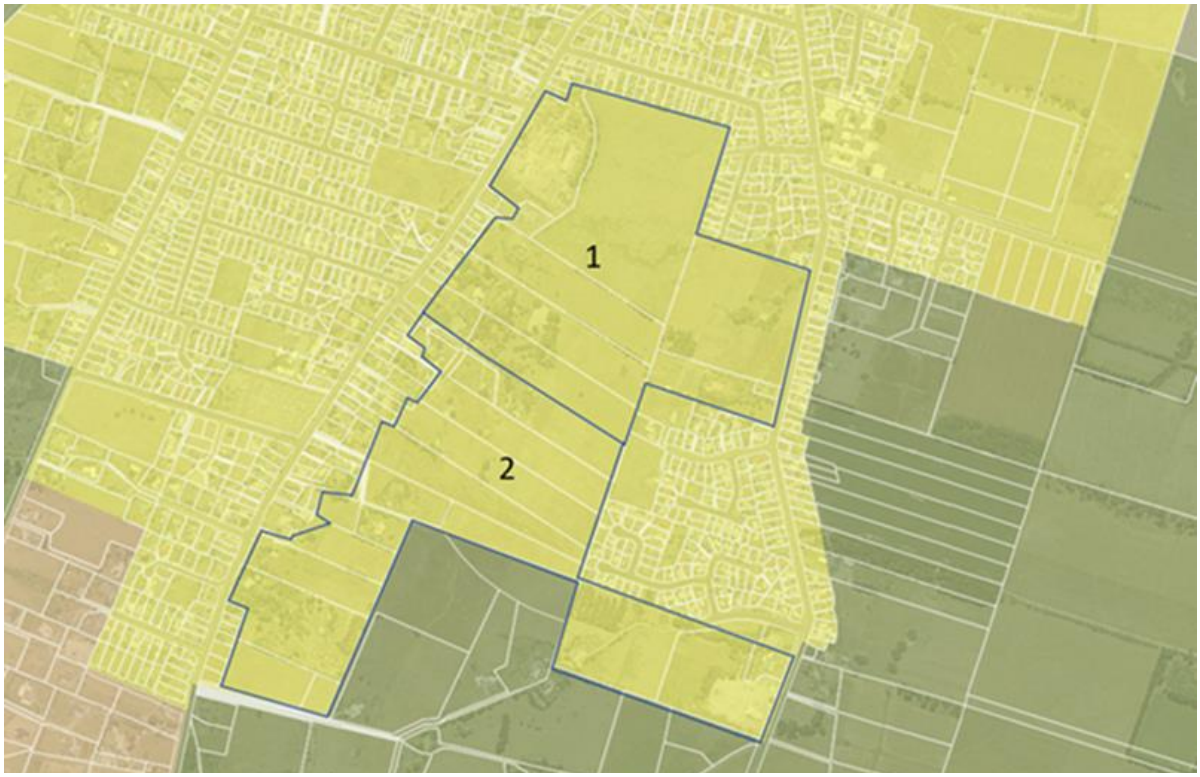
WAIPUKURAU SOUTH DEVELOPMENT AREA

THREE WATERS SERVICING REQUIREMENTS

5 JUNE 2025

CONFIDENTIAL



WAIPUKURAU SOUTH DEVELOPMENT AREA
THREE WATERS SERVICING REQUIREMENTS

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A	20/05/2025	First Issue
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This report ('Report') has been prepared by WSP exclusively for Central Hawkes Bay District Council ('Client') in relation to 3 waters servicing for Waipukurau South Development Area ('Purpose') and in accordance with the Short form Agreement with the Client dated 18 September 2024. The findings in this Report are based on and are subject to the assumptions specified in the report and the Offfer of Services dated 9 September 2024. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

1 SCOPE 3

2 DEVELOPMENT AREA 4

2.1 SITE 4

2.2 SEISMIC HAZARDS 4

2.3 DEVELOPMENT YIELD 6

2.4 OTHER GROWTH 6

3 WATER SUPPLY 7

3.1 EXISTING WATER SUPPLY SYSTEM 7

3.2 SECOND WATER SUPPLY 7

3.3 LEVELS OF SERVICE 7

3.3.1 INTRODUCTION 7

3.3.2 RAW AND TREATED WATER SUPPLY 8

3.3.3 TREATED WATER STORAGE 8

3.3.4 NETWORK PERFORMANCE 9

3.4 DISCUSSION 10

3.5 DEVELOPMENT RECOMMENDATIONS 11

4 WASTEWATER 12

4.1 EXISTING WASTEWATER SYSTEM 12

4.1.1 EXISTING WASTEWATER NETWORK 12

4.2 EXISTING WASTEWATER TREATMENT PLANT 13

4.3 DEVELOPMENT FLOWS AND HYDRAULIC MODELLING 14

4.4 WASTEWATER SYSTEM UPGRADES 15

4.4.1 TARGET LEVEL OF SERVICE 15

4.5 DEVELOPMENT RECOMMENDATIONS 18

5 STORMWATER 19

5.1 EXISTING STORMWATER SYSTEM 19

5.1.1 EXISTING STORMWATER NETWORK 19

5.1.2 EXISTING ISSUES 20

5.2 STATUTORY REQUIREMENTS AND OBJECTIVES 22

5.2.1 GLOBAL STORMWATER CONSENT 22
5.2.2 CATCHMENT MANAGEMENT PLAN 22
5.2.3 HAWKE'S BAY REGIONAL COUNCIL WATERWAY GUIDELINES 22
5.2.4 OBJECTIVES FOR WSDA STORMWATER MANAGEMENT 23
5.3 STORMWATER UPGRADES 23
5.3.1 BACKGROUND 23
5.3.2 DEVELOPMENT DENSITY / YIELD ASSUMPTIONS 24
5.3.3 CONCEPT DESIGN - NORTHERN CATCHMENT (DEVELOPMENT AREA 1) 24
5.3.4 BASINS 1 AND 2 CONSTRUCTION 26
5.3.5 SOUTHERN CATCHMENT BASINS (DEVELOPMENT AREA 2) 26
5.3.6 OFFSITE UPGRADES 27
5.4 DEVELOPMENT RECOMMENDATIONS 28
6 LIMITATIONS 29
7 BIBLIOGRAPHY 30

EXECUTIVE SUMMARY

The Central Hawke's Bay District Council (CHBDC) is amending the District Plan to include a new chapter for the Waipukurau South Development Area (WSDA). This amendment aims to guide development within the WSDA through the insertion of a structure plan and bespoke planning provisions, which will provide a framework to integrate the delivery of infrastructure and land use planning. This report supports the plan change, describing the existing three waters (3W) networks, their capacity to handle growth, the required service levels, necessary upgrades, and recommendations for these upgrades.

WATER

The Waipukurau water supply network includes a borefield, water treatment plant, reservoirs and pipelines. The are three key considerations in the system; raw and treated water availability, treated water storage volume and network performance.

There is adequate raw and treated water available to service projected 30-year growth in the township (including the WSDA). The volume of treated water stored in the town's two reservoirs is just adequate to meet the desired level of service for the current population and additional growth will reduce the level of service. Hydraulic modelling indicates that the existing network can accommodate an additional 200-300 connections in the WSDA without materially affecting the current levels of service.

With respect to the water supply system it is recommended that:

- No more than about 100 additional connections are allowed before additional storage is constructed in the network
- CHBDC plans for network upgrades to maintain levels of service when the WSDA has more than approximately 200-300 connections (depending on other growth). The planned Waipukurau Second Water Supply and related SH2 upgrade would effectively service the ultimate development in the WSDA
- 150mm diameter fire mains should be constructed as part of the development, linking through the development between Porangahau Road and Tavistock Roads.

WASTEWATER

Waipukurau's wastewater network consists of gravity wastewater pipelines, four network and one terminal pump station lifting into the wastewater treatment plant. The existing network through and downstream of the WSDA is at capacity although it can accommodate up to 100 WSDA connections as a short term arrangement. A new trunk main from the WSDA connecting to the trunk mains in Mt Herbert Road is recommended to service the ultimate development. The trunk main would be extended up through the development by developers. The existing trunk mains along Mt Herbert Road have spare capacity and can cater for the ultimate development. The Mt Herbert Road terminal pump station is under capacity.

This report does not consider the adequacy of the wastewater treatment plant which is being assessed by others.

With respect to the wastewater network we recommend that:

- That a trunk wastewater pipeline is constructed from the WSDA to the trunk mains on Mt Herbert Road as soon as possible, to limit the number of new connections on the existing network as far as possible. We suggest that no more than 100 lots within the WSDA are connected to the existing wastewater networks around the site.
- Any connections to the existing network are temporary and are in locations agreed with CHBDC considering the impact on the network. This may require temporary pump stations which could be designed to a lower standard to be agreed with CHBDC. The temporary network connections should be removed from the existing network and connected to the new trunk main when it becomes available.
- The trunk main is extended within the WSDA by the developers.
- Mt Herbert Pump Station is upgraded as soon as possible, noting it is currently undersized.

STORMWATER

The stormwater system in the WSDA includes drains, channels and wetlands. There are two distinct catchments; with the northern half draining northwards to the Pah Flat Darin, and the southern half draining to Lake Hatuma. The HBRC resource consent for discharge of stormwater sets out stormwater management requirements, including stormwater treatment and attenuation.

A concept design has been prepared for the northern catchment. The concept is to construct four stormwater basins for treatment and attenuation, two of which have been constructed. There is a very high level concept for the southern catchment.

The offsite effects of the development have been modelled (with the stormwater designs in place). The development is predicted to increase existing flooding around Blundell Ave by a small amount in long duration 1% AEP events. Options have been developed to mitigate this effect.

With respect to stormwater management it is recommended that:

- No development should occur without a downstream stormwater basin.
- The stormwater basins for the northern catchment are designed generally in accordance with the WSP Concept Design Report
- The offsite upgrading (Option A or B refer Section 5.3.6) should be completed before there is significant development in the WSDA
- The stormwater basins should be designed to satisfy the requirements of the CMP and HBRC Waterways Guide.

1 SCOPE

Central Hawke's Bay District Council (CHBDC) is preparing an amendment to the District Plan to include a new chapter to guide development within the Waipukurau South Development Area (WSDA). The plan change will insert a structure plan and bespoke planning provisions to provide a framework for the integrated delivery of infrastructure and land use planning.

This report has been prepared to support the plan change. It includes a description of the existing three waters (3W) networks and their ability to cope with growth, the required levels of service, upgrades that will be required to support development and recommendations for upgrading.

WSP has been assisting CHBDC with wider infrastructure planning for several years and has produced a range of reports covering 3W infrastructure. This report draws on and summarises that work and should be read in conjunction with that work where necessary (refer Bibliography).

This report does not address wastewater treatment requirements which is managed by CHBDC and a separate consultant.

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2 DEVELOPMENT AREA

2.1 SITE

The WSDA covers approximately 50 hectares of undeveloped land between Porangahau Road and Tavistock Road, Waipukurau (Figure 2-1). The land is currently zoned General Residential. The site is arbitrarily divided into two development areas (shown as 1 and 2 on Figure 2-1 or A and B on the masterplan). Area 1 (A) is expected to be developed earlier than Area 2 (B) due to proximity to the township and ease of connection to services.

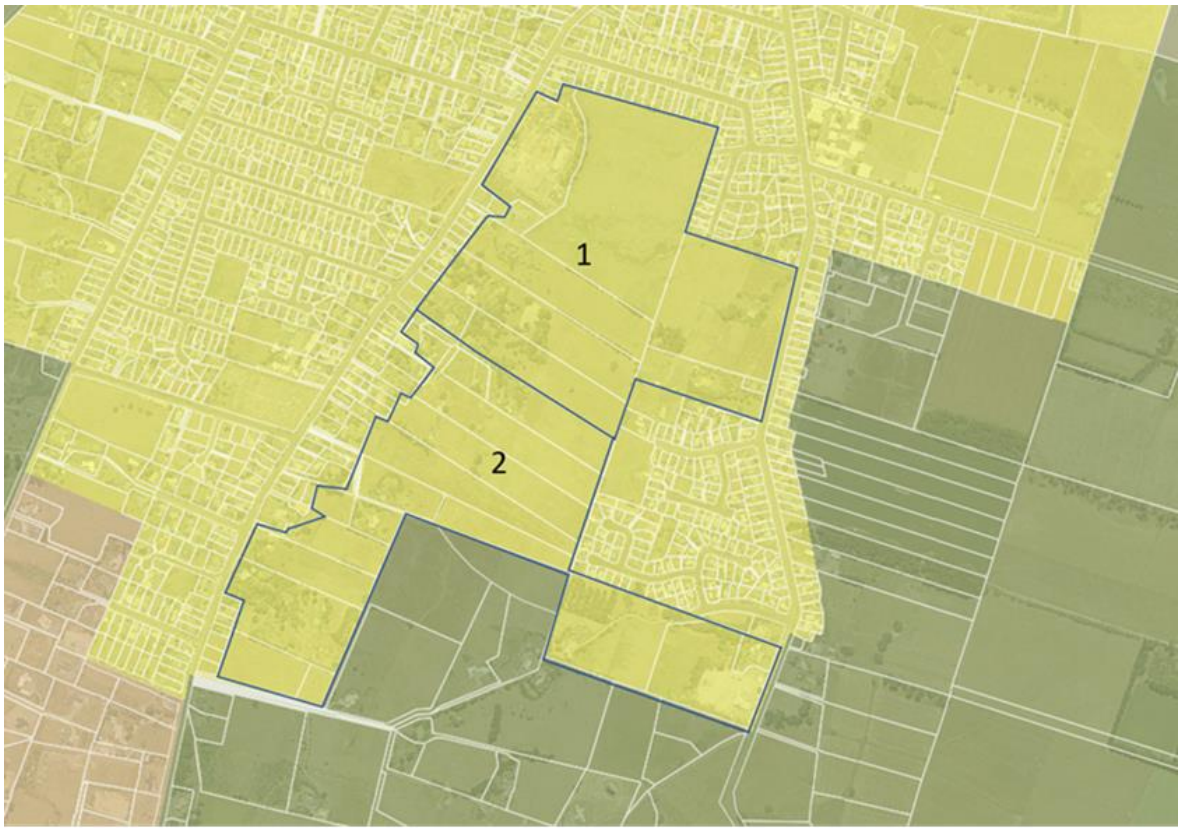


Figure 2-1: Waipukurau South Development Area.

The land is gently sloping with three natural catchments. Most of the land falls northwards towards the Tukituki River. The southern part of Area 2 falls southwards away from the township. A small area on the eastern edge of the site falls eastwards towards Tavistock Road. The catchments are expected to remain largely unchanged after development, and therefore the servicing recommendations are based on existing catchments.

2.2 SEISMIC HAZARDS

WSP carried out an assessment of natural hazards at the site (refer Waipukurau South Growth Cell, Desktop Assessment of Natural Hazards, WSP, 2022). The site is located within the Waipukurau Fault Zone, a major earthquake-generating fault system with a reoccurrence interval of >3500 to ≤ 5000 years (Reoccurrence Interval Class III, GNS 2014). Because the site is in the

Waipukurau Fault Zone, areas of the site are subject to an earthquake ground surface deformation hazard. GNS (2014) defined Fault Avoidance Zones (FAZ) based on the level of fault location accuracy (Figure 2-2).

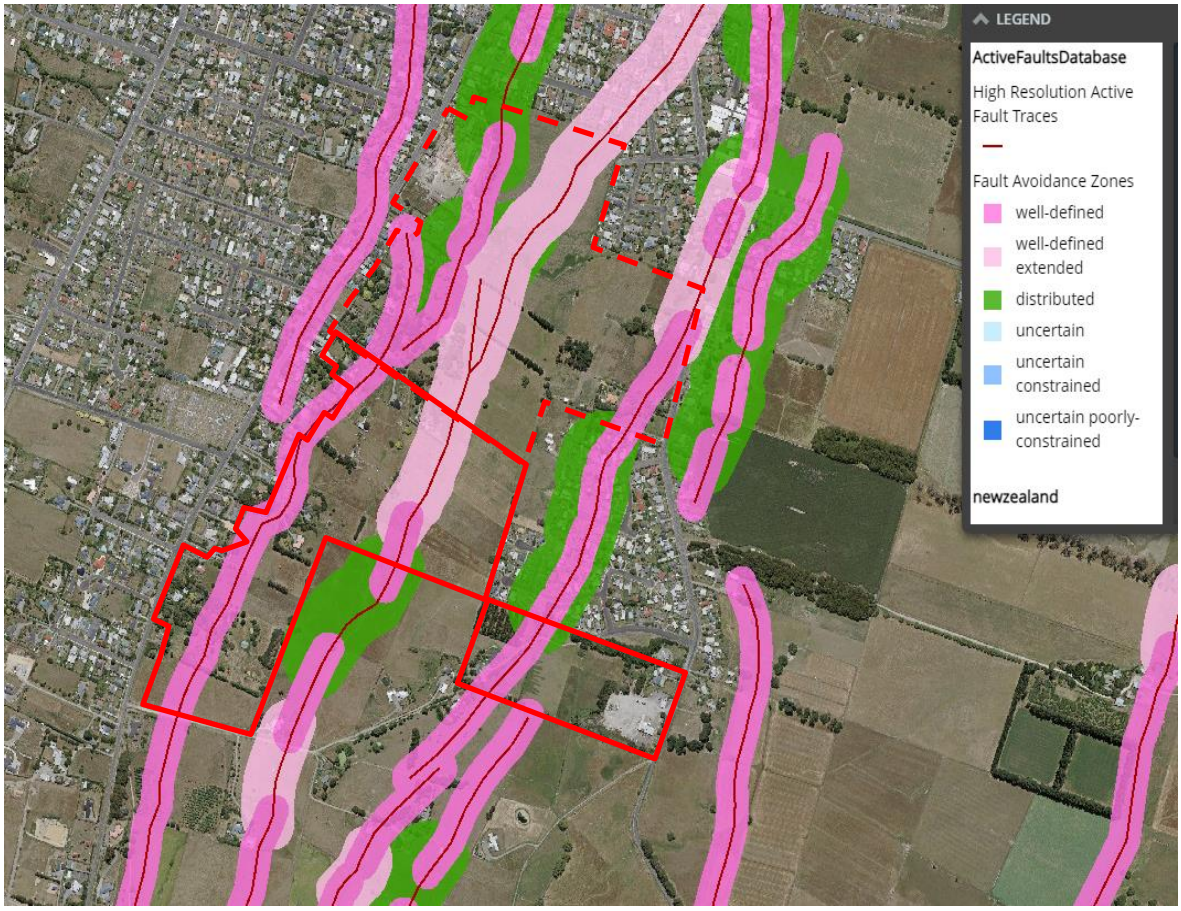


Figure 2-2: Faults and Fault Avoidance Zones

CHBDC's district plan includes provisions aimed at managing the risk of natural hazards. It provides controls for buildings near fault zones and requires that resource consent is obtained for utility services within fault zones. CHBDC has engaged another consultant to undertake further investigation and to provide advice with respect to managing the seismic hazard.

Fault rupture can be expected to cause significant damage to three waters services. Experience from the recent Christchurch earthquakes shows that modern flexible pipe systems like PVC-U and polyethylene have an inherent level of resilience, compared to older asbestos cement and vitrified clay systems. However even with modern systems, seismic shaking and ground movement can result in damage to pipes and structures, joints pulling apart, differential settlement (which can compromise flow through gravity pipelines) and uplift of structures. In the highest risk areas, Christchurch City Council chose to build low pressure or vacuum sewer systems to replace the original gravity systems that were badly damaged and prohibitively expensive to replace. While these new systems may be less likely to be damaged by ground movement, they are typically far more expensive to own and operate.

The guidelines titled Underground Utilities – Seismic Assessment and Design Guidelines – Edition 1 – March 2017, available through Water New Zealand's website, provide useful guidance for designing seismic resilience into three waters infrastructure. This guidance would be a useful reference for CHBDC when considering resource consent applications and/or engineering approvals for new infrastructure in the WSDA. Applying the guidance relies heavily on

understanding the potential for ground movement during an earthquake, and we recommend that this is assessed.

2.3 DEVELOPMENT YIELD

WSP's infrastructure assessments have been based the indicative development yield provided to us by CHBDC:

- Area 1 - 506 Lots (average 500 m^2)
- Area 2 - 444 Lots (average 500 m^2)
- Total – 950 Lots

We understand that this may be conservative (high) based on subsequent analysis.

2.4 OTHER GROWTH

Waipukurau has historically had relatively slow and steady growth. In recent years several large developments have been proposed on the eastern and southern edge of the township. The three waters assessments undertaken for this report assume a small amount of other growth in parallel with the WSDA, consistent with low levels of historic growth. This approach has been followed to identify upgrading attributable to the WSDA. Separate work streams are considering the effect of the other potential developments.

3 WATER SUPPLY

3.1 EXISTING WATER SUPPLY SYSTEM

Waipukurau's potable water is drawn from a borefield 3 km west of the town. CHBDC holds consent to draw a peak flow of 100 L/s from groundwater beneath the site. Water is pumped from four bores to an elevated water treatment plant and reservoir site at Pukeora. Treated water is then fed into town through a gravity trunk main. A second reservoir (Hunter Park Reservoir) within the town itself feeds the Central Business Area.

There are several challenges with the water supply system that CHBDC is working to address. The primary issues are:

- Water quality at the SH2 borefield is variable, with periodic elevated turbidity during storm events. This has resulted in periods of non-compliance with water quality standards.
- The existing infrastructure is aging and lacks resilience to resist natural events such as earthquakes. There are several single points of failure which could interrupt the Waipukurau water supply. The Hunter Park and Pukeora reservoirs have poor seismic capacity and need to be replaced in the near future. The reticulation network in the town is also old and leakage rates are high. Reticulation upgrades are progressing in the network to address some of these issues.
- The volume of the storage reservoirs is marginal, particularly when combined with the single point of supply which provides limited time for an emergency response to leaks or faults. The two existing reservoirs provide a total of around 3.8 ML of storage which is just adequate for the current population.
- Hydraulic modelling of the existing system and various growth scenarios carried out by Beca Ltd indicates some existing level of service issues with the current network.

3.2 SECOND WATER SUPPLY

Since 2019 CHBDC has been planning a significant upgrade of Waipukurau's water supply headworks, to improve resilience and reliability and to increase supply to support growth. The project, known as the Waipukurau Second Water Supply Project (W2WS), involves providing a second water connection to Waipukurau from neighbouring Waipawa, via a new pipeline with an elevated reservoir at its highpoint.

3.3 LEVELS OF SERVICE

3.3.1 INTRODUCTION

The following sections describe the pre and post WSDA levels of service for the water supply system; including raw and treated water supply, treated water storage and network performance.

3.3.2 RAW AND TREATED WATER SUPPLY

In 2023 WSP assessed projected water demand and availability for Waipukurau (refer Sustainable Water Management Plan Implementation – Phase 1, Water Loss and Demand Annual Reporting (WSP, Sustainable Water Management Plan Implementation - Phase 1, Water Loss and Demand Annual Repoting, 2023)).

The report assessed future water demands (using population growth forecasts from Squillions Ltd commissioned by CHBDC) and compared them to the available supply (limited by the water take consents). Waipukurau was forecast to grow from 1,860 households (2021) to 3,990 households (2051); growth of 2,130 households (more than double the number of households in WSDA).

The report concluded that the existing consented water take is sufficient to meet the 30-year projected growth, even if the consent was reduced by 20% when it is renewed (refer Figure 3-1). The SH2 borefield and the Pukeora Water Treatment Plant are capable of abstracting and treating the consented volumes. Therefore there is sufficient raw and treated water supply for the WSDA.

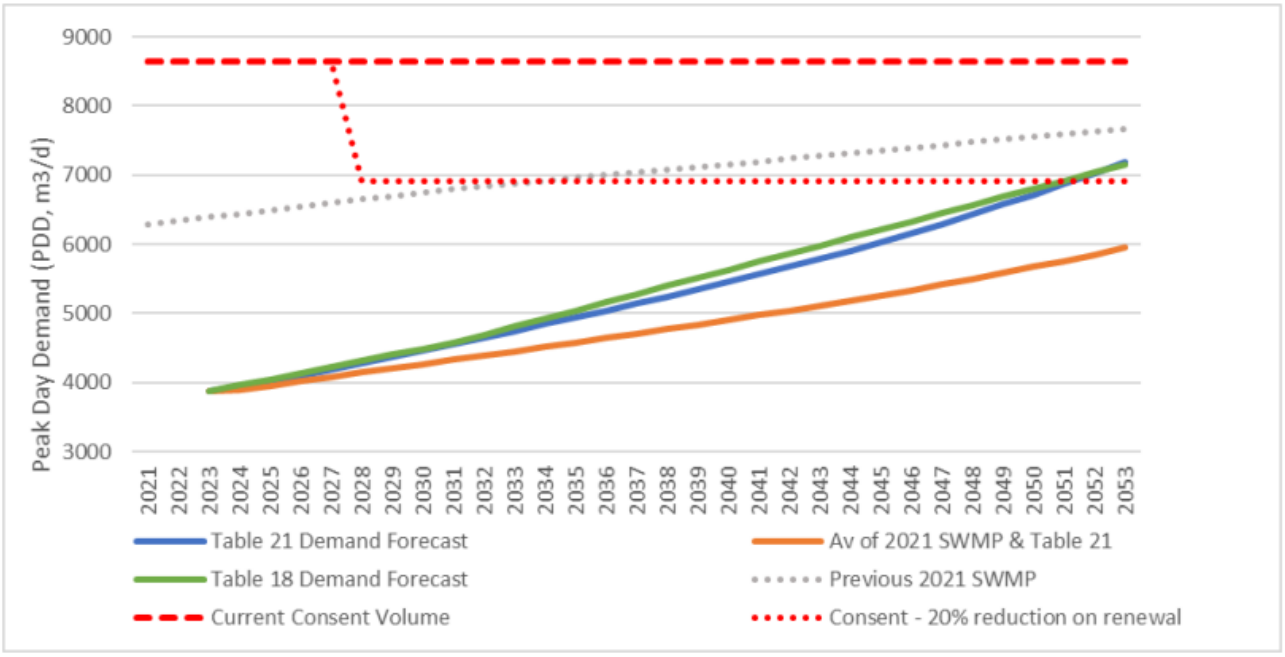


Figure 3-1: Waipukurau Water Balance Forecast (taken from Sustainable Water Management Plan Implementation, Water Loss and Demand Annual Reporting, WSP, 19 December 2023)

3.3.3 TREATED WATER STORAGE

In 2021 WSP assessed the existing and recommended treated water storage volume for Waipukurau (refer Reservoir Masterplan, Waipukurau and Waipawa (WSP, 2021)).

The report notes that:

- The existing storage volume in the Waipukurau System is 3.8 ML (2.9ML at Pukeora and 0.9 ML at Hunter Park)
- The desirable storage volume is 3.8 ML (based on present day demands) or 5.5 ML (based on 2051 demands). The volume was calculated to provide fire-fighting storage in accordance with FNZ PAS 4509, plus emergency storage (12 hours at average day demand), plus operational storage (6 hours at peak day demand).

We note that the reservoir masterplan used average and peak demand figures from 2020/21 and since that time there has been a downward trend in water demand, which has been attributed to better data collection from new flowmeters and leak repairs. The desirable storage volume may therefore be conservative.

Based on this assessment the existing storage is just adequate for today's demands. Additional storage is therefore recommended to cater for any growth. Using the design basis above, for every 100 connections the desirable storage increases by approximately 0.2 ML (or emergency storage reduces by about 30 minutes).

Under the Waipukurau Second water Supply Project, CHBDC is proposing to increase storage in the system to approximately 6 ML to provide for future growth.

3.3.4 NETWORK PERFORMANCE

CHBDC commissioned Beca Ltd to undertake hydraulic modelling to support this assessment (refer Waipukurau South Growth Precinct Modelling, Water Supply Scenarios (Beca, 2025)).

Beca assessed the existing network and various future scenarios with different supply configurations and levels of growth. The modelling assessed the various scenarios against the following target levels of service:

	Criteria	Category	Threshold (Peak Day)
Level of Service	Pressure	Low pressure	< 250 kPa
		High pressure	> 900 kPa
	Fire Flow	FW2	12.5L/s from within 135m and a further 12.5L/s within 270m radius (25L/s total from two hydrants)
	Fire Flow	FW3	25L/s within 135m and a further 25L/s within 270m radius (50L/s total from up to three hydrants)
	Fire residual pressure	Residual pressure	>100kPa during fire flows

Figure 3-2: Target Levels of Service (Beca, Waipukurau South Growth Precinct Modelling Water Supply Scenarios, May 2025)

In summary the modelling *of the existing network* indicates that (refer Table 3-1):

- There are some existing level of service issues within the existing network
- With 300 lots in the WSDA the level of service is marginally improved. This is because the development improves connectivity in the network
- With 800 lots in the WSDA the level of service is marginally lower, with an increase in the number of connections below 250 kPa pressure.
- With 800 lots in the WSDA and 580 connections elsewhere the level of service is significantly affected.
- The modelling also demonstrates that the proposed Waipukurau Second Water Supply is effective at servicing the growth and maintaining levels of service. We note that there would

be other ways to upgrade the network to cater for growth (ie the Waipukuaru Second Supply is not the only option).

SCENARIO	NUMBER OF HYDRANTS WITH FIRE FLOW <25 L/S (FW2)	NUMBER OF HYDRANTS WITH FIRE FLOW <50 L/S (FW3)	CUSTOMER PRESSURE < 250 KPA	CUSTOMER PRESSURE > 900 KPA
Existing	77	34	18	203
Existing with 300 Lots in WSDA. Low Development Elsewhere. (Scenario 5a)	65	34	18	149
Existing with 800 Lots in WSDA. Low development elsewhere.	65	34	22	88
Existing with 800 Lots in WSDA and 580 extra connections elsewhere. Beca scenario 5	96	35	204	4

Table 3-1 Network Performance (Adopted from Table 5-1 Beca report and Beca email 4 June 2025)

3.4 DISCUSSION

There is sufficient raw and treated water available for the WSDA. The proposed Waipukurau Second Water Supply would also increase the amount of treated water available.

Ignoring other growth, the network modelling assessment indicates that 300 WSDA connections can be accommodated on the existing network without adversely affecting the levels of service. At 800 WSDA connections, the levels of service are somewhat reduced. With 800 WSDA connections and 580 extra connections on the existing network, levels of service are significantly reduced. The modelling therefore indicates that the current network can cater for early development in the WSDA (up to approximately 200-300 connections depending on the level of other growth) before levels of service start to be affected. With higher levels of development the network will need to be upgraded. It is difficult to be definitive about the exact timing and nature of the upgrades as there will be different options depend on where growth occurs. If the Waipukurau Second Water Supply is constructed and the existing DN175 mm main in SH2 upgraded, this is effective at servicing growth.

The current treated water storage just meets the desired level of service for current day demands. Additional connections will mean the storage falls behind the desired level of service (100 extra connections conservatively adds 0.2 ML to the desired reservoir storage). Extra connections will however reduce the level of service offered by the existing reservoirs.

Beca Ltd's modelling indicates that proposed Waipukurau Second Water Supply can cater for the WSDA ultimate development and additional development with improved levels of service. It also addresses the shortfall in treated water storage that otherwise develops.

3.5 DEVELOPMENT RECOMMENDATIONS

It is recommended that:

- Additional storage is constructed before about 100 additional connections are added in the WSDA
- CHBDC plans for network upgrades to maintain levels of service when the WSDA has more than approximately 200-300 connections (depending on other growth). The planned Waipukurau Second Water Supply and related SH2 upgrade would effectively service the ultimate development in the WSDA.
- 150mm diameter fire mains should be constructed as part of the development, linking through the development between Porangahau Road and Tavistock Roads at key locations, generally in accordance with the Beca hydraulic model configuration (refer Figure 3-3).

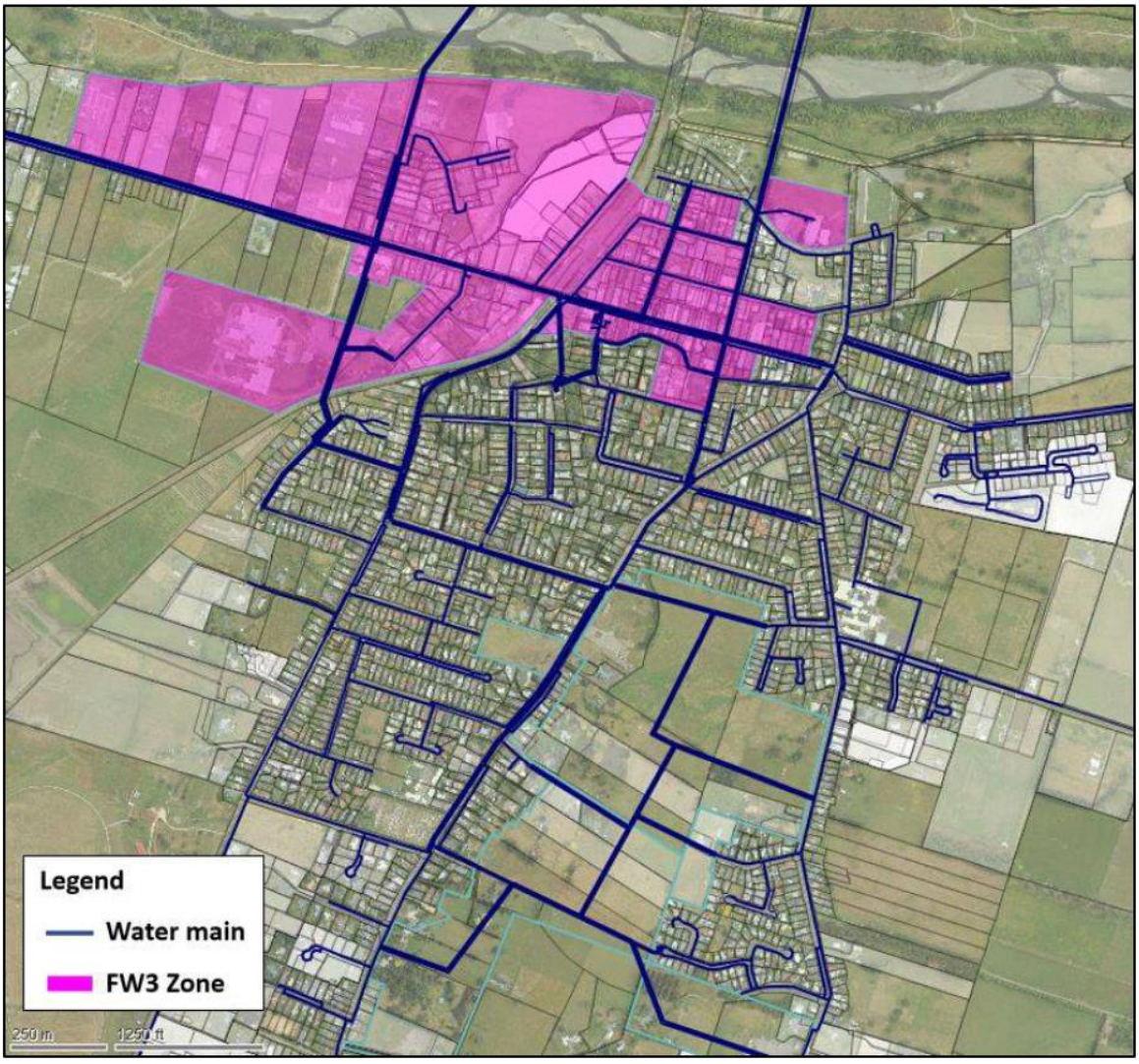


Figure 3-3: Diagram of Beca hydraulic model links.

4 WASTEWATER

4.1 EXISTING WASTEWATER SYSTEM

4.1.1 EXISTING WASTEWATER NETWORK

Waipukurau's wastewater network comprises a gravity system with four local pump stations within the network and a terminal pump station (Mount Herbert Road PS) which lifts wastewater into the wastewater treatment plant (WWTP) on Mount Herbert Road east of the township.

In 2021/2 WSP previously performed system performance and growth modelling of the Waipukurau wastewater network. In 2025 we updated the model and re-assessed the WSDA and Golden Hills proposed developments and also assessed the capacity of the Mt Herbert Road Pump Station(refer Waipukurau Wastewater Model Update Report (WSP, 2025) and Mt Herbert Road Pump Station Capacity Assessment Report (WSP, 2025)). The outcomes of this work are as follows:

- Parts of the wastewater network are at capacity, mainly due to high inflow and infiltration (I&I). The two pipelines which run through / beside the WSDA (refer Figure 4-1) are at capacity and are unable to convey any significant additional flows. The western branch servicing Porangahau Road is at capacity and is predicted to overflow in several locations with the current population. The east branch along Tavistock Road is also at capacity, with a particular capacity issue at Tutanekai Street leading to predicted manhole overflows.
- Along Mt Herbert Road three parallel trunk mains service the whole of Waipukurau. These parallel mains have spare capacity which is sufficient to service the WSDA (ignoring other growth that may occur).
- The Mt Herbert Road pump station is currently under capacity during wet weather. There have been a number of over flows during recent wet weather events.

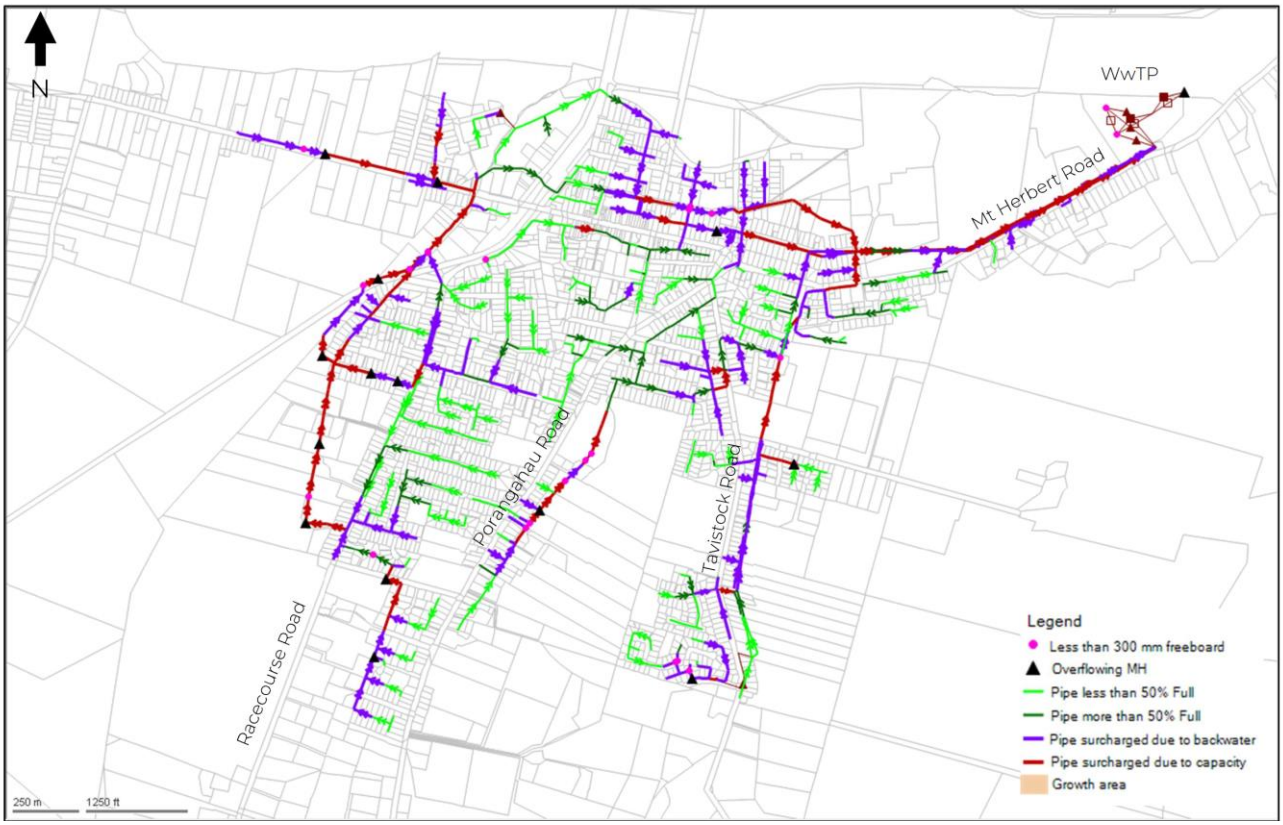


Figure 4-1: Network performance for the current network during the 10% AEP 2hr rainfall event (Reproduced from Waipukurau Wastewater Model Update Report (WSP, 2025)).

4.2 EXISTING WASTEWATER TREATMENT PLANT

The Waipukurau WWTP is located east of the township, as shown in Figure 4-2. Three parallel gravity pipelines (1 x 600mm diameter and 2 x 300mm diameter) convey flows from the town along Mount Herbert Road to the Mount Herbert Road Pump Station, which lifts wastewater into the treatment plant. The capacity of the wastewater treatment plant has not been assessed in this report.



Figure 4-2: Aerial imagery of Waipukurau township, showing location of WWTP.

4.3 DEVELOPMENT FLOWS AND HYDRAULIC MODELLING

The modelling includes three stages of growth, as discussed in the Waipukurau Wastewater Model Update Report (WSP, 2025). These stages are:

- The “WSDA Min” scenario - 100 connections.
- The “WSDA Mid” - 400 connections .
- The “WSDA Max” - 950 connections (which is conservative).

The hydraulic modelling was based on the following assumptions:

- Flows from the new development were based on 200 l/p/d and 3.5 people per lot with a DWF peaking factor 2 and WWF peaking factor 2.5 (equating to peak flows of 20.5 L/s for Development Area 1 and 17.9 L/s for Development Area 2.
- The Redwood Drive Pump Station was assumed to have capacity for additional 2.8 L/s of flow.
- Mount Herbert Road Pump Station capacity was set based on the drawdown test undertaken in early 2025. See the Mt Herbert Road Pump Station Capacity Assessment Report (WSP, 2025) for additional information.
- No internal pump stations within the WSDA were modelled as the extent to which flows needed to be pumped was unknown.

4.4 WASTEWATER SYSTEM UPGRADES

4.4.1 TARGET LEVEL OF SERVICE

The Level of Service (LoS) agreed with CHBDC in the *Waipukurau Wastewater Infrastructure Plan* Report (WSP, 2022) is the 10% AEP rainfall event (climate change adjustment to RCP8.5 2081-2100). The 2-hour event was used as this is the critical duration event for the Waipukurau wastewater network. All network overflows in the 10% AEP event are classified as unacceptable. Required Network Upgrades

4.4.1.1 PROPOSED TRUNK PIPELINE

The network between the WSDA and the Mount Herbert Road trunk mains (the pipes to the west and east and downstream of the WSDA) is at capacity. A new trunk pipeline is required from the WSDA to Mount Herbert Road. WSP has completed the preliminary design for a new trunk pipeline servicing the WSDA (refer *Waipukurau South Growth Precinct - Trunk Wastewater Pipeline Preliminary Design Report* (WSP, 2023) for the design of this pipeline). The proposed pipeline runs from Winlove Crescent to Francis Drake Street, discharging into the existing parallel trunk mains on Mt Herbert Road (refer Figure 4-3).

The proposed pipeline involves approximately 1,000 m of new DN300 pipe, and 250 m of DN500 pipe. The depth of the termination point at Winlove Crescent needs to be decided, balancing the cost of a deep connection with the flexibility this gives for designing the pipeline extending up into the WSDA.

CHBDC proposes to construct this pipeline to enable development in the WSDA.



Figure 4-3: Proposed trunk main alignment and pipe size (Reproduced from *Waipukurau South Growth Precinct - Trunk Wastewater Pipeline Preliminary Design Report* (WSP, 2023))

4.4.1.2 WASTEWATER NETWORK WITHIN WSDA

CATCHMENTS

There are four catchments within the WSDA (shown indicatively on Figure 4-4). Servicing for each a catchment is described below. The main challenge to be resolved is staging; for example if development occurs in the upper catchment before the lower catchment.



Figure 4-4: Wastewater catchments within WSDA

CATCHMENT A – NORTH CENTRAL

This catchment can be serviced by extending a gravity pipeline from the new trunk main at Winlove Crescent as shown in Figure 4-4. The main could either follow the roads as they are developed, although it may be advantageous for it to take a more direct route through the wetland (this enables the trunk main to be terminated at a shallower depth). The main will need to be installed in stages as development proceeds.

The main challenge with the main, is if development occurs in a piecemeal fashion, with early development in the upstream areas occurring before the downstream areas.

CHBDC may need to invest in some preliminary design work for this pipeline to guide developers in the design of 'their' sections of the main, and also allow CHBDC to have confidence in the overall design.

CATCHMENT B – NORTH EAST

This small catchment could either be serviced by a small pump station, pumping over to the Catchment A pipeline, or by extending a gravity main up Tavistock Road to the new trunk main. The latter option is recommended as it would enable CHBDC to divert some existing catchment off the overloaded pipelines east of Tavistock Road and would also avoid the need to operate a pump station.

CATCHMENT C - SOUTH WEST

This catchment falls towards the south away from the township and it will need to be serviced by a pump station pumping back to the top of the new gravity trunk main.

CATCHMENT D - SOUTH EAST

This catchment also falls south, as does the area around Redwood Drive which is currently serviced by the Redwood Drive Pump Station which pumps into the gravity mains east of Tavistock Road. A new pump station will be required to service this catchment, effectively replacing the current pump station and enabling its removal. The new pump station could either pump east into a new gravity line up Tavistock Road (the line that services Catchment B) or it could pump west into the new trunk main.

4.5 DEVELOPMENT RECOMMENDATIONS

The existing network downstream of the WSDA is currently surcharged in a 10% AEP event. Under the scenario where 100 connections are added in the WSDA, the surcharging increases by a small amount without extra overflows. Therefore the first stages of the development could proceed without upgrading the wastewater reticulation. This should be considered a short term arrangement as the network is close to overflowing and has little headroom for additional flows.

As discussed in Section 4.1.1, the Mt Herbert Road Pump Station is currently under capacity.

We recommend that:

- The trunk wastewater pipeline (Section 4.4.1.1) is constructed as soon as possible to limit the number of new connections on the existing network as much as possible.
- No more than 100 lots within the WSDA are connected to the existing wastewater networks around the site. Any connections to the existing network are temporary and are in locations agreed with CHBDC considering the impact on the network. This may require temporary pump stations which could be designed to a lower standard to be agreed with CHBDC. The temporary network connections should be removed from the existing network and connected to the new trunk main when it becomes available.
- The internal wastewater trunk main is built by the developers in a coordinated fashion. CHBDC should consider developing a preliminary design for this pipeline to guide developers.
- Mt Herbert Pump Station is upgraded as soon as possible, noting it is currently undersized.

5 STORMWATER

5.1 EXISTING STORMWATER SYSTEM

5.1.1 EXISTING STORMWATER NETWORK

The stormwater drainage system serving Waipukurau consists of a combination of piped drains, formed open channels and natural watercourses. The Tukituki River is isolated from the township by stopbanks and all pipes passing underneath the stopbanks are protected against backflow by non-return flaps at the pipe outlet.

There are three main catchments within the Waipukurau stormwater system, a south eastern catchment which discharges by way of open drains and natural watercourses to Hatuma Lake, a smaller north eastern catchment which discharges into the Tukituki River immediately downstream of the Rail Bridge and a much larger eastern catchment which discharges through the Pah Flat Stream into the Tukituki River some 2km east of the town.

A series of natural and manmade open drains traverse the WSDA. There are two distinct natural catchments within the WSDA (Figure 5-1). The open drains from Development Area 1 and the northern part of Development Area 2 discharge to the northeast and through the drain under Mt Herbert Road, finally discharging into the Tukituki River. The open drains in the southern part of Development Area 2 discharge to the south and flows towards Lake Hatuma.

A wetland assessment commissioned by CHBDC identified localised areas of the site which meet the definition of 'natural wetland' under the NES-FW. CHBDC's structure plan provides for the primary wetland, located in the middle of Development Area 1, to be retained.

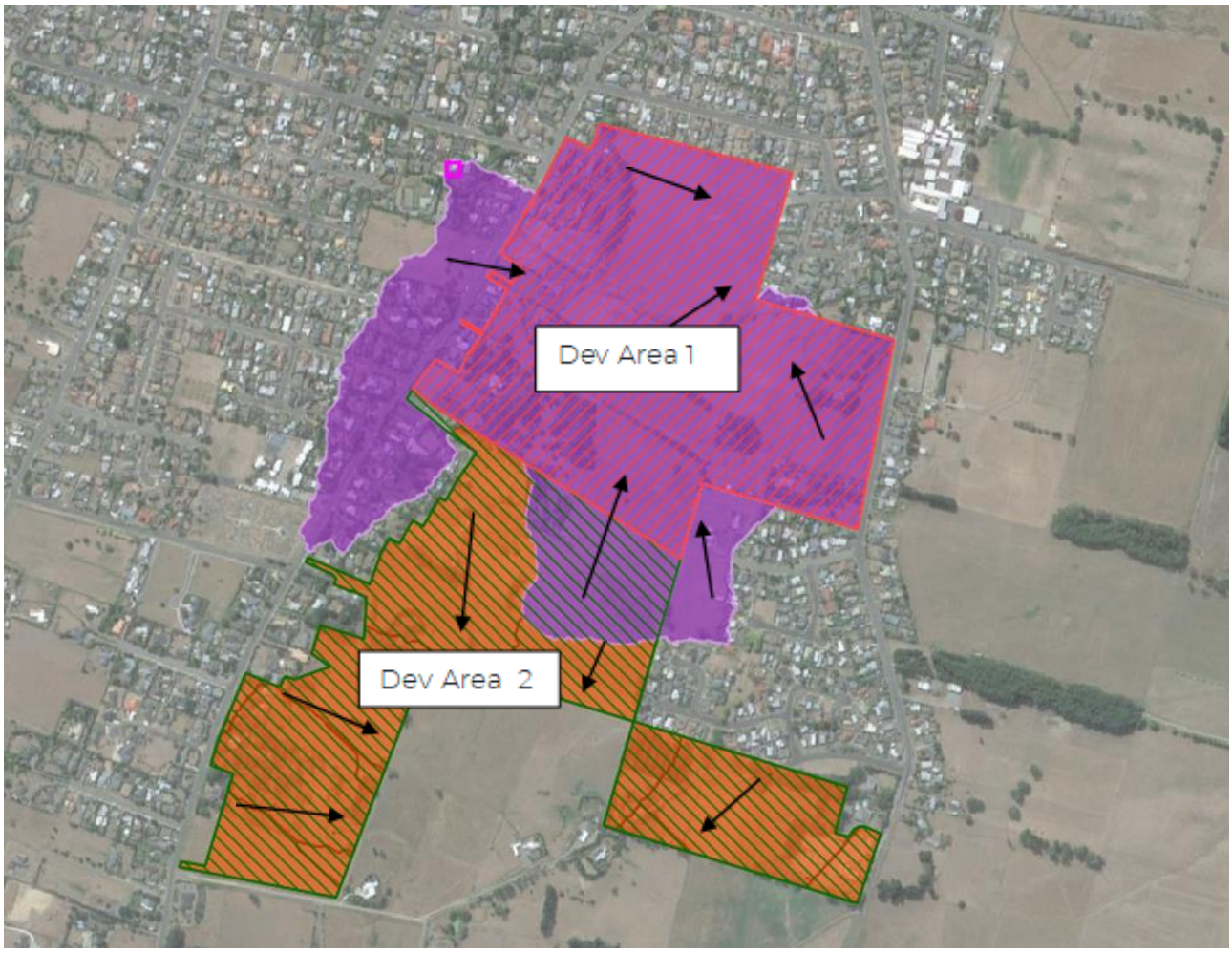


Figure 5-1 Development Area 1 (red hatch) and Development Area 2 (green hatch). North draining catchment shown in purple (to Pah Flat Stream), south draining catchments shown in orange (Lake Hatuma). Approximate flow direction shown by arrows.

5.1.2 EXISTING ISSUES

WSP previously built a stormwater model and carried out a hydraulic assessment of Waipukurau (WSP, 2022) which identified existing flooding issues within residential areas downstream of the WSDA. These issues are shown on Figure 5-2 and Figure 5-3 taken from the Waipukurau Stormwater Modelling Report (WSP, 2022). Figure 5-2 highlights issues with the primary piped network (10-year ARI) and Figure 5-3 highlights the flooding issues in a 100-year ARI event.

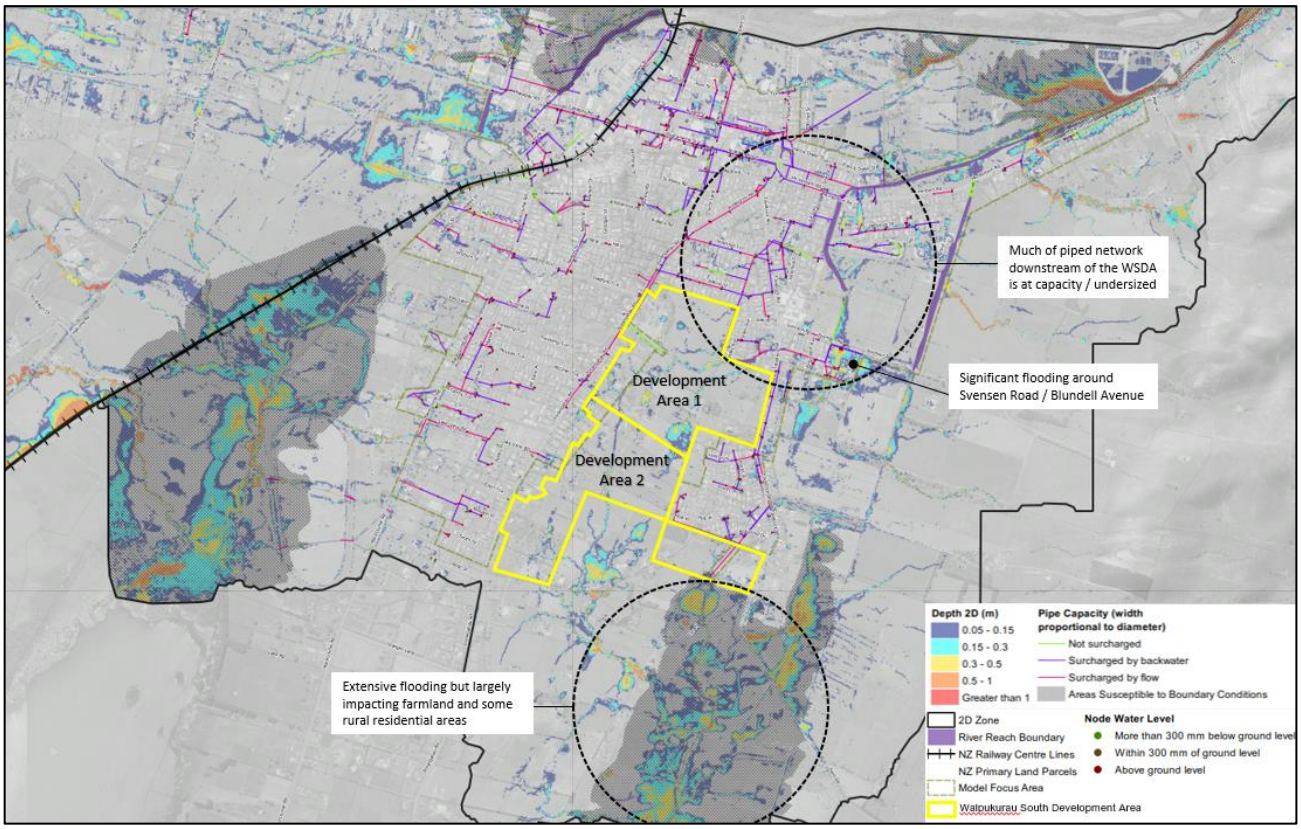


Figure 5-2 Primary network capacity and flood depth in a 10-year ARI event (existing flood risk issues)

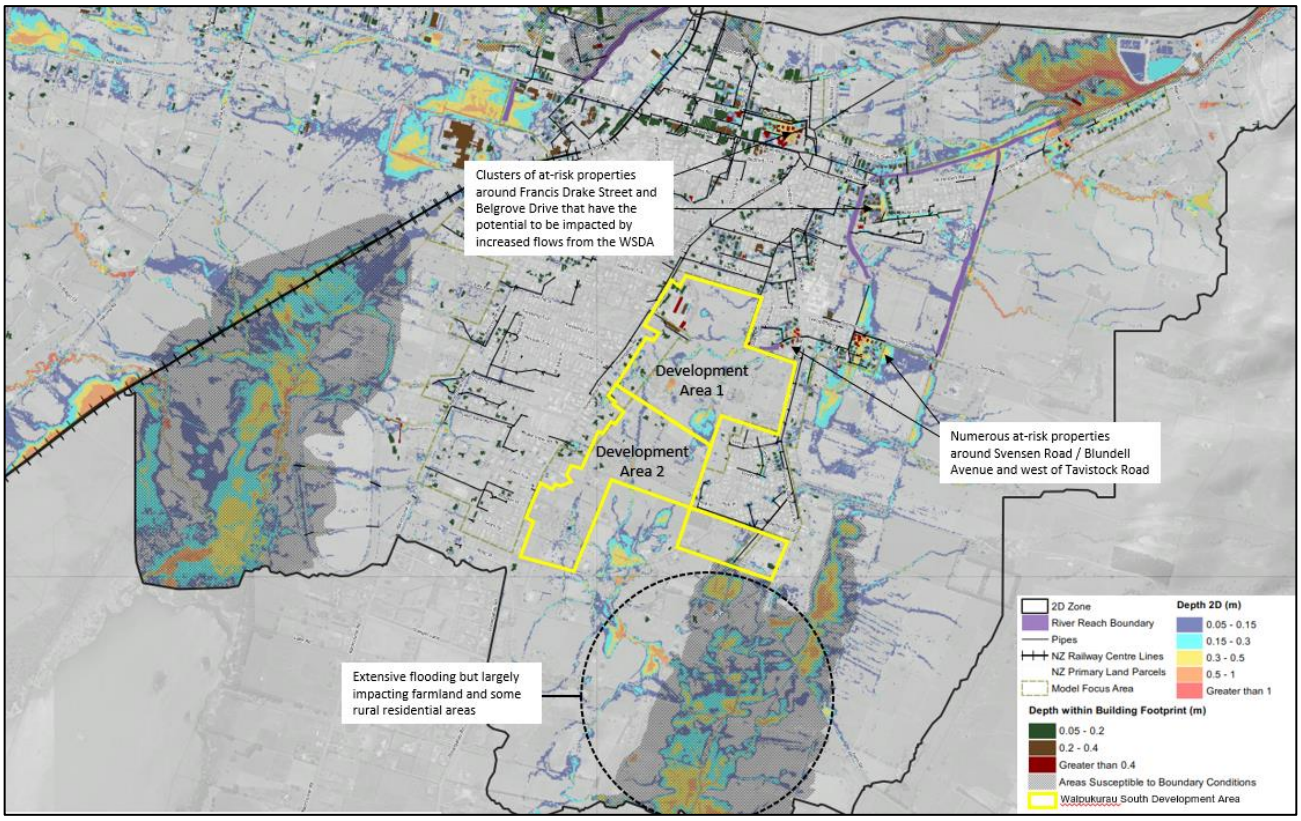


Figure 5-3 Flood depth and at-risk properties in a 100-year ARI event (existing flood risk issues).

5.2 STATUTORY REQUIREMENTS AND OBJECTIVES

5.2.1 GLOBAL STORMWATER CONSENT

CHBDC holds a Hawke's Bay Regional Council resource consent for discharge of stormwater from the WSDA catchment to the river (Auth-119592-01). Condition 5 of that consent requires development stormwater infrastructure to be in accordance with the approved Catchment Management Plan (CMP), or if the CMP is not approved, the HBRC Waterway Guidelines (WG):

> *'Stormwater infrastructure constructed in new development areas shall be undertaken in accordance with the approved CMP and until the CMP is approved, shall be undertaken in accordance with the Hawke's Bay Regional Council Waterway Guidelines (Stormwater Management, May 2009) and Low Impact Design (April 2009)) or equivalent.'*

CHBDC has submitted a CMP to HBRC for approval and we assume it will be approved before any development occurs in the WSDA.

5.2.2 CATCHMENT MANAGEMENT PLAN

The CMP is a relatively high-level document. Under the heading of 'growth' the plan promotes a water sensitive design approach to managing stormwater from development, with the following 'improvement options' (abbreviated):

- All future development and streetscape upgrades need to consider water sensitive urban design principles – developers to include appropriate solutions for stormwater management to build community resilience.
- Clearer understanding of minimum standards and best practice regarding Stormwater design in the Central Hawke's Bay region. That stormwater design is guided by (at minimum) the Hawke's Bay Regional Council Waterway Guidelines (Stormwater Management, 2009) and Low Impact Design (2009) with the wider purpose to limit Stormwater runoff and contaminant generation at source by minimising the construction of impervious areas and design and installation of appropriate treatment train solutions. Further guidance is available from other authorities such as Wellington Water (Water Sensitive Design for Stormwater Treatment, Device Design Guide 2019) and Auckland Council (Water Sensitive Design for Stormwater, Guideline Document 2015/004).
- The impact of climate change is assessed appropriately for each development, and mitigation and adaption measures are implemented.
- Developers are required to attenuate stormwater to pre-development flow rates in order to manage loading on the Stormwater network. This occurs by way of consent notices being registered at the time of subdivision on all new titles. Attenuation covers a wide range of options within the Stormwater Bylaw. Practice or guidance notes could be developed to assist designers with specific expectations of Council.

Our interpretation of the CMP is that stormwater design for development is to be guided by the Hawke's Bay Regional Council Waterway Guidelines (WG), rather than needing to strictly adhere to it.

5.2.3 HAWKE'S BAY REGIONAL COUNCIL WATERWAY GUIDELINES

The Waterway Guidelines (WG) is a complex document that can be interpreted in several ways, but the basic requirements are:

- Provide stormwater treatment.
- Control stream erosion – the WG suggests several approaches depending on the stream and velocities etc., including applying extended detention (ED) where needed.
- Control peak storm flows – the WG recommends that where there are existing flooding problems downstream and no catchment study evaluating a potential project, the post-development peak discharge for the 100-year storm is attenuated to 80% of the pre-development peak discharge, and the 2 and 10-year peak flows are attenuated to pre-development.

5.2.4 OBJECTIVES FOR WSDA STORMWATER MANAGEMENT

To comply with the global consent for stormwater discharge, the primary stormwater management objectives for the development of the WSDA are to:

- Provide water quality treatment before discharging to the receiving environment
- Provide peak flow attenuation for the 50%, 10% & 1% AEP events (i.e. reduce post-development flows back down to 80% of the pre-development levels before entering the receiving environment)
- Enhance the existing wetland located in the middle of Development Area 1, and to incorporate it into the flood storage/stormwater attenuation system.

Stormwater management will be primarily achieved using constructed wetlands. Each wetland's outlet(s) will consist of a pipe and a weir which will be specifically sized and located to throttle and reduce peak flows while a volume of water temporarily fills up in the wetland during a storm event. Temporary or 'live' storage is only used for the purposes of peak flow attenuation.

5.3 STORMWATER UPGRADES

5.3.1 BACKGROUND

The Waipukurau South Growth Precinct Stormwater Management Concept Design Report (WSP, 2023) provides background for the stormwater infrastructure required to service the WSDA:

> *"Central Hawkes Bay District Council (CHBDC) obtained funding for bulk infrastructure to service the land through the government's Infrastructure Acceleration Fund (IAF), including funding for stormwater basins to manage stormwater quality and offsite flows.*
>
> *Part of the land falls to the north and part falls towards the south and the IAF application included two stormwater basins; one for the northern catchment and one for the southern catchment. Since the IAF application was approved, CHBDC has advanced discussions with landowners (particularly the owner of the northern land parcels where the original stormwater basin was proposed) and purchased a block of land within the WSGP at 83 Porangahau Road when it became available. CHBDC now proposes a total of four stormwater basins [for the north-draining WSDA catchment] to reduce the burden on any one landowner."*

Further details about the stormwater basins required to service the northern development catchments (predominantly Development Area 1) and the southern development catchment (Development Area 2) are provided in the following Sections 5.3.3 and 5.3.5. Details around the

requirements for offsite upgrades, to improve capacity and reduce the potential impacts of the development, are provided in Section 5.3.6.

5.3.2 DEVELOPMENT DENSITY / YIELD ASSUMPTIONS

The stormwater concept design was based on a development yield of 950 lots, average lot size of 500 m2 and an average 65% percentage imperviousness. A review of recent subdivision applications shows that 65% percentage imperviousness is relatively conservative (see Table 5-1) which means there is scope to increase the development density/yield to provide areas of smaller lot sizes if required.

Table 5-1 Percentage imperviousness for new development - from a review of recent subdivision applications.

LOT SIZE	NUMBER OF LOTS	% IMPERVIOUS RANGE	AVERAGE
350 m²	8	39-71%	54%
430 m²	7	39-58%	46%
625 m²	6	26-51%	43%

5.3.3 CONCEPT DESIGN - NORTHERN CATCHMENT (DEVELOPMENT AREA 1)

The topography of the northern catchment is generally flat, with overland flowpaths that pass through existing wetlands before exiting the site through a grassed open channel leading to a piped network under existing residential properties at the end of Willow Grove (the receiving environment).

CHBDC's ecologist (Beca Ltd) identified a natural wetland at the lower end of the site and this area was set aside / protected in the original development plans. CHBDC, WSP and the Beca ecologist met to discuss the wetland and whether it could form part of the stormwater management design, as opposed to being left in its original state. It was agreed that the best outcome for the project and wetland was to integrate stormwater management with the wetland, which would provide opportunities to augment / maintain water flow in the wetland and to improve the wetland through new plantings and public access points. This approach modifies the wetland and will therefore require consent from the Hawkes Bay Regional Council (HBRC).

The concept for stormwater management for the northern development area is four stormwater basins / wetlands shown indicatively in Figure 5-4 which discharge to the stormwater network near Willow Grove. The primary objectives of this stormwater concept are to:

- Provide water quality treatment before discharging to the existing natural wetland and the receiving environment.
- Provide peak flow attenuation for the 50%, 10%, and 1% AEP events (i.e. reduce post-development flows back down to 80% of the pre-development levels before entering the receiving environment).
- Enhance the largest existing wetland located at the north-eastern area such that it could also be used for flood storage/stormwater attenuation purposes.

The functionality/performance is largely derived from its surface area for treatment, and the peak flow attenuation function from the outlet structures. An outlet riser with an outlet pipe will slow down discharge flows as it passes through the throttle. Larger events will pass via a weir spillway that also controls flows in those events. Refer to the Waipukurau South Growth Precinct Stormwater Management Concept Design Report (WSP, October 2023) for more details.

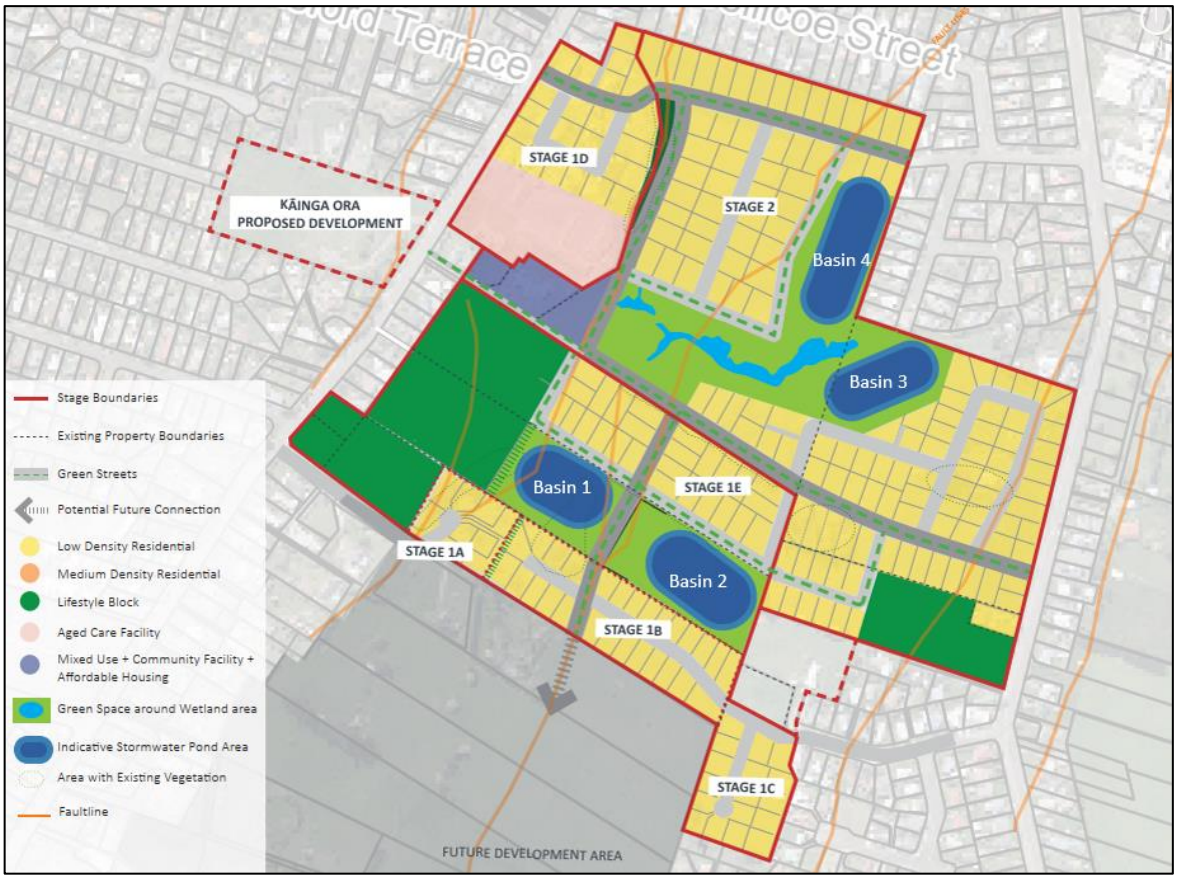


Figure 5-4 Stage 1 development area, showing structure plan proposed basin.

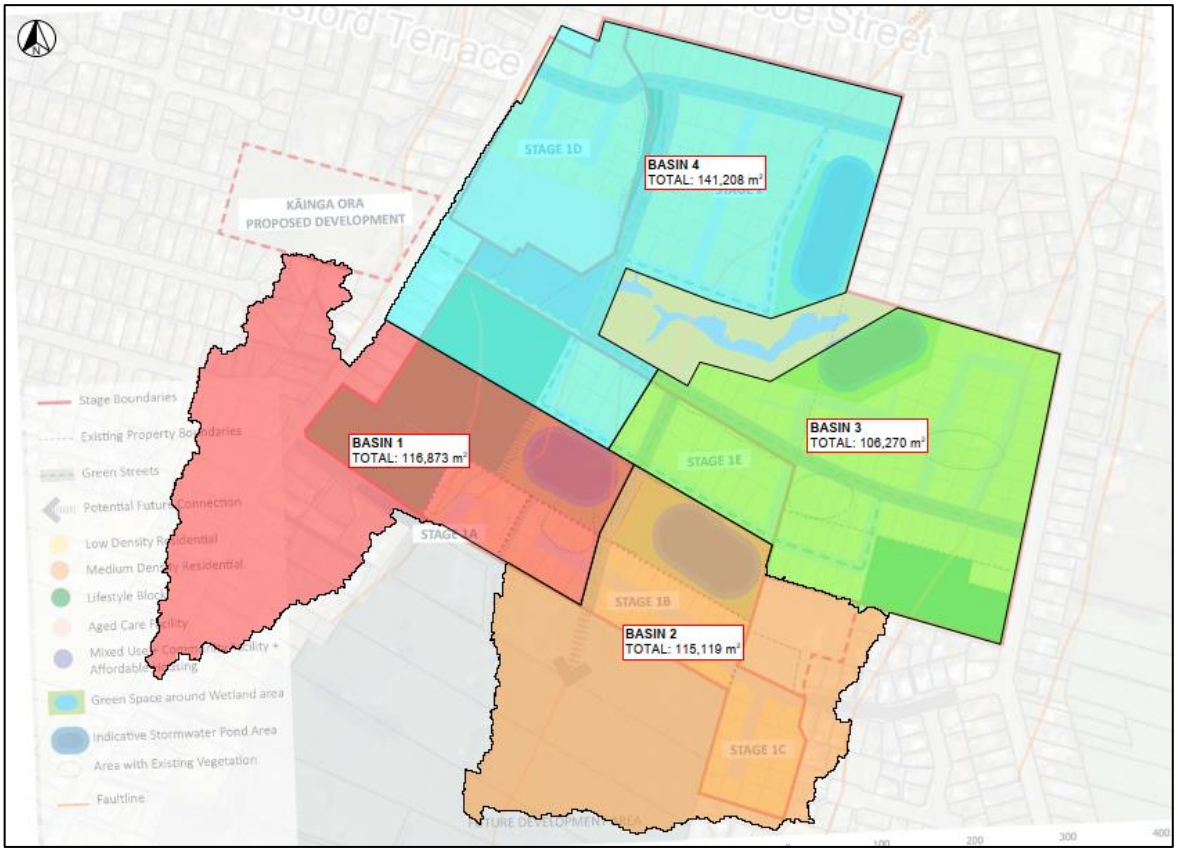


Figure 5-5 Northern sub-catchments.

5.3.4 BASINS 1 AND 2 CONSTRUCTION

CHBDC constructed Basins 1 and 2 in 2024/5 to service early developments in this catchment. Figure 5-6 shows an overview of the basin design.

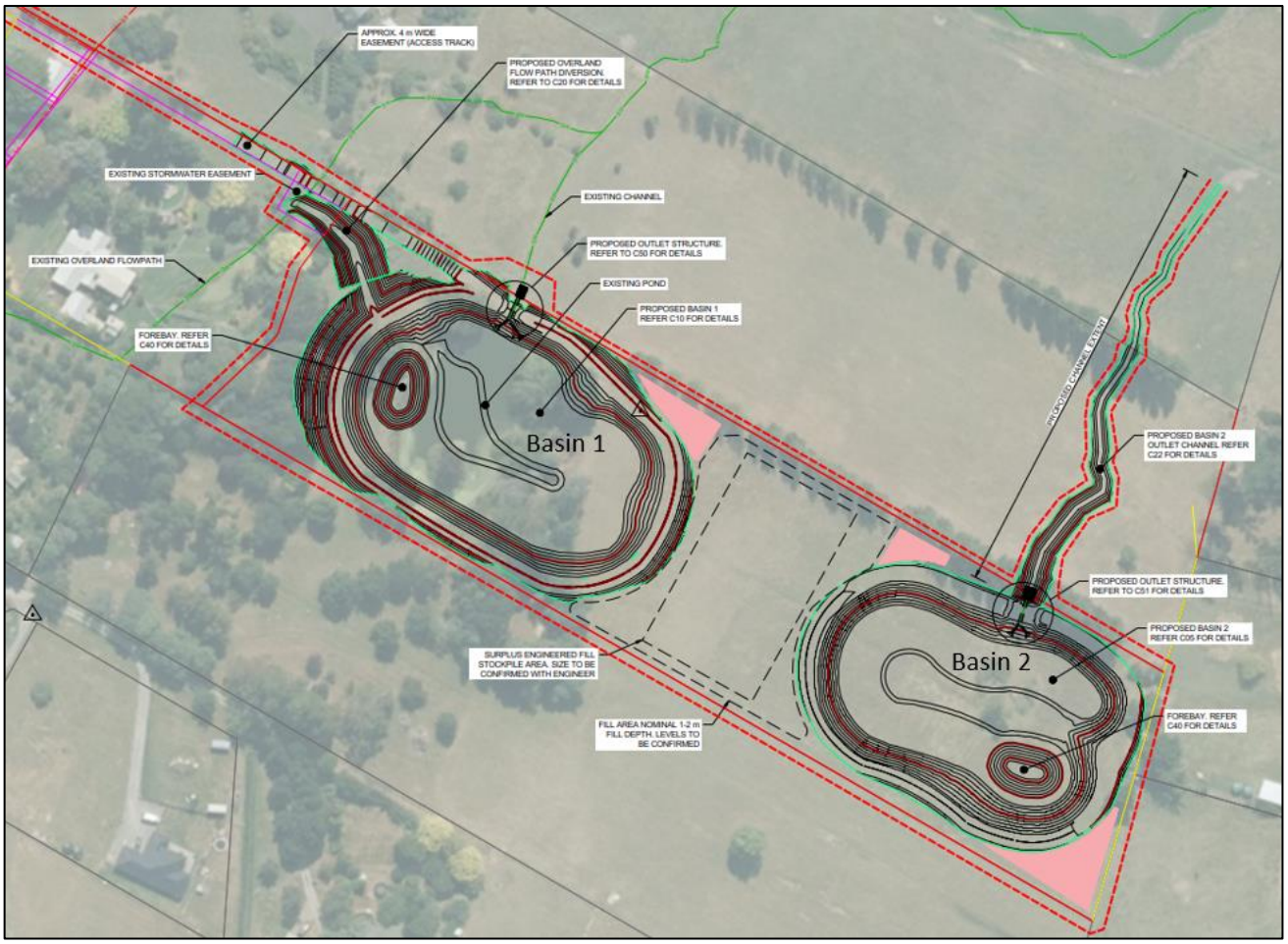


Figure 5-6 Stormwater Basins 1 and 2 design for construction

5.3.5 SOUTHERN CATCHMENT BASINS (DEVELOPMENT AREA 2)

Due to the topography of Development Area 2, three stormwater basins will be required as indicated in the high-level stormwater basin concept presented in Figure 5-7.

These basins have not been sized at this time, and it is assumed that they will be sized at the time of development in these catchments according to the requirements at that time.

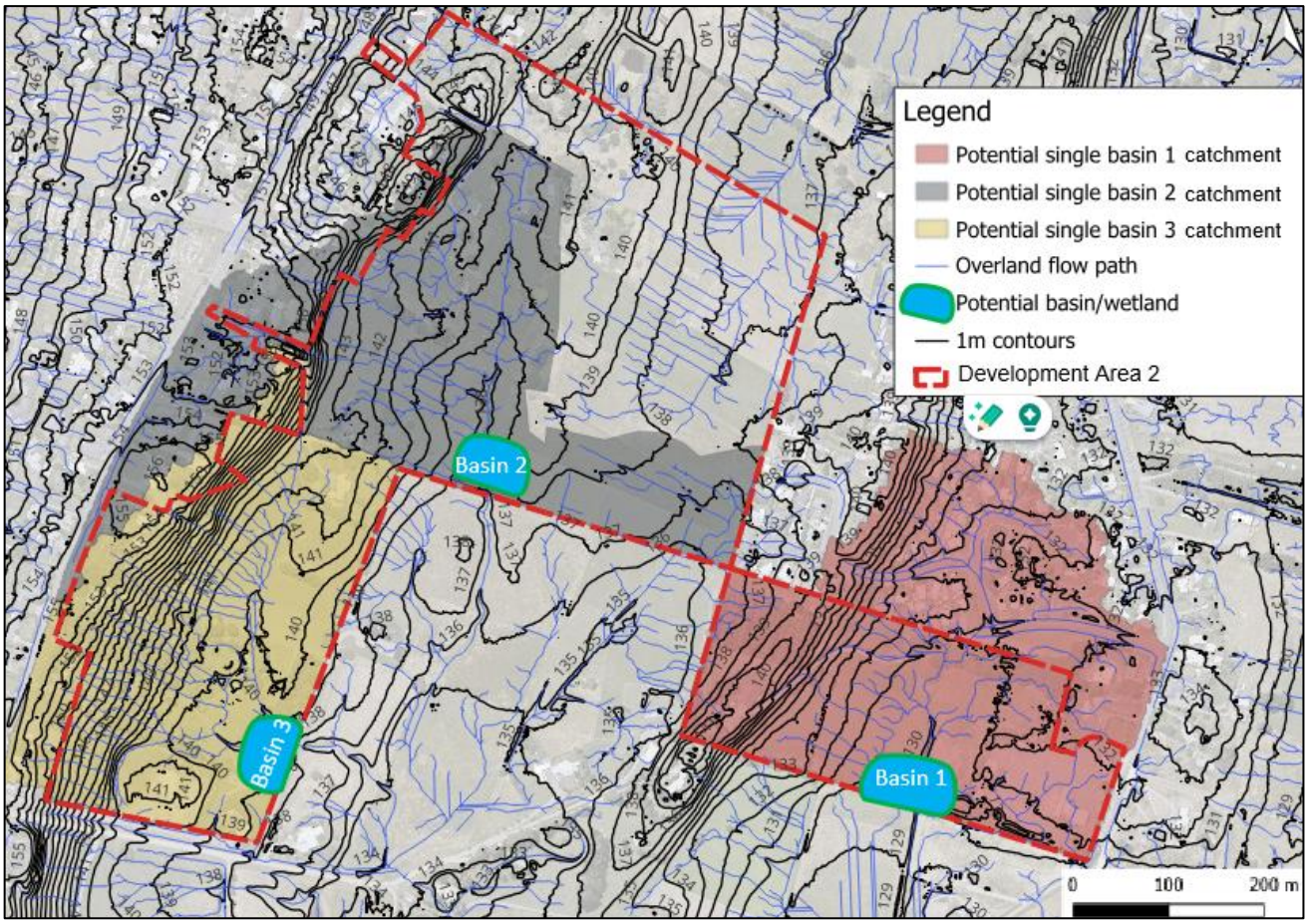


Figure 5-7 Southern development catchment (Development Area 2) stormwater basin concept.

5.3.6 OFFSITE UPGRADES

The Waipukurau stormwater hydraulic model was used to assess the impact of the WSDA northern catchment and associated stormwater basins (refer Section 5.3.3) on the existing stormwater network downstream of the site, particularly in areas already at risk of flooding. The associated *Offsite Stormwater Upgrades Assessment Report* (WSP, 2024) confirms that the basins are effective at reducing *peak flow* (and therefore reduce off-site flooding in short duration events). However, because the *volume* of runoff following development increases, the WSDA is predicted to increase offsite flood depths (in existing flood areas around Blundell Avenue) by a small amount [approximately 100 mm] in long duration 1% AEP events.

Options to mitigate the minor predicted increase in existing flood depth (henceforth reduce the potential impacts of the WSDA) were assessed in the *Waipukurau Blundell Avenue Offsite Stormwater Options Modelling Assessment* (WSP, 2025). Three upgrade options were assessed, Options A and B involving duplicating the stormwater pipe through the Central Hawkes Bay College grounds and localised upgrades in the network upstream, and Option C upgrading of the Eastern Interceptor.

The assessment showed that:

- Options A, B and C mitigate the minor increase in 1% AEP flood depth attributable to the WSDA
- Options A and B reduce the existing (pre- WSDA) flooding and buildings at risk during the 10% AEP event, but not the existing flooding during the 1% AEP event

- Installing a parallel pipeline through the Central Hawkes Bay College grounds is a critical part of any network upgrades, made more effective with additional minor network upgrades/changes
- To further reduce the existing (pre- WSDA) flood risk during the 1% AEP event, upgrades to the Eastern Interceptor would be required (and potentially diverting flow to here from Blundell Drain) along with the network upgrades.

5.4 DEVELOPMENT RECOMMENDATIONS

With respect to stormwater management, we recommend that:

- No development should occur in advance of a downstream stormwater basin.
- The stormwater basins for the northern catchment are designed generally in accordance with the WSP Concept Design Report (refer Section 5.3.3)
- The offsite upgrading (Option A or B refer Section 5.3.6) should be completed before there is significant development in the WSDA.
- The stormwater basins should be designed to satisfy the requirements of the CMP and HBRC Waterways Guide.

6 LIMITATIONS

This report ('Report') has been prepared by WSP exclusively for Central Hawkes Bay District Council ('Client') in relation to 3 waters servicing for Waipukurau South Development Area ('Purpose') and in accordance with the Short Form Agreement with the Client dated 18 September 2024. The findings in this Report are based on and are subject to the assumptions specified in the report and the Offfer of Services dated 9 September 2024. WSP accepts no liability whatsoever for any reliance on or use of this Report, in whole or in part, for any use or purpose other than the Purpose or any use or reliance on the Report by any third party.

In preparing this Report, WSP has relied upon data, surveys, analyses, designs, plans and other information ('Client Data') provided by or on behalf of the Client. Except as otherwise stated in this Report, WSP has not verified the accuracy or completeness of the Client Data. To the extent that the statements, opinions, facts, information, conclusions and/or recommendations in this Report are based in whole or part on the Client Data, those conclusions are contingent upon the accuracy and completeness of the Client Data. WSP will not be liable for any incorrect conclusions or findings in the Report should any Client Data be incorrect or have been concealed, withheld, misrepresented or otherwise not fully disclosed to WSP.

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