement through creation of new habitat.	Adopting water sensitive urban design strategies. The conversion of the site from intensive pastoral farming into urban development with appropriate stormwater management systems as proposed for Wairakei South will create significant ecological benefit.
Flooding	Increased flood risks from development of large scale impervious areas, asset failures.	Robust, engineered outcomes designed to protect people and property, conversion of flood prone land into much needed housing and employment land.	Undertake robust flood modelling factoring in climate change projections, model scenarios where pump failure occurs and ensure people and property are protected.
Operational & Regulatory	Maintenance failures, regulatory change and coordination challenges	Taking the opportunity to adopt the latest technology to offset and automate typical human tasks, work in partnership with developer and Iwi to ensure a robust arrangement is in place.	Develop long term catchment management plans and operational plans, ensure robust monitoring systems are in place and appropriate staff, and capital resources are allocated to monitoring and maintenance.
Economic	High capital costs to construct and maintain robust flood management systems.	The SMP allows for the creation of significant areas of developable land, drawing development contributions and long-term rates, in a strategic location. Lot owners do not have to manage stormwater storage or treatment on site.	Understand the costs of the stormwater assets over the long term, from design through to construction and maintenance, and how these are attributed across the area they serve.

5.9. SUMMARY OF PROPOSED STORMWATER MANAGEMENT APPROACH

Wairakei South presents a highly engineered solution to resolving the flooding issues over a large tract of land in a highly strategic area, enabling its development.

The stormwater management approach combines passive, green water quality management with large scale storage areas, with pumping to offset the displaced floodplain storage.

The approach allows the development to progress in manageable earthworks and sales stages, avoids significant adverse impacts on adjoining properties and provides significant flood management benefits to the surrounding land, including enhanced pumping capacity, improved flood protection levels, and reduced inundation risk for the broader Bell Road catchment area.

6. MANA WHENUA MATTERS

Mana whenua engagement has been undertaken extensively by the applicant throughout the substantive application development process. Cultural Impact Assessments (CIA) have been prepared and provided by the relevant iwi authorities, and recommendations from these have been considered and incorporated into the proposed development where appropriate (Appendix V of the AEE). The CIA documentation, including identified cultural values, assessments and recommended mitigation measures can be referred to elsewhere in the substantive application package.

7. DEPARTURES FROM REGULATORY OR DESIGN CODES

There are no known departures from WBOPDC regulatory and design standards.

Based on the design and investigations that have been completed to date, it is expected that stormwater effects from the site can be appropriately and adequately managed consistently with the requirements of the WBOPDC District Plan, WBOPDC Development Code, and BOPRC Stormwater Management Guidelines.

8. CONCLUSIONS

The Stormwater Management Plan for Wairakei South provides a simple, robust system allowing the long term, staged development of the site. It combines green infrastructure with mechanical pumping, allowing flood displacement to be offset. The developed site will leverage the green swale network for passive amenity and recreation, and in large storms these areas will double as highly resilient flood risk mitigation areas.

If the stop banks breach and the pumps fail, the landform has ultimately been designed to be above the reasonably foreseeable flood heights, meaning safety of the inhabitants will be secured long term.

For Maven, the key driver for the design has been devising a simple, integrated stormwater management approach to facilitate urban development and optimise available land.

The refinement of design of the proposed stormwater management devices will be addressed at a future engineering plan approval stage.

Based on the design and investigations that have been completed to date, it is expected that stormwater effects from the site can be appropriately and adequately managed consistently with the requirements of the BOPRC Stormwater Management Guidelines, WBOPDC District Plan and Development Code.

9. LIMITATIONS

This report is solely for our clients use for the purpose for which it is intended in accordance with the agreed scope of work. It may not be disclosed to any person other than the client and any use or reliance by any person contrary to the above, to which Maven has not given its prior written consent, is prohibited. Notwithstanding the above, the Panel may rely on the assessments and conclusions in this report for the purposes of assessing and determining the fast-track application.

This report must be read in its entirety and no portion of it should be relied on without regard to the limitations and disclaimers set out.

Maven BOP Limited makes no assurances with respect to the accuracy of assumptions and exclusions listed within this report and some may vary significantly due to ongoing stakeholder engagement.