

Ngaaruawaahia Structure Plan - Water & Wastewater Technical Assessment

Prepared for Watercare Services Ltd
Prepared by Beca Limited

27 October 2023



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Appendix A – Proposed Capital Projects

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Revision History

Revision N°	Prepared By	Description	Date
A	Diego Valenzuela	Draft for Client Review	10/02/2023
B	Diego Valenzuela	Final	02/03/2023
C	Diego Valenzuela	Updated	20/03/2023
D	Claire Scrimgeour	Minor edits as requested	27/10/2023

Document Acceptance

Action	Name	Signed	Date
Prepared by	Diego Valenzuela		27/10/2023
Reviewed by	Claire Scrimgeour/Shawn Le Grange		27/10/2023
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on behalf of	Beca Limited	Beca Limited	

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1 Introduction

A structure plan for Ngaaruawaahia was prepared by Waikato District Council (WDC) in 2017 with the purpose to provide a long term 30 year planning framework for the future development of the wider Ngaaruawaahia area. The 2017 structure plan included a water and wastewater technical assessment to identify the infrastructure needs to provide water services to the existing and future developments. The structure plan study area is shown in Figure 1-1 below:

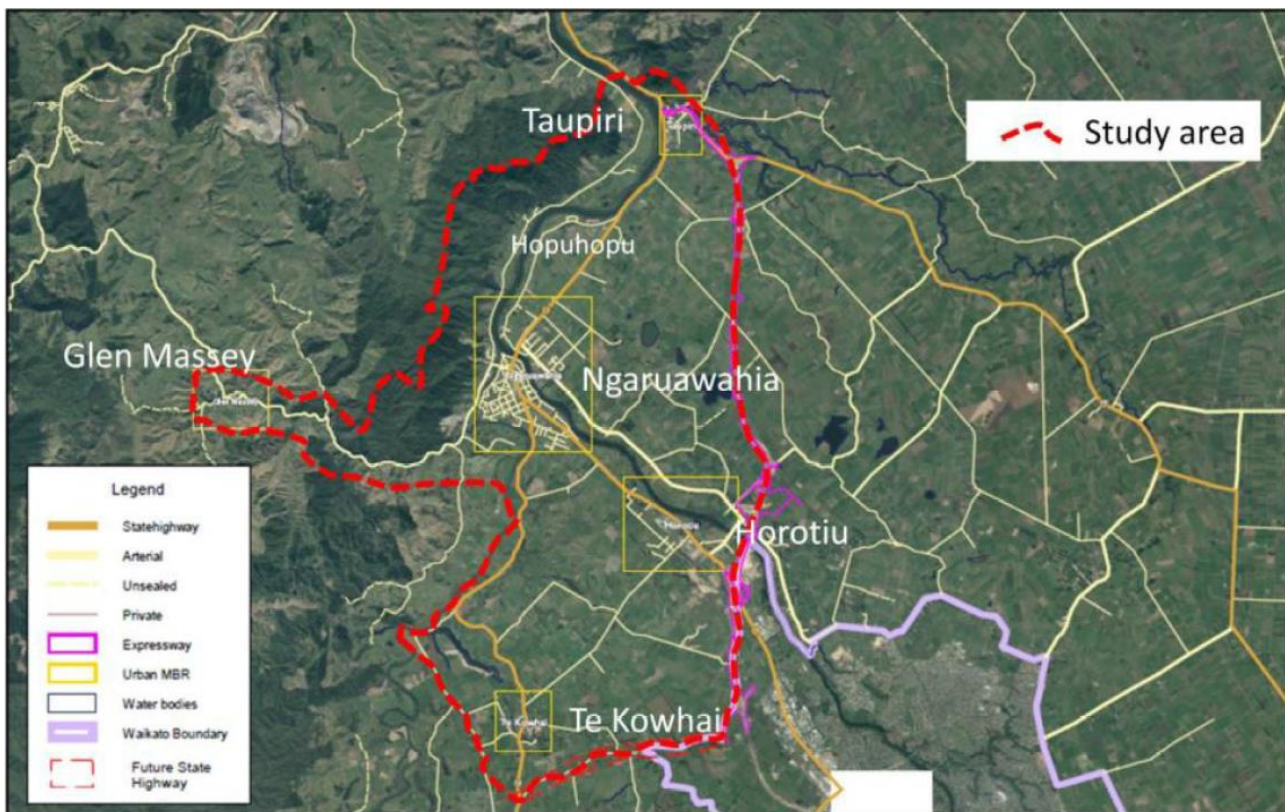


Figure 1-1: Ngaaruawaahia Structure Plan Area

WDC is currently updating the structure plan to include the latest information available in regard to proposed developments, existing and future infrastructure, land use and other constraints that will influence the growth in the area. Since 2017 there have been significant changes in the area including:

- the water network model has been updated
- various network improvements have been implemented
- the Waikato 2070 Growth Strategy has been developed
- the Northern Metro Wastewater Detailed Business Case has been undertaken
- and the growth cells and population projections have been revised.

This report is an update to the 2017 structure plan water and wastewater technical assessment to reflect all these changes.

1.1 Scope

The updated water and wastewater technical assessment focuses in identifying the water and wastewater infrastructure needs related to each growth cell in Ngaaruawaahia, Taupiri and Hopuhopu. Te Kowhai has also been included as there are plans to provide public water and wastewater services from/to the Ngaaruawaahia network. See Figure 1-2 for an overview of growth cell locations.

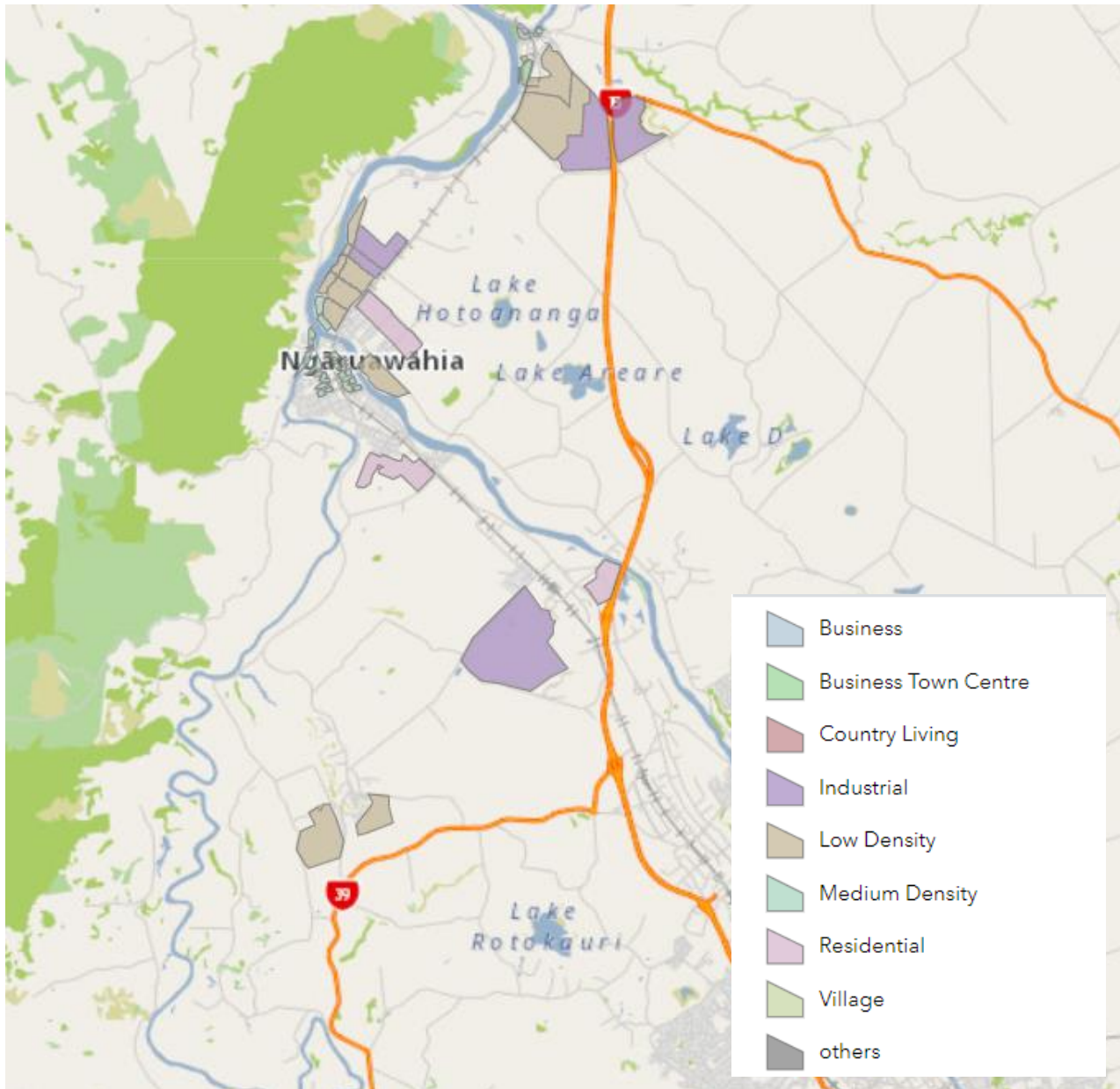


Figure 1-2: Growth Cells Overview

The scope of the water and wastewater assessment is to:

- Provide a summary of the existing network infrastructure including its limitations and how these are planned to be addressed.
- Summarise water supply demand projections out to 2050 for the four settlements.
- Summarise wastewater flow projections out to 2050 for the four settlements.
- Develop high level infrastructure improvements to meet growth out to 2050 or as far as practicable, including indicative timing of servicing for each of the growth cells in Ngāruawāhia, Hopuhopu, Taupiri and Te Kowhai.
- Prepare a high level servicing scheme plan for each growth cell.
- Prepare high level cost estimates for the proposed network upgrades.

1.2 Limitations

- The water and wastewater assessment is based on existing modelling information available. No modelling was undertaken as part of this report.
- Assessment of the existing water and wastewater treatment plants capacity is excluded from the review.
- Consent matters for water take and wastewater discharges are excluded.
- Proposed infrastructure and cost estimates are at high level only. More detailed reviews are needed in order to identify the preferred option for the projects that will cater for the improved levels of service and future growth.
- Cost estimates are only prepared for projects associated with growth. Projects to address existing levels of service are excluded.

2 Existing Networks

2.1 Water

The Central District water supply scheme provides drinking water to the townships of Ngaaruawaahia, Horotiu, Hopuhopu and Taupiri. Raw water is extracted from the Waikato River and treated at the Ngaaruawaahia Water Treatment Plant (WTP). There is an interconnection to the Huntly WTP via a transmission main commissioned in 2019 that provides additional resilience to the water supply network.

The existing network is divided in three supply zones, Ngaaruawaahia City Centre, Taupiri-Hopuhopu and the Horotiu Boosted zone. Two reservoirs are located at the WTP that provide a head source for gravity feed into the town reticulation. The Horotiu Boosted zone is supplied from the Central Districts reservoir and a booster pump station. The Taupiri / Hopuhopu water reticulation is supplied by the Hopuhopu reservoirs adjacent to the old State Highway 1.

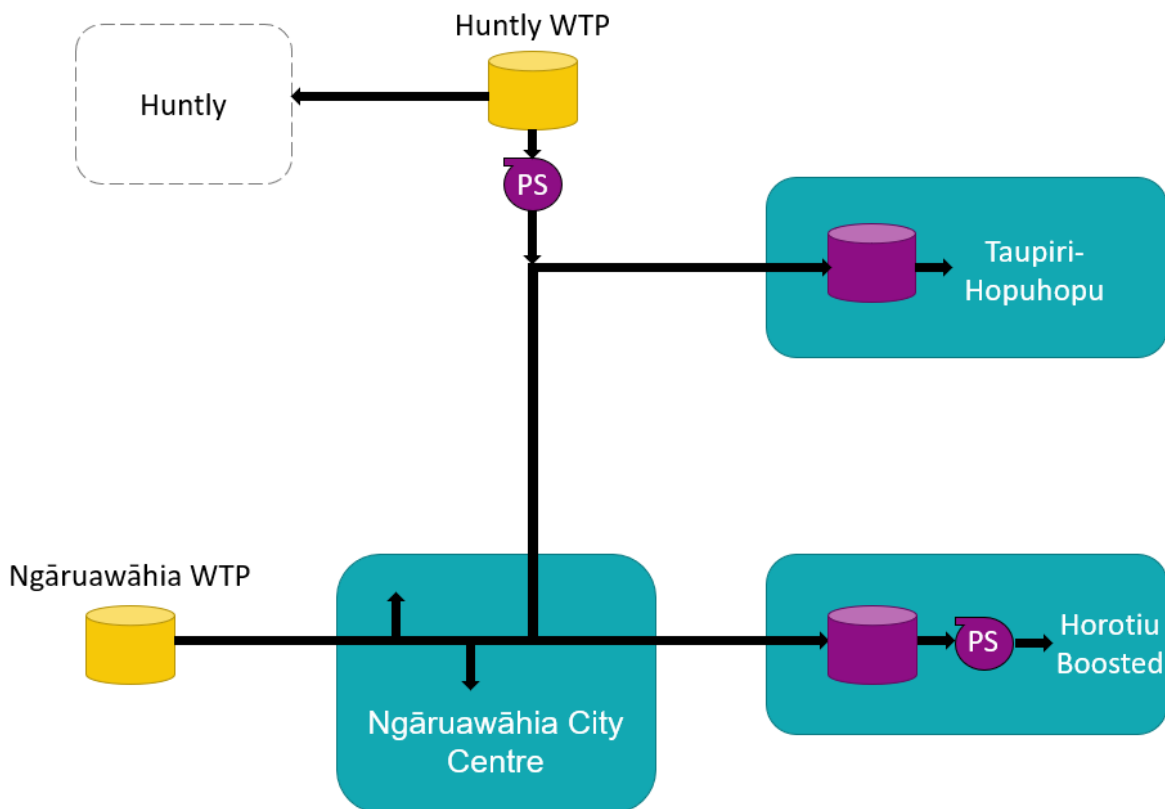


Figure 2-1: Ngaaruawaahia Network Schematic

The townships of Te Kowhai and Glen Massey are not serviced by a public water supply, however there are plans to provide reticulated water supply to Te Kowhai due to planned residential development.

2.2 Wastewater

The Ngaaruawaahia wastewater treatment plant (WWTP) currently receives its wastewater from Taupiri, Hopuhopu, Ngaaruawaahia and Horotiu.

Flows from Taupiri and Hopuhopu are conveyed through a single DN150 mPVC main, shared by the following key pump stations:

- Taupiri South (Taupiri)

- Reserve (Hopuhopu)
- Ashwell Crescent (Hopuhopu)

Flows from Ngaaruawaahia are predominantly supplied from the following pump stations, also by means of a shared DN250/375 AC rising main:

- Waikato Esplanade
- Ngaere Street
- Regent Street

Flows from Horotiu are conveyed from the Horotiu Road SPS to Thomas Street SPS (Ngaaruawaahia), which in return, discharges to a gravity section which flows to the Waikato Esplanade SPS.

The schematics below illustrate the current configuration of the network discharging to the Ngaaruawaahia WWTP.

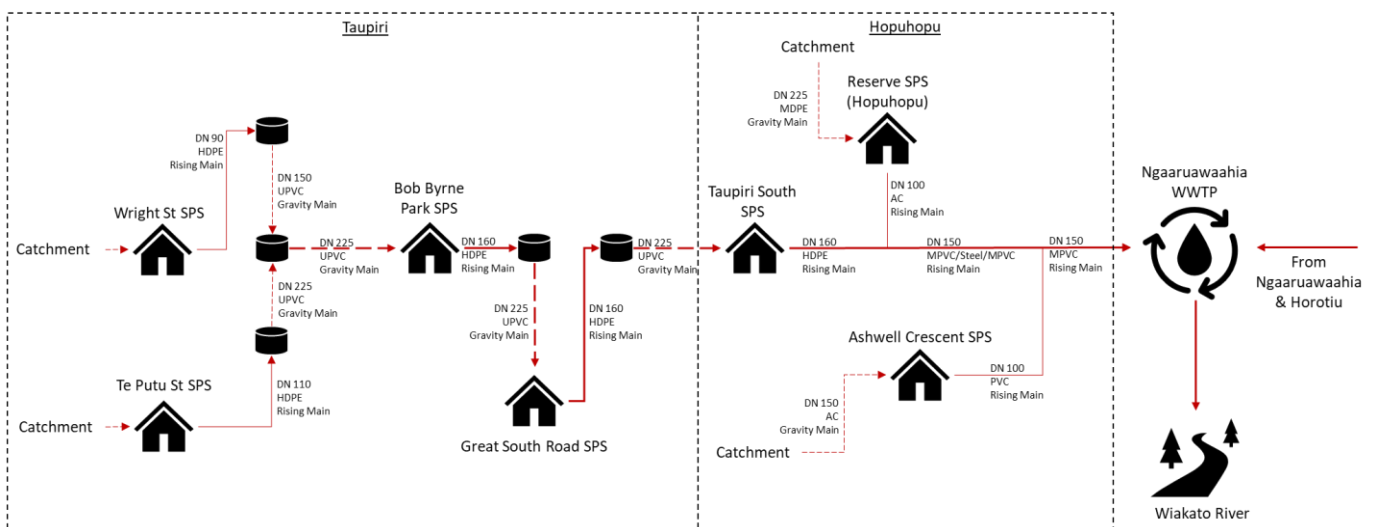


Figure 2-2: Status Quo - Taupiri/Hopuhopu to Ngaaruawaahia WWTP

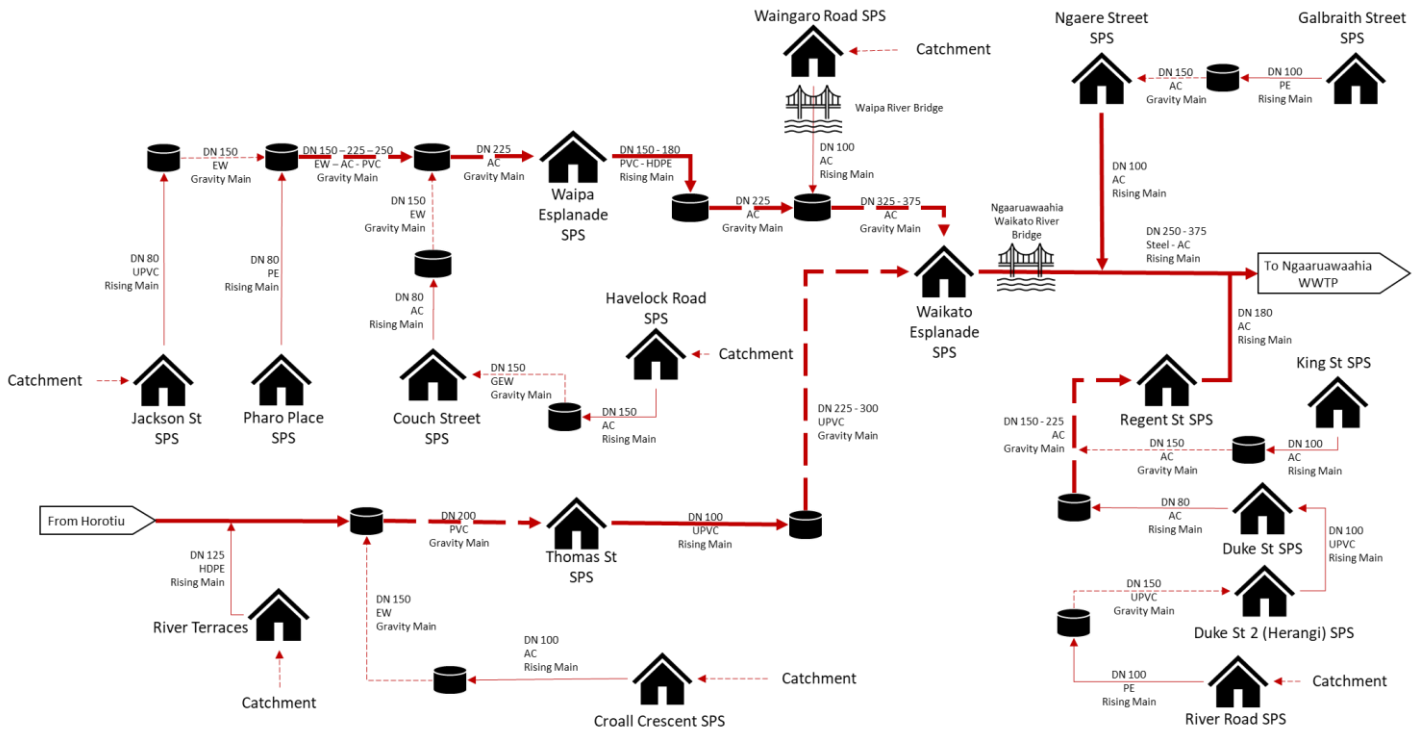


Figure 2-3: Status Quo - Ngaaruawaahia to Ngaaruawaahia WWTP

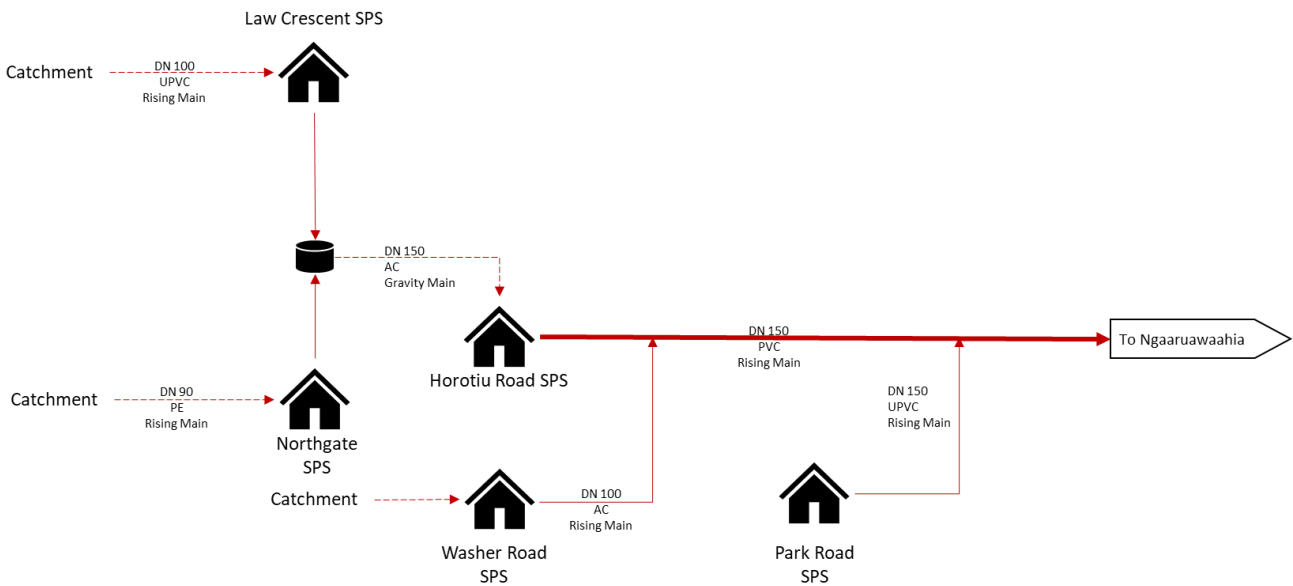


Figure 2-4: Status Quo - Horotiu to Ngaaruawaahia

Te Kowhai currently has a wastewater treatment system (septic tanks and recirculating filter) servicing a small portion of the village (approx. 20 properties). The treatment plant discharges to land adjacent to the Te Kowhai Stream.

There are a number of planned/committed projects that have been considered as part of the pumping and conveyance options development.

A new SPS is planned in Horotiu that will ultimately service the entire Horotiu township. In addition, it is planned to connect Horotiu Street SPS (HR-SPS) to the POAL-SPS via a gravity sewer and abandoning the HS-SPS, see below (Jacobs, August 2019).

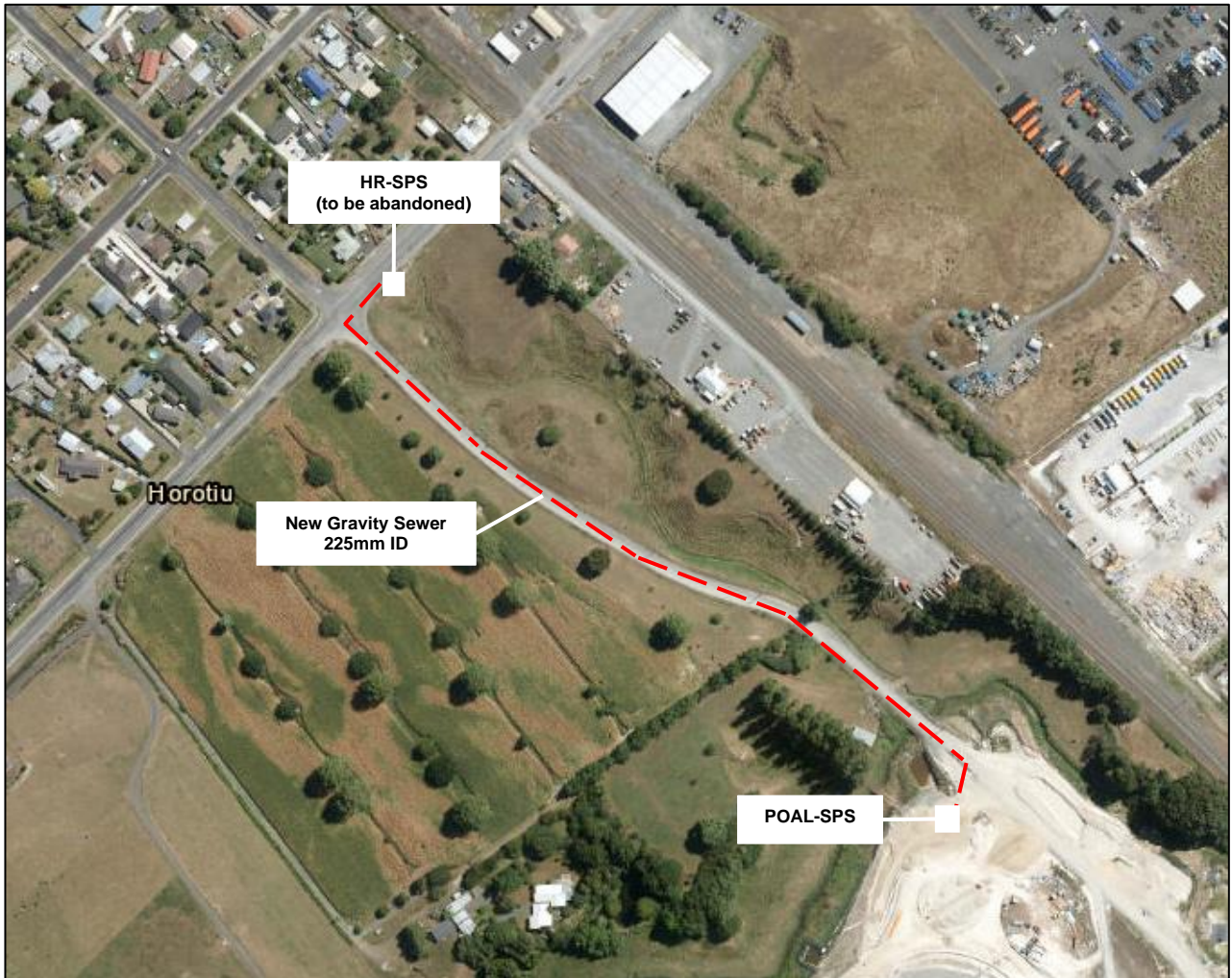


Figure 2-5: Horotiu Planned/Committed Projects

Currently in construction is the rising main upgrade from the Esplanade SPS (E-SPS) and across the Ngaaruawaahia Waikato River bridge. The next stage of the upgrade will include a new gravity sewer (800 OD PE) along Great South Road and a new lift pump station (N-SPS) at the Ngaaruawaahia WWTP. The new N-SPS will lift the flows received from the gravity sewer through the inlet works.

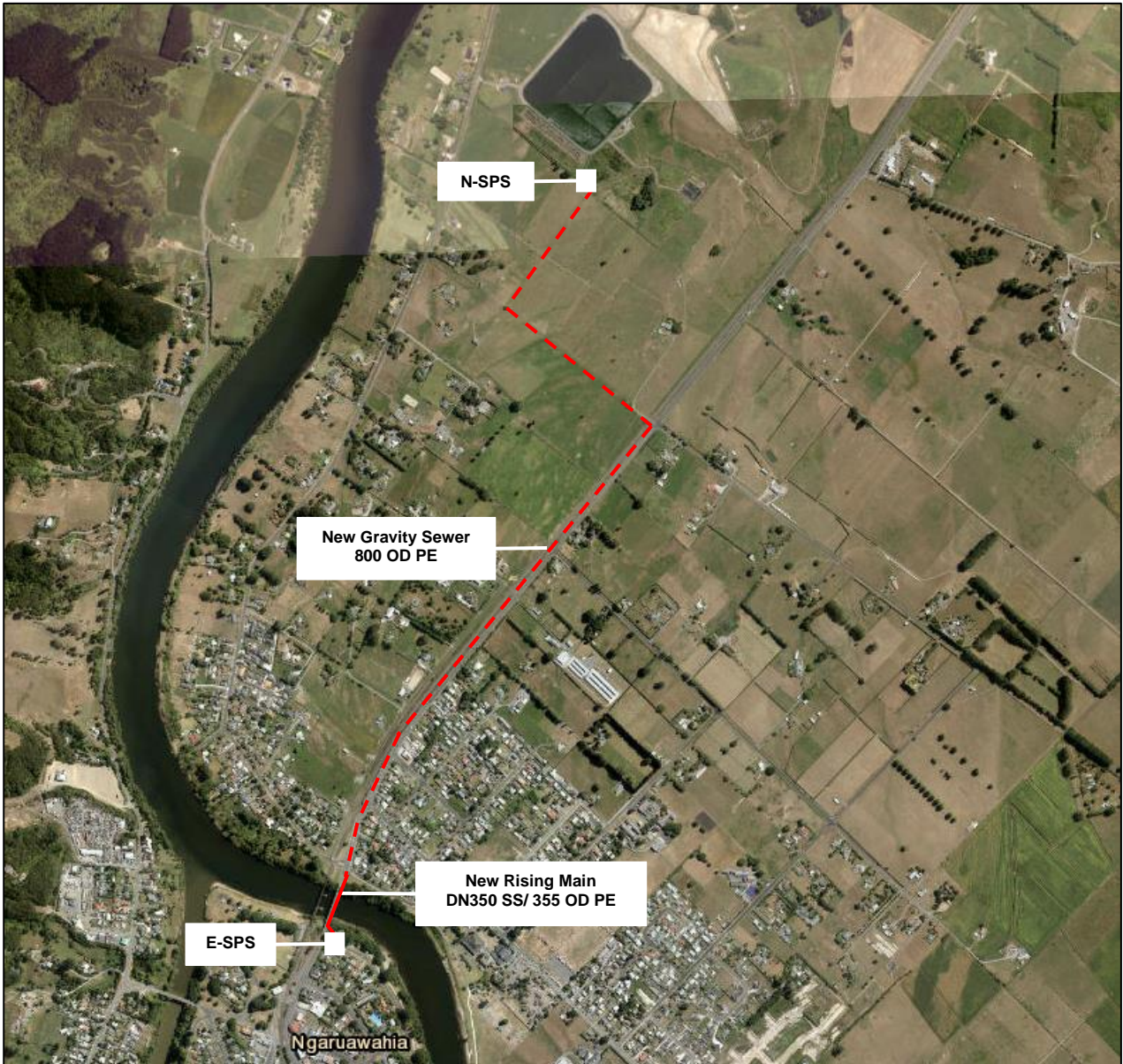


Figure 2-6: Ngaruawahia Planned/Committed Projects

3 Population and Demand Projections

The water and wastewater service areas are different; therefore, population and demand projections need to be considered separately.

3.1 Water

A water hydraulic model calibration was carried out by HAL in 2021 using field data collected in December 2020. Following the calibration, an assessment of the system performance of the existing networks and future growth scenarios was undertaken (HAL, 2022). The performance assessment identified upgrades required to meet the levels of service for the actual and future scenarios.

A population growth model was built for the modelling purposes, which included predicted infill growth and additional information provided by WDC. To calculate the future demand, 2.8 persons/household and 220 L/person/day were used, in accordance with the Watercare (WSL) modelling specification. For commercial and industrial growth, zones from the WDC operative district plan were assigned. For the purpose of this report, no changes have been made to the population and demands projections used by HAL.

Note that HAL did not include allowances for all the future commercial/business zones in Taupiri, Ngaaruawaahia and Horotiu.

A servicing options assessment report prepared by BTW predicted the future populations for Te Kowhai (BTW Company, 2022). The methodology used populations provided by WSL, which were reviewed and updated with information given by developers.

Table 3-1: Population Equivalent Projections

Town	2025	2030	2045	2050
Ngaaruawaahia/Horotiu	8,348	9,360		12,359
Taupiri	644	1,366		2,698
Te Kowhai	842	2,163	5,018	

The peak daily water demand projections are summarised in Table 3-2 below. The information is taken from the HAL report for Ngaaruawaahia/Horotiu and Taupiri, which used a peak factor of 2.0 (from WSL modelling specification). For Te Kowhai, the BTW report considered an average of 260 L/person/day and a 1.5 peak factor, in accordance with the RITS 6.2.3, so these values were used to estimate the future peak water demand.

Table 3-2: Peak Daily Water Demand Projections

Peak Water Demand (m ³ /day)	2025	2030	2045	2050
Ngaaruawaahia/Horotiu	4,010	4,730		6,550
Taupiri	520	840		1,430
Te Kowhai	328	844	1,957	

Population and demand projections for Glen Massey are not shown as there are no plans to provide a reticulated public water supply to this town in the near future.

3.2 Wastewater

The population and growth assumptions in the 2016 wastewater model are out of date as they were based on 2013 census projections and did not consider the Waikato 2070 growth strategy. The growth assumptions for the Northern Metro DBC are the most relevant to this assessment. The Northern Metro DBC (Beca, 2022) assumptions have been used, which include:

- Data from Council on residential population projections was used (University of Waikato (UoW) April 2021 'High' projections).
- Wet industry allowance in Horotiu (50ha).
- All industrial and commercial growth cells included in Waikato 2070 were included with development assumed to be complete by 2050.
- Te Kowhai residential area included the village and adjacent growth cells and 100 dwellings at the airpark.
- Allowance for infill growth as per Metro Spatial Plan.
- The residential and non-residential information was combined to provide population equivalent projections for input into conveyance as outlined in Table 3-3 below.

Table 3-3: Metro Area Combined Growth Summary - Wastewater

Total Population Equivalent Projections (Residential and Non-residential)				
Area	2021	2031	2041	2051
Taupiri	632	2,473	4,344	6,215
Ngaaruwaahia (incl Hopuhopu)	5,700	9,008	11,637	13,478
Horotiu	1,309	3,135	6,538	6,548
Te Kowhai	1,012	1,677	2,017	2,248

The population equivalent data for wastewater are higher than for water mainly due to the additional industrial/commercial allowances, and allowances for infill.

Table 3-4: Average Daily Wastewater Flow Demand Projections

Average Daily Flow (m³/day)	2021	2031	2041	2051
Taupiri	143	511	885	1,260
Ngaaruwaahia	1,189	1,851	2,377	2,745
Horotiu	196	561	1242	1,244
Te Kowhai	229	362	430	476

Population and demand projections for Glen Massey are not shown as there are no plans to provide a reticulated public wastewater to this town in the near future.

4 Water and Wastewater Servicing Assessment

4.1 Water Supply Assessment

4.1.1 Methodology

The water network was assessed by reviewing the previous modelling reports (HAL, 2022) and the servicing options assessment report prepared by BTW for Te Kowhai (BTW Company, 2022). This section provides a summary of the existing infrastructure limitations based on these reports.

It is understood that both reports considered the latest future development areas available at the time, however it is noted that the HAL report did not include all the projected commercial/industrial growth cells in Taupiri, Ngaaruawaahia and Horotiu included in Waikato 2070. Water and wastewater infrastructure within future development areas are typically responsibility of the developer through the subdivision process. Therefore, an assessment of water and wastewater infrastructure within the development areas has not been undertaken.

The existing water network infrastructure was assessed by HAL against the levels of service (LoS) specified in the WDC Water Modelling Guideline specification, which are summarised below:

Table 4-1: WDC Level of Service Requirements

Parameter	Level of Service	Level of Service Requirement
Minimum pressure (on-demand)	20m	Pressure at point of supply to on-demand residential lots
Minimum pressure (restricted supply)	10m	Pressure at point of supply to restricted rural supply
Maximum pressure	80m	Pressure at point of supply preferably between 40-60m
Maximum velocity	2 m/s	Under peak flow conditions
Maximum headloss	5m/km	Under peak flow conditions
Fireflows	FW2 FW3 FW4	As outlined in SNZ PAS 4509 – minimum FW2 residential, FW3/FW4 where specifically required. Minimum 10m residual pressure availability

In addition, the following was also reviewed:

- Overall reservoir storage, based on 24 hrs and 48 hrs of average day demand
- Security of supply based on pipe criticality
- Opportunities for optimising pressure management to target non-revenue water (NRW) reduction

The HAL review included actual and future scenarios based on the population and water demand projections.

4.1.2 Ngaaruawaahia/Taupiri/Horotiu

In general, the hydraulic modelling assessment showed that the network performs well under existing and future demand. The results revealed some issues with the existing infrastructure in both current (2025) and future (2050) scenarios. These are summarised in Table 4-2.

Table 4-2: Summary of Ngaaruawaahia Network System Performance Issues

Issue	Zone	Location	Comment	Upgrade Proposed?
Low Pressure	Horotiu Boosted	Kay Road	Pressure may drop below 15m due to long stretch of rural pipework supply.	Yes
Low Pressure	Taupiri-Hopuhopu	Tainui College	Pressure may drop below 10m at peak demand, but it is assumed there is a private booster pump	No
Low Pressure	Ngaaruawaahia Central	Kelm Road	Pressure may drop below 10m under future scenario. Upgrade will be required as the development area progresses – Note this area is not included as a growth cell within Waikato 2070.	Yes
High Pressure	Horotiu Boosted	Horotiu Boosted Zone	Pressure currently boosting to 65m, opportunity to be optimised to reduce pipe burst risk	Operational only
High Headloss	Ngaaruawaahia Central	Ngaaruawaahia WTP	240m of 300mm CI (1987) exceeds headloss LoS (current and future)	No (Low priority)
High Headloss	Taupiri-Hopuhopu	Hopuhopu Reservoir	550m of 200mm MPVC (2009) exceeds headloss LoS (current and future)	Yes
High Headloss	Horotiu Boosted	River Road	1.5km of 80mm PVC (1991) exceeds headloss LoS (current and future)	Yes
High Headloss	Ngaaruawaahia Central	Various	Increased headlosses in Ngaaruawaahia Central under future development scenario	No
High Headloss	Taupiri-Hopuhopu	River crossing	560m of 150mm HDPE (2017) exceeds headloss LoS when operating emergency supply to Taupiri (future scenario only)	Yes
Fireflow	Ngaaruawaahia Central	Duke Street	Not able to supply FW2 (25 L/s) residential fireflows	Yes
Fireflow	Ngaaruawaahia Central	Kia Toa Street	Not able to supply FW2 (25 L/s) residential fireflows	Yes
Fireflow	Ngaaruawaahia Central	Coach Street - Havelock Road	Not able to supply FW2 (25 L/s) residential fireflows	Yes
Security of Supply	Horotiu Boosted	Whole zone	Risk due to single supply from Central Districts reservoir servicing the entire zone. In an unplanned outage, River Road boundary valve could be opened, however not sufficient HGL for all customers in zone	Operational only (rezoning from HCC network)
Reservoir Storage	Taupiri-Hopuhopu	Hopuhopu Reservoir	Hopuhopu new reservoir not able to supply 48 hrs of ultimate (2050) average demand. Assumes old reservoir is decommissioned	Yes

Following the identification of the LoS deficiencies, a number of upgrade options were evaluated to resolve the current deficiencies, and sized to provide resilience to the ultimate network scenario. The options were discussed with WDC Operations and Planning teams in a workshop. Table 4-3 below provides a summary of the capital upgrade projects that were recommended to be implemented. Details of the proposed capital upgrade projects are shown in Appendix A.

Table 4-3: Proposed Ngaaruawaahia Network Capital Upgrade Projects

Project	LoS Failure	Proposed Upgrade	Year Required	Required to service growth?
CAP8 – Upgrade River Road Main	Low pressures Kay Road	2200m of 150mm ID main	2022	No
CAP9 – Install PSV on Hopuhopu New Reservoir Inlet/Outlet	High headloss Hopuhopu Reservoir Inlet/Outlet main	Install 200mm PSV + flow meter	2022	No
CAP10 – Decommission Hopuhopu Old Reservoir	Low turnover Hopuhopu reservoir	Decommission Hopuhopu old reservoir	2022	No
CAP11 – Upgrade Kelm Road Supply Mains	Low pressures Kelm Road	810m of 150mm ID main 1,050m of 100mm ID main	2030	Yes – Duke St watermain upgrade only, further upgrades if Kelm Rd area is identified as a growth cell in future
CAP12 – Upgrade Taupiri Supply Main	High headloss supplying Taupiri	2,700m of 250mm ID main	2030	Yes
CAP13 – Ngaaruawaahia Fireflow Upgrades	FW2 failures	Various main upgrades ¹	2022	Potentially in part due to infill
CAP14 – New Reservoir	Taupiri township 48hr storage	New reservoir at Hopuhopu or alternative location such as closer to Taupiri	2050	Yes

Refer to Appendix A for maps of upgrades required to service growth.

4.1.3 Te Kowhai

Te Kowhai is not currently serviced by a public water supply. The servicing strategy (BTW Company, 2022) identified key infrastructure required to provide reticulated drinking water to Te Kowhai. The assessment was based on previous modelling reports that assessed the feasibility of servicing Te Kowhai from the Ngaaruawaahia-Huntly network. Water supply servicing from the HCC network was not assessed in the report. The servicing option assessment considered inputs from modelling work done for the Ngaaruawaahia network (HAL, 2022) to understand the effects on the existing network when supplying Te Kowhai.

The proposed infrastructure includes the key items described below:

- Connection into DN250 main from the Ngaaruawaahia water supply network at the intersection of Horotiu Road and Park Road.
- New 2,800m³ reservoir capacity (24.5m diameter x 6.0m height), based on 2045 two days of average daily demand plus 1 hr FW3 (50 L/s) fire flow event, located within the Te Kowhai West growth cell. Two reservoirs of 1,400 m³ each is likely to be a better solution to avoid water quality issues. These are assumed to be provided in 2 stages.
- New 7.2km DN250 PE100 PN12.5 reservoir water filling line.

¹ HAL report suggests duplication of mains to meet the fireflow requirements. An alternative solution could be upsize existing mains, depending on the age and condition of them.

- New water supply trunk reticulation from the proposed reservoir to Te Kowhai (refer Table 4-4).
- Pump station at the reservoir outlet likely required to provide adequate pressure to the reticulated network.
- New chlorine dosing system at Te Kowhai reservoir likely required.
- New flow control valve (or pressure sustaining valve) at Te Kowhai reservoir inlet to restrict flows into the reservoir to allow refills of the Central Districts reservoir.
- Upgrade of 2.1 km of DN200 MPVC watermain along Horotiu Road is likely required for 2050 future scenario. For cost estimate purposes, it is assumed a new dedicated DN315 PE100 PN12.5 will be installed.

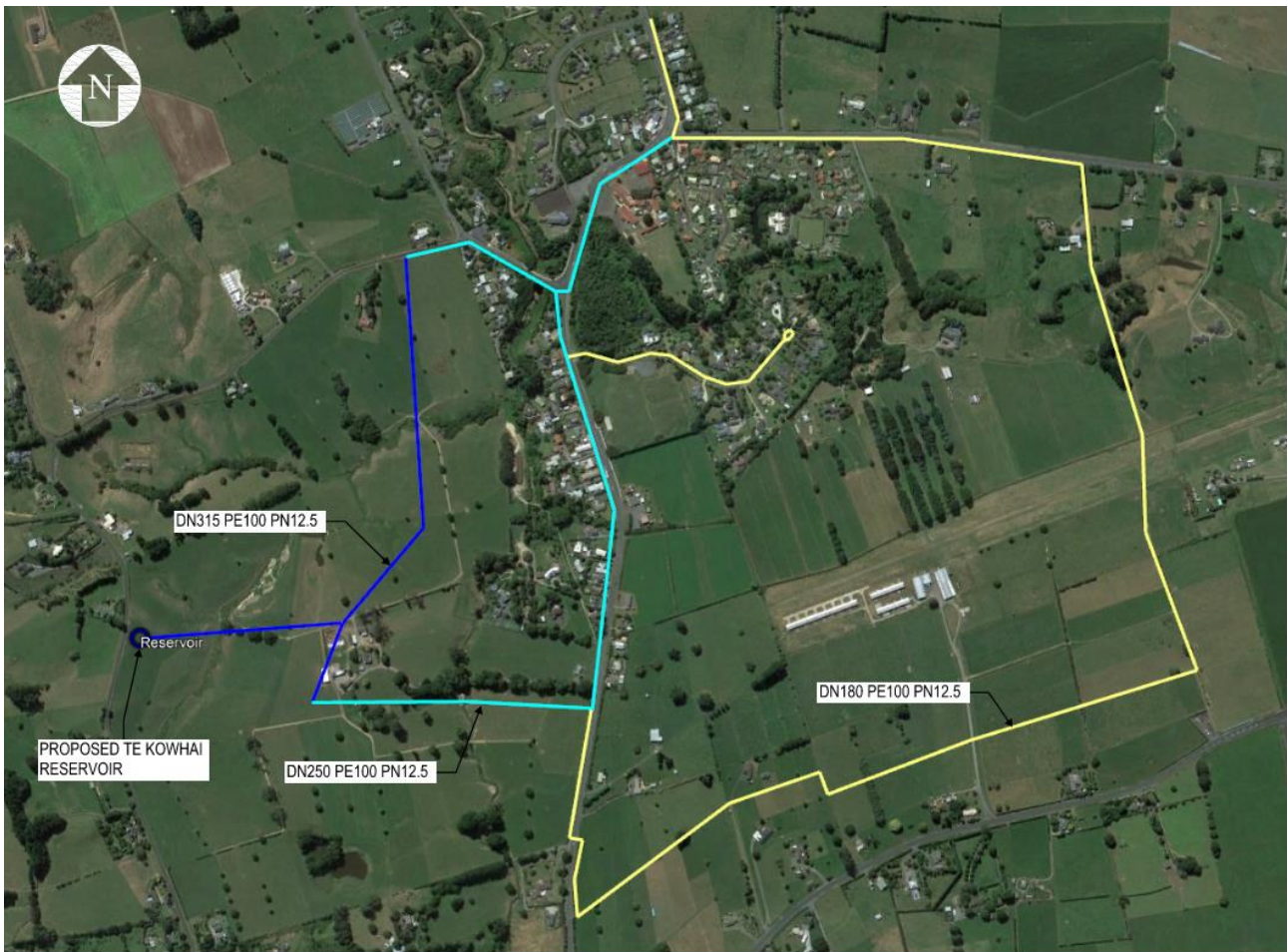


Figure 4-1: Te Kowhai Proposed Trunk Reticulation Network (image from Google Earth)²

Table 4-4: Proposed Te Kowhai Trunk Water Reticulation Network

Pipe	Approximate Length
DN315 PE100 PN12.5	1,200m
DN250 PE100 PN12.5	1,900m
DN180 PE100 PN12.5	4,000m

² Length and pipe diameters were not specified in BTW report. Figure 4-1 is an estimate based on Figure 3.9 and drawing 220289-00-02-A of BTW report

4.2 Wastewater Assessment

The Central Districts wastewater model was built and calibrated in DHI Mike Urban in 2016. The model was used to undertake a range of system performance analysis for the existing (2016) and future (2025 and 2045) scenarios. The results of the system performance include:

- Dry Weather System Performance Network hydraulic capacity is sufficient for the existing and future dry weather flows. Infiltration and exfiltration is not considered to be a significant issue, however some catchments (FM02, FM03 and FM05) appear to have moderate infiltration or poor to very poor implied asset condition.
- Approximately 76% of the network is expected to experience low velocities (less than 0.6m/s) under existing peak dry weather conditions. These pipes are at a higher risk of siltation.
- The emergency storage capacity at most local pump stations exceeds six hours of average dry weather flow (note – the RITS now specifies 8 hours storage required).
- Wet Weather System Performance Network hydraulic capacity and overflows during wet weather were assessed for the 6 months, 1 year, 2 year and 5 year ARI storm events. Downstream constraints, particularly pump stations, pose the greatest risk to pipe capacity with up to 45% of the network being surcharged in the 2045 5 year ARI storm.
- Pump stations appear to pose significant constraints, with many pump stations have a pump start level above the invert of the upstream pipe. Uncontrolled overflows are predicted in several areas in Ngaaruawaahia and Horotiu. Some of these issues, such as at Waingaro Rd and Thomson St, have been confirmed by operational staff.
- All catchments exhibit relatively low levels of inflow and infiltration when compared against the standards set out in the WSA Management of Wastewater System Infiltration and Inflow. This implies it would typically not be cost effective to remedy the network through an I/I reduction programme. However, the I/I does have a significant impact on the network capacity largely due to pump stations being under-capacity and backflows surcharging the network.

A review of the wastewater model by HAL in 2018 identified some issues with the model calibration, inconsistencies in the model, missing GIS data and some unsuitable growth area assumptions. Projects undertaken since 2016 have not been taken into account for the modelling.

4.2.1 Methodology

The wastewater high level design was based on the Regional Infrastructure Technical Specifications (RITS) with the following features:

- Where possible planned/committed infrastructure has been incorporated in the options development.
- The alignment of proposed routes has been kept within the road corridor where possible/practical.
- It has been assumed that an air valve will be required every 600 m for a rising main.
- For gravity pipe sections, the average measured grade has been assumed to calculate the required pipe size.
- The population equivalent data were used to calculate the ADF, PDF and PWWF design flows in accordance with RITS Equation 5.1, 5.2 and 5.3 respectively.
- The existing and future development areas in hectares (ha), were used to calculate the PDF and PWWF design flow projections.

4.2.2 Ngaaruawaahia/Taupiri/Horotiu

The Northern Metro DBC considered the transfer mains to connect Taupiri, Ngaaruawaahia, Te Kowhai and Horotiu to the Pukete WWTP. The preferred option is illustrated in Figure 4-2. The key projects are:

- New pump station at Taupiri (T-SPS) with rising main to Ngaaruawaahia WWTP site
- Upgrade of Ngaaruawaahia WWTP pump station (N-SPS) and installation of rising main to Horotiu

- Upgrade of Horotiu POAL pump station and installation of rising main to Pukete WWTP
- New pump station at Te Kowhai with rising/gravity main to Horotiu.

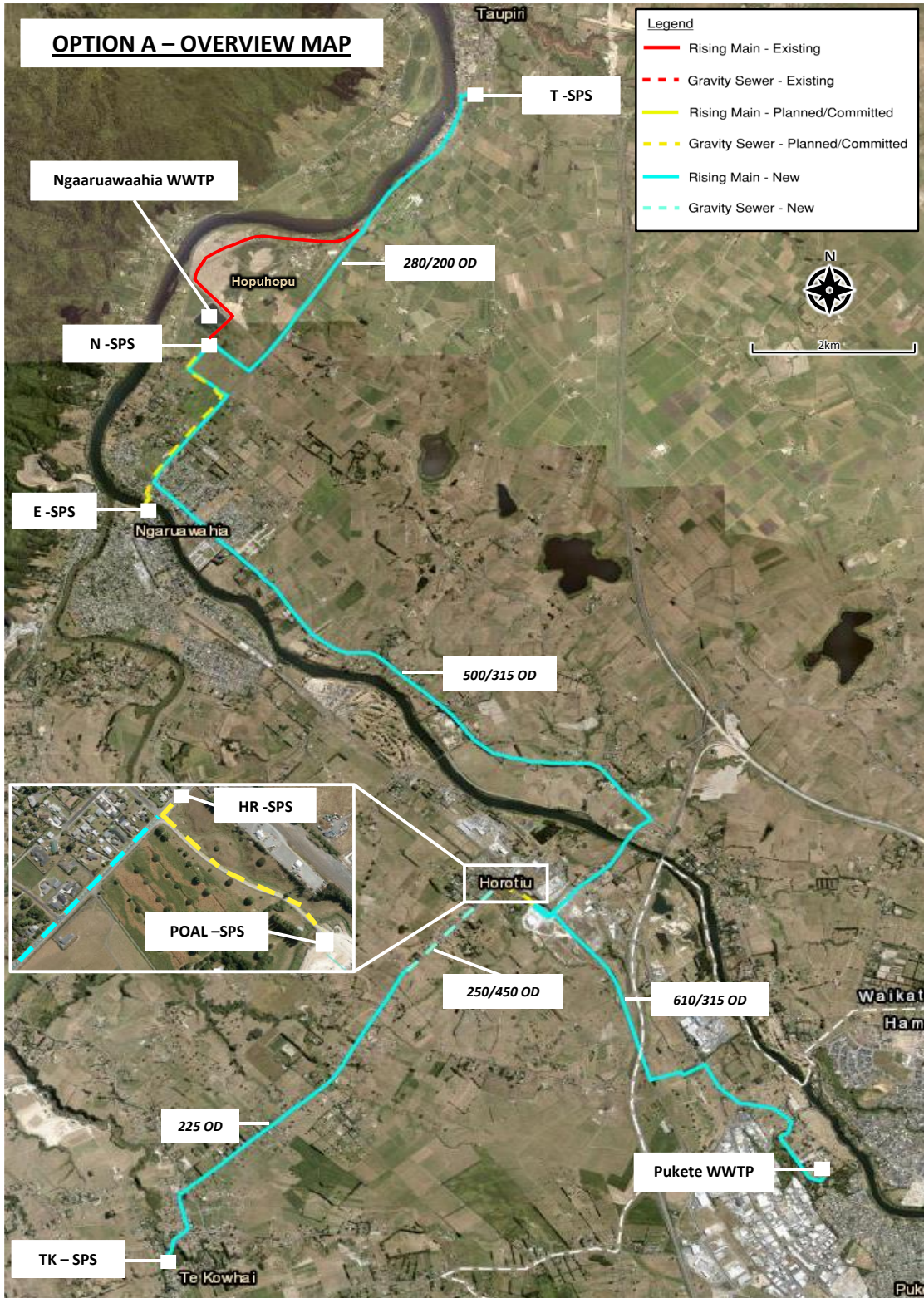


Figure 4-2: Northern Metro DBC Preferred Option Overview

Upgrades within the towns were not considered in the DBC. To service the growth areas, the following additional wastewater upgrades are required (refer Figure 4-3):

- Starr Road – extend a gravity main along Starr Rd to connect up to the new gravity main along Great South Road (this has been designed at suitable depth for this connection and also a potential connection at Kerr Road).
- Saalbrey Road – provide a new pump station and rising main to connect to the Thomas Road wastewater pump station. This route has been selected as the existing network west of Great South Road has very limited capacity, and the Thomas Road pump station would have capacity available once the Horotiu wastewater is diverted to Pukete WWTP.
- River Road – it is likely to be feasible to extend a gravity main along River Road to service this growth area, however, this is expected to be post 2050 so has not been included in cost estimates.

Only limited infill was allowed for in the 2016 Wastewater Model, however, indications were that many pipes to the west of Great South Road were under capacity during wet weather and any infill would make this worse. Recent projects including pump station storage and upgrade of the rising main from the Waikato Esplanade pump station are likely to have improved capacity, particularly in the areas east of Great South Road. Updated modelling is required to confirm upgrades due to infill growth.

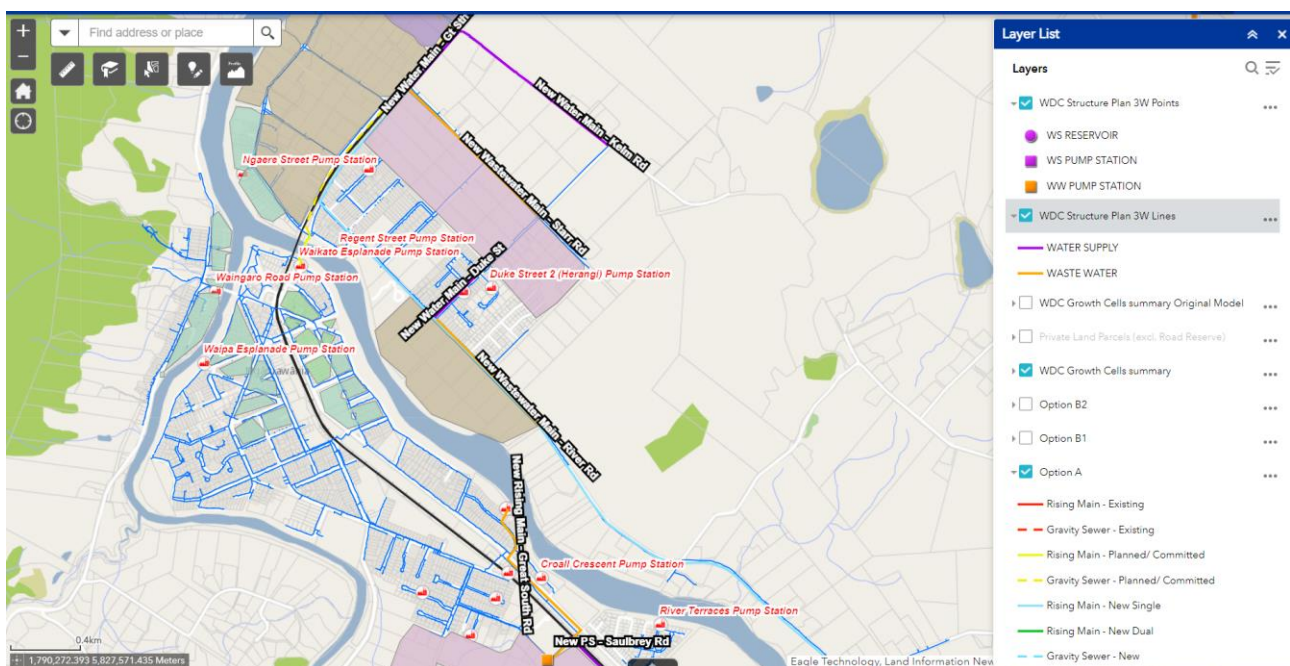


Figure 4-3: Ngaaruawaahia Growth Projects

4.2.3 Te Kowhai

The servicing strategy (BTW Company, 2022) identified key infrastructure required to connect all existing Te Kowhai properties and the new growth areas (including Air Park) to a reticulated wastewater system. This built on the DBC project recommendations.

The proposed infrastructure includes the key items described below in addition to the transfer pump station (refer Northern Metro DBC):

- Trunk mains around Te Kowhai 17pprox..1900 m of 150mm diameter pipe.

4.3 Growth Cell Summary

The priority water and wastewater upgrades required to service each growth cell have been outlined in Table 4-5. This list is the major network upgrades only and does not include the internal servicing of the cells.

Table 4-5: Growth Cell Summary

Area	Indicative start date	Projects Required for Growth Cells	
		Water	Wastewater
Taupiri			
Kainui Rd	2030	New reservoir and supply main (incl. booster pump station)	New PS and rising main to WWTP
Taupiri West Industrial	2050	Not included in 2022 modelling	New PS and rising main to WWTP
Ngaaruawaahia / Hopuhopu			
Infill west of Great South Rd	2023-30	Fireflow upgrades	Upgrades indicated in 2016 modelling. Model update required to confirm
Infill east of Great South Rd	2023-30	Fireflow upgrades	TBC following model update
River Rd	2050	None	Extend WW gravity main along River Rd
Saulbrey Rd	2023-30	None	New PS and rising main to Thomas St
Starr Rd	2030	Duke St water main upgrade	New gravity main along Starr Rd
Galbraith St	2023	None	None
Business Park (adjacent to Ngaaruawaahia WWTP)	2030	None	Will connect up to new WW main to WWTP, connection location TBC
Hopuhopu	2025	New reservoir and supply main	Free up capacity in existing network through new Taupiri rising main
Kelm Rd	Not in Waikato 2070	Refer HAL report	Not allowed for
Horotiu			
Kernott Rd	2020	TBC once demand confirmed and modelling undertaken Horotiu Stage 2 watermain upgrade likely to be required	Transfer PS and rising main from Horotiu to Pukete (or alternatively Ngaaurawaahia WWTP)
Horotiu Industrial Park	2023	TBC once demand confirmed and modelling undertaken Horotiu Stage 2 watermain upgrade likely to be required	Transfer PS and rising main from Horotiu to Pukete (or alternatively Ngaaurawaahia WWTP)

Area	Indicative start date	Projects Required for Growth Cells	
		Water	Wastewater
Te Kowhai			
TK Central	2030	Supply line from Horotiu, new TK reservoir and trunk mains	Transfer pump station to Horotiu with rising/gravity main, local trunk mains. Transfer PS and rising main from Horotiu to Pukete WWTP or Ngaaruawaahia WWTP.
TK Air Park			
TK West	2030		

5 Cost Estimates

5.1 Basis for Cost Estimating

Costs were developed using unit rates where available. Unit rates were provided by Beca quantity surveyors based on similar type of projects.

The following items have been included in the capital costs:

- Civil works
- Mechanical and electrical installation
- Instrumentation and control
- Project costs (Preliminary + General, contractor margins) – 20%
- Consultant fees (Investigation/Design/Engineering) – 13%
- Risk/contingency allowances – 30%
- Construction supervision and management/overhead costs – 10%
- Procurement costs – 3%

The following items have been excluded from the comparative capital costs:

- Legal fees
- Client insurances
- Escalation after 1st quarter 2023
- Goods and Services Tax.

At the time of writing, no Concept Design has been prepared for the proposed capital works. The estimates are based on the indicative alignments presented in this report. A conceptual design of the preferred options will need to be prepared to confirm the estimated capital and operating costs. We have allowed for an estimating tolerance to account for general unknowns in the design and for any discrepancies in the design information prepared to date. The cost estimates are deemed to be Class 5 estimates as per the AACE Cost Estimate Classification System and have an expected accuracy range of -30% / +50%.

Contingencies have been allowed for due to uncertainties which may impact design development and construction which include:

- Reinstatement required and service complications in more developed areas
- Installation for pipelines assumes in road with 0m-2.5m installation trench depth, gravity pipes in certain sections may require more depth.

5.2 Capital Cost Estimates

Table 5-1 summarises the capital cost for the upgrades required to service growth over the next 30 years. The detail is provided in Appendix B. The costs for the new wastewater mains to be implemented as part of the Metro Wastewater DBC project are taken from the Preferred Option Technical Report dated December 2022.

Table 5-1: Capital Cost Estimate for Growth Projects – Waikato 2070 Growth Zones

Capital Project	Water	Wastewater
Ngaaruawaahia/Horotiu		
OD180 Duke Street Watermain	\$ 340,000	
DN300 Starr Road Gravity Sewer		\$ 1,187,000
OD160 Saulbrey Road Sewer Rising Main		\$ 866,000
Saulbrey Road Sewer Pump Station		\$ 979,000
Upgrade N-SPS and new SRM to Horotiu – Stage 1*		\$ 45,350,000
Upgrade Horotiu POAL SPS and SRM to Pukete WWTP – Stage 1*		\$ 33,910,000
Taupiri/Hopuhopu		
OD315 Great South Road Watermain	\$ 3,153,000	
New Reservoir (location TBC)	\$ 5,432,000	
Taupiri to Ngaaruawaahia Sewer Pump Station and Rising Main (including emergency storage) – Stage 1*		\$ 11,140,000
Te Kowhai		
New Te Kowhai Reservoir – Stage 1	\$ 5,070,000	
New Te Kowhai Reservoir – Stage 2	\$ 5,070,000	
OD250 Ngaaruawaahia to Te Kowhai Watermain	\$ 6,879,000	
Te Kowhai Trunk Water Reticulation Mains	\$ 6,379,000	
Booster Pump Station, Valves, Hydrants, Chlorine Dosing	\$ 3,327,000	
OD250 Horotiu Watermain (Stage 2)	\$ 2,006,000	
Te Kowhai Trunk Sewer Reticulation Mains		\$ 1,494,000
Te Kowhai SPS and Sewer Rising Main to Horotiu		\$ 9,590,000

Note * As per Metro WW DBC preferred option

6 Recommendations

The following items are recommended for further investigation or discussion:

- Consider a longer design horizon for the trunk watermain and sewer rising main connecting Te Kowhai and Horotiu. The structure plan considers growth cells up to 2050, but these assets may need to be sized for a longer design horizon.
- Review how future commercial/industrial zones in Taupiri, Ngaaruawaahia and Horotiu excluded in the HAL analysis will influence the future performance of the water network.
- Undertake wastewater model update to identify Infill zone impacts in Ngaaruawaahia.
- Confirm staging of Taupiri wastewater rising main and requirements for Hopuhopu development.

7 References

Beca. (2022). *Northern Metro Wastewater Detailed Business Case - Preferred Option Technical Report*.

BTW Company. (2022). *Te Kowhai Water Supply and Wastewater Servicing Options Assessment (Final Draft)*.

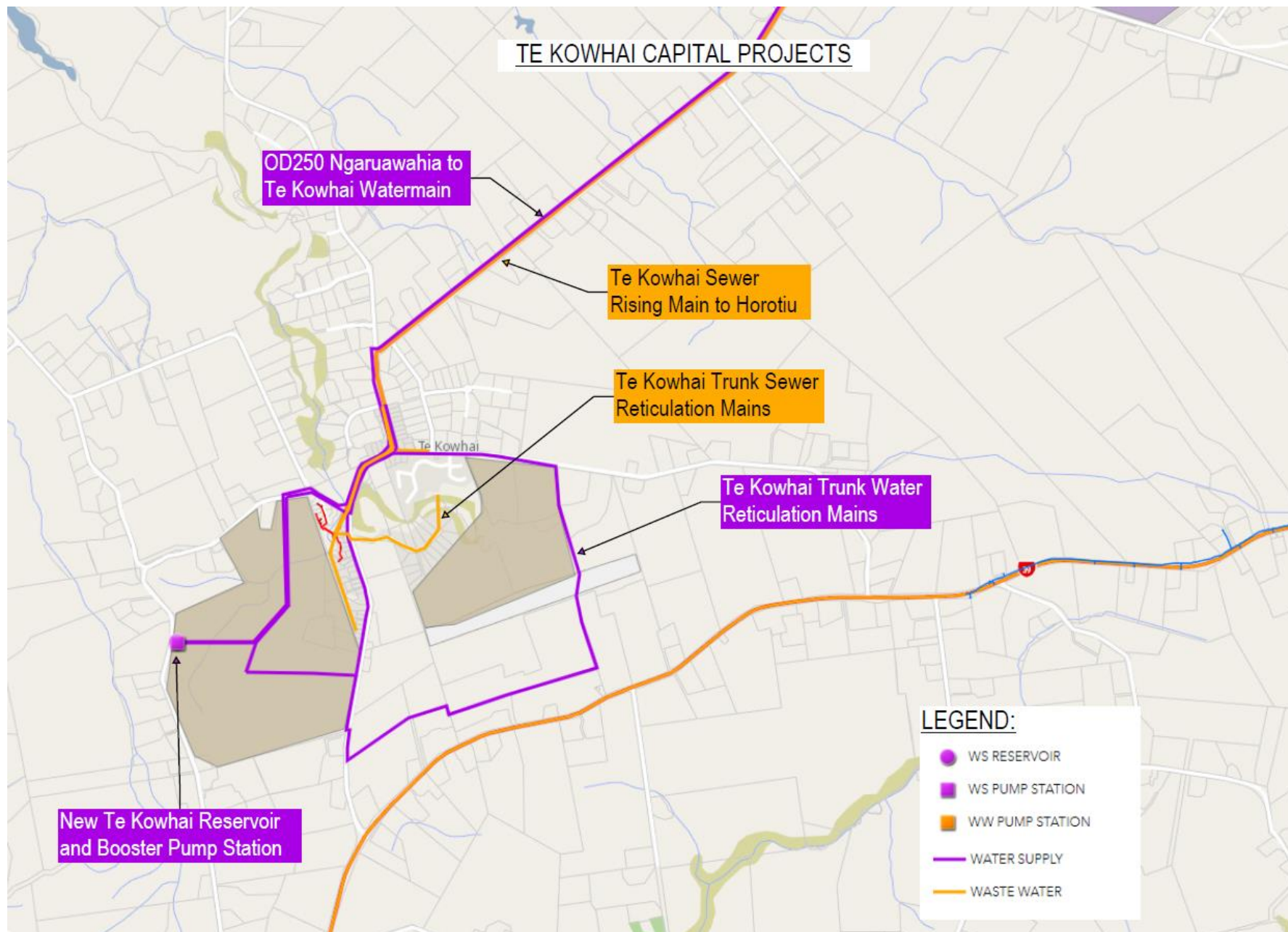
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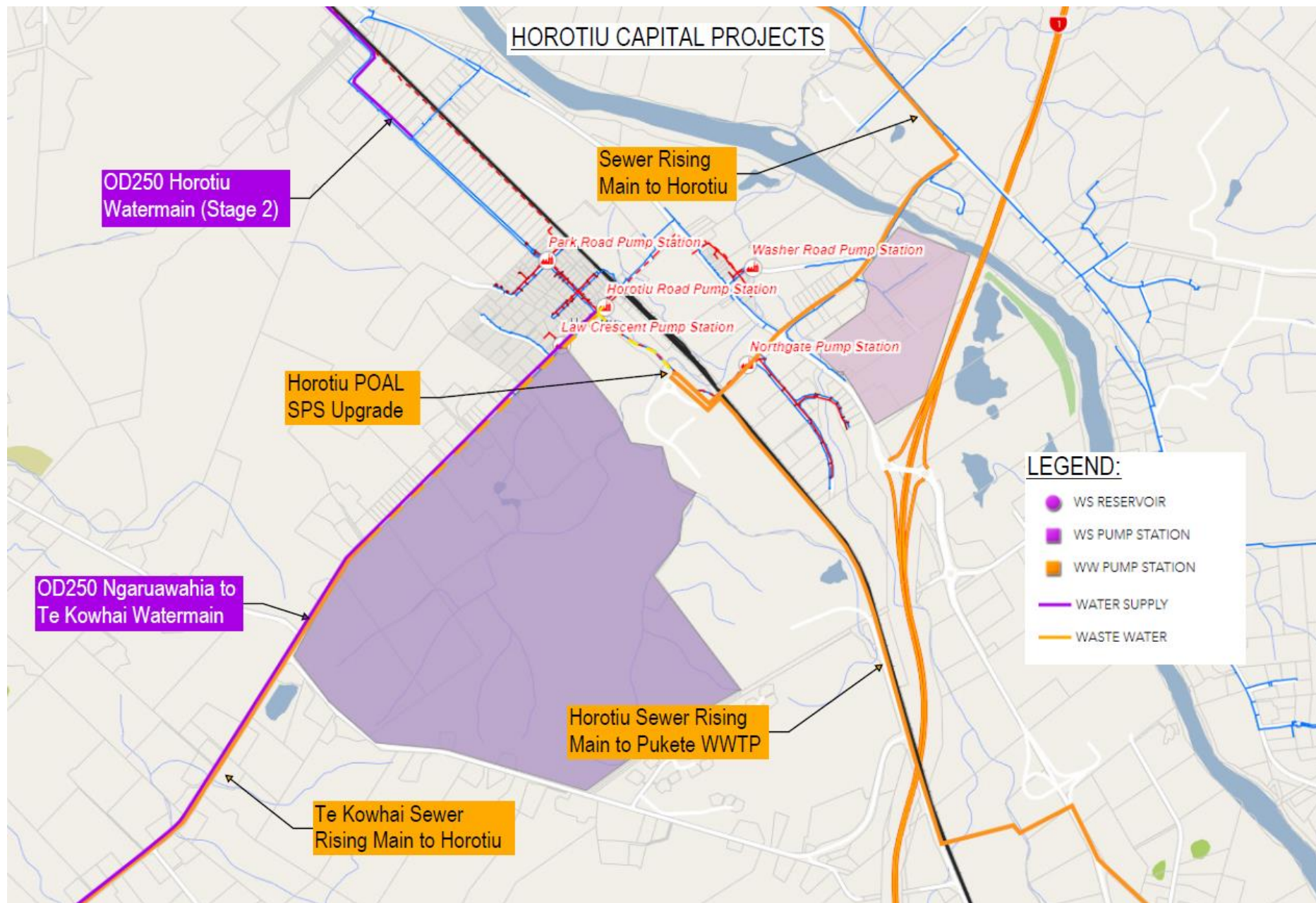
HAL. (2022). *Te Kowhai Water Servicing Strategy - Modelling Results (Aug 2022)*.

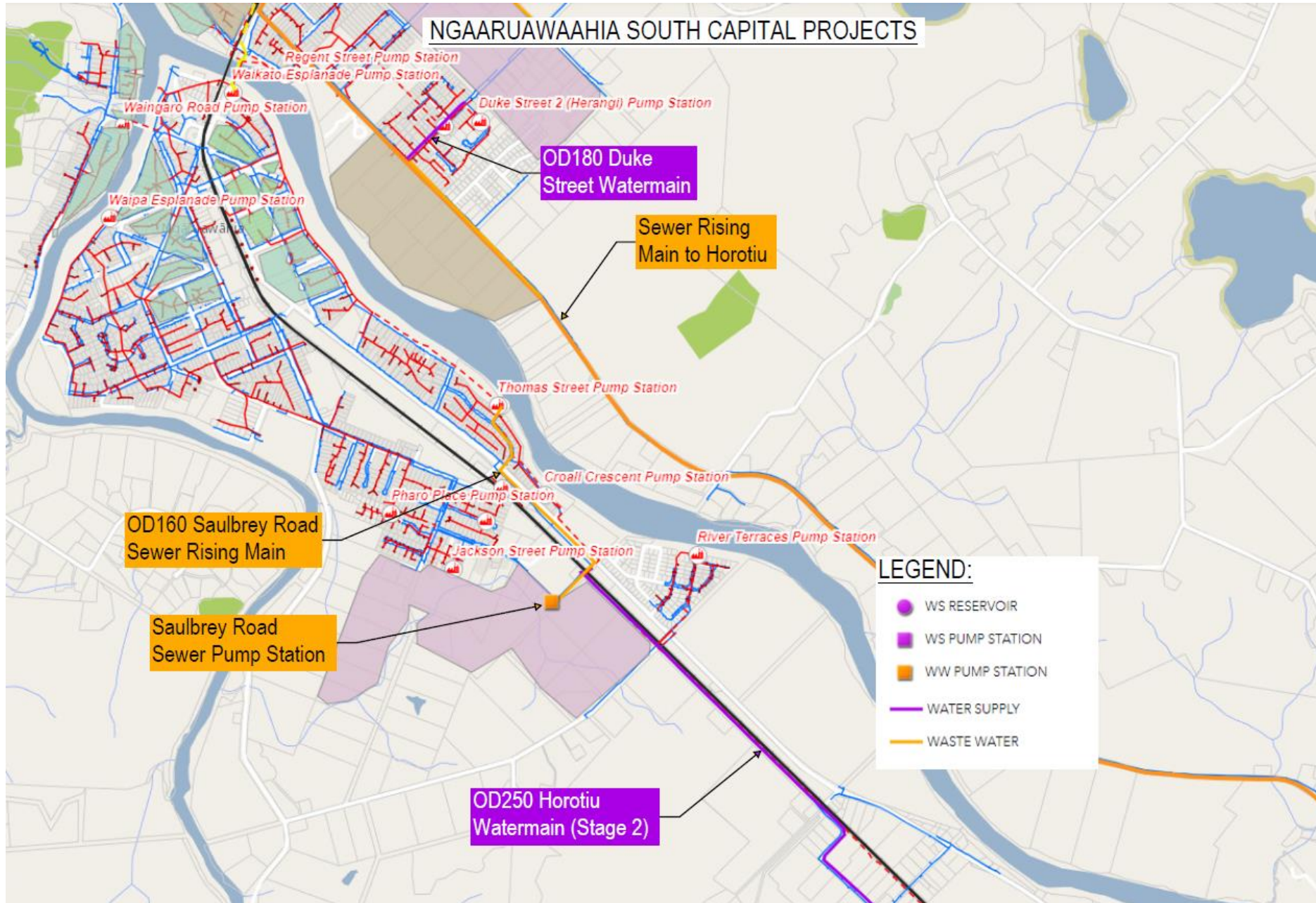
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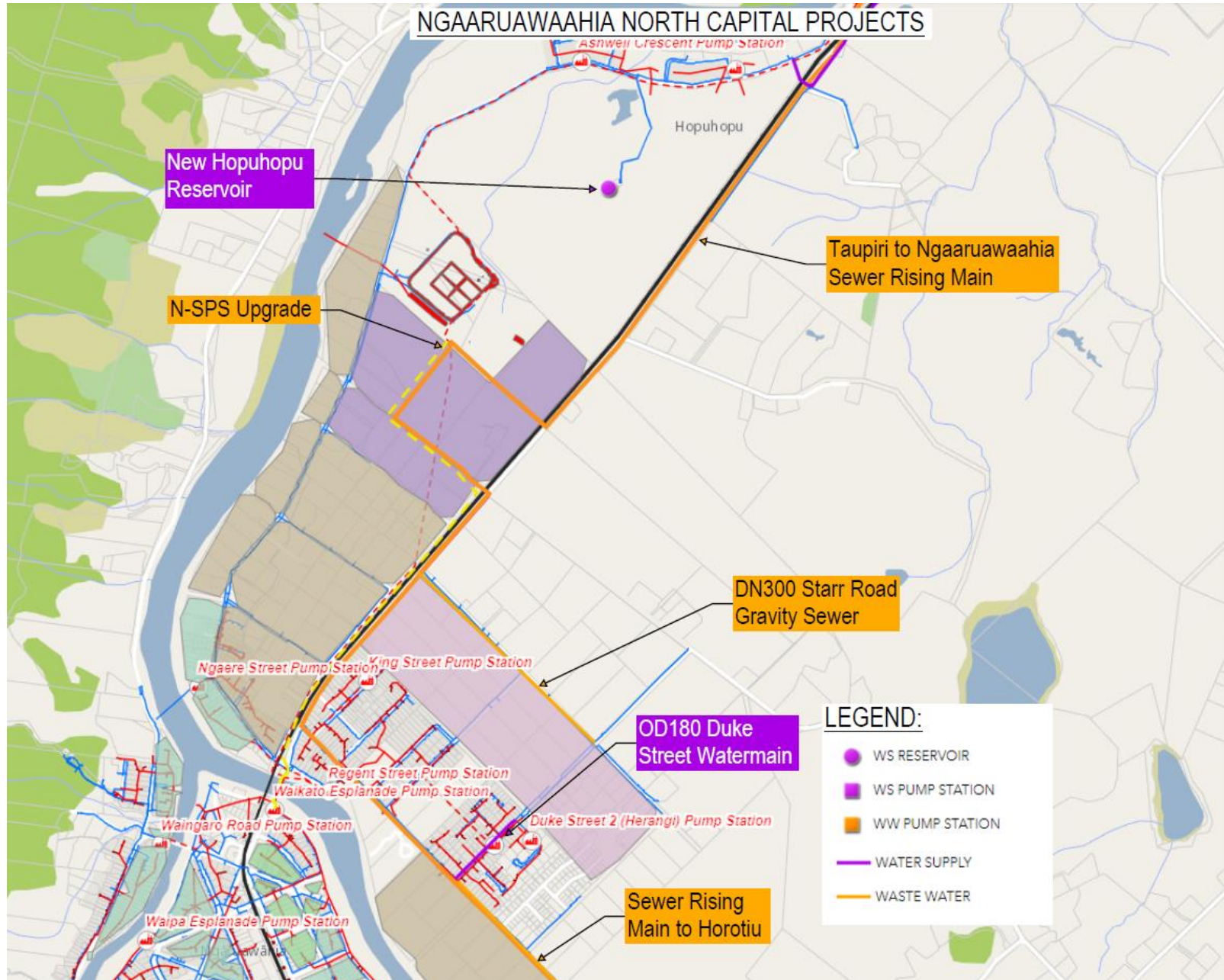
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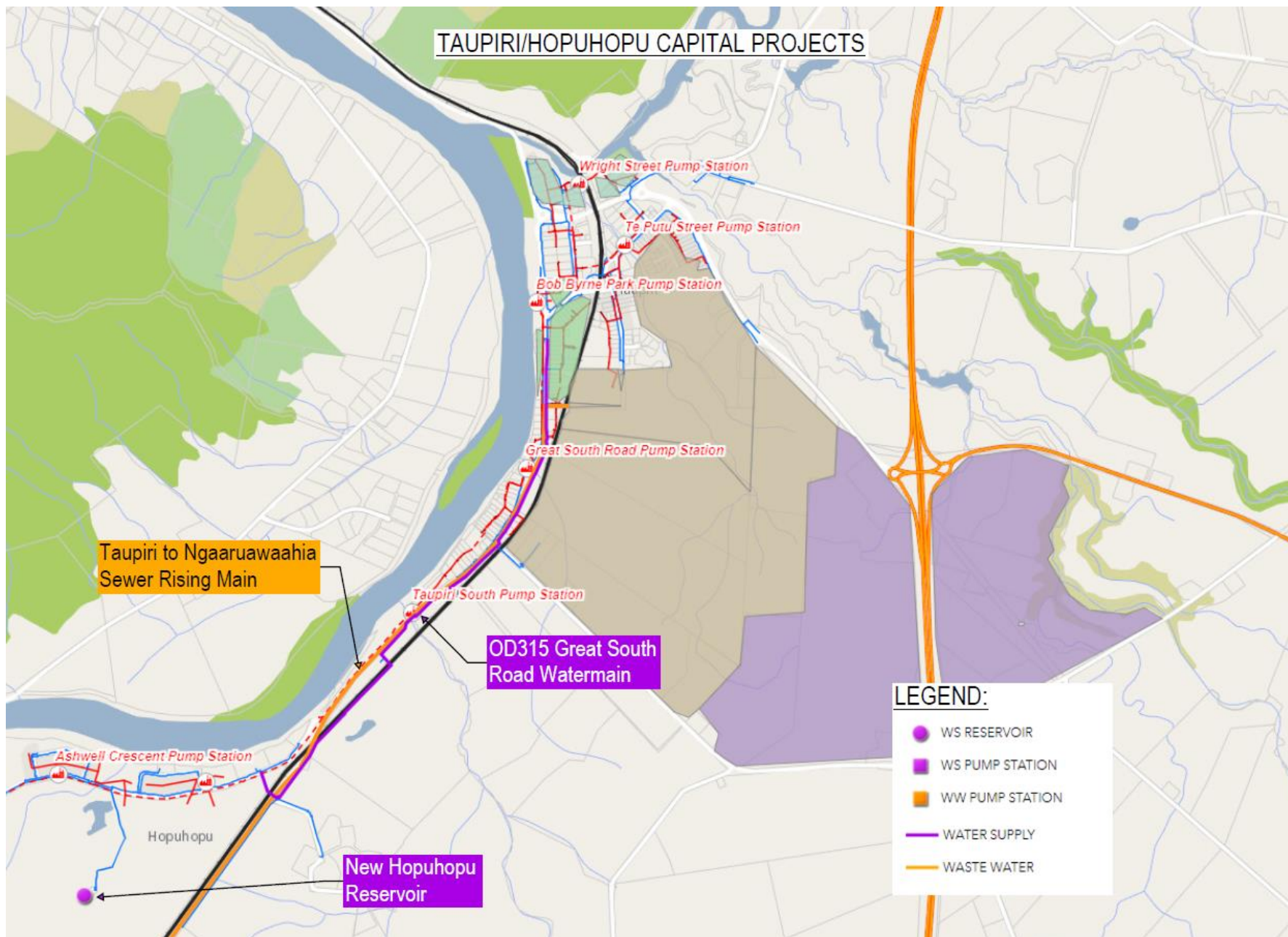
Appendix A – Proposed Capital Projects











B

Appendix B – Cost Estimates

CAPITAL COST ESTIMATE - Ngaruawahia Water						
Project	Item	Description	Quantity	Units	Rate \$	Subtotal \$
<i>New Pipes - All PE100 PN12.5, in road, 1m cover</i>						
CAP11	1	OD180 PE100 PN12.5 along Duke Street (replaces DN100 AC)	380	m	\$ 573	\$ 217,873
CAP11	2	OD180 PE100 PN12.5 along Great South Road (new)	430	m	\$ 538	\$ 231,215
CAP11	3	OD125 PE100 PN12.5 along Kelm Road (replaces OD63 MDPE)	1050	m	\$ 597	\$ 627,281
CAP12	4	OD315 PE100 PN12.5 along Great South Road (replaces DN150 PVC)	2700	m	\$ 733	\$ 1,978,371
CAP14	5	New Hopuhopu reservoir (1500 m3) - assume steel	1	No.	\$ 2,775,000	\$ 2,775,000
Provisional Cost						
		Provisional allowance for hydrants and valves (TBC with client)	1	PS	\$ 305,474	\$ 305,474
Net Construction Cost Estimate						\$ 6,135,214
		Main Contractor On-site overheads (P&G)	20%	%	\$ 6,135,214	\$ 1,227,043
Gross Construction Cost Estimate						\$ 7,362,257
		Design Development Contingency	10%	%	\$ 7,362,257	\$ 736,226
		Construction Contingency	20%	%	\$ 8,098,482	\$ 1,619,696
Total Construction Budget						\$ 9,718,179
		Professional Fees	13%	%	\$ 9,718,179	\$ 1,263,363
		Procurement Fees	3%	%	\$ 9,718,179	\$ 291,545
		Client-owned project costs	10%	%	\$ 7,362,257	\$ 736,226
Total Expected Concept Capital Cost Estimate						\$ 12,010,000

CAPITAL COST ESTIMATE - Ngaruawahia Wastewater						
Project	Item	Description	Quantity	Units	Rate \$	Subtotal \$
	1	Supply and install PE100 PN16 rising main DN280 PN16	4600	m		Refer Metro DBC
	2	Stage 1 PS - Supply and installation of 3.5m diameter, 5-6m deep pre-fabricated GRP wet well, including cover slab & McBerns type cover. Supply and installation of 3 x submersible sewage pumps; 45 kW - 57 L/s and 46m TDH.	1	No.		Refer Metro DBC
	3	Emergency Storage; 474m ³ , allow for buried GRP tanks manifolded.	1	No.		Refer Metro DBC
	4	Starr Rd 300mm Gravity Main PVC	1200	m	\$ 626	\$ 751,752
	5	Saulbrey Rd Rising main 160OD PE	1050	m	\$ 540	\$ 567,242
	6	Saulbrey Rd pump station - assume small standard RITS PS 10 L/s	1	No.	\$ 500,000	\$ 500,000
	7	River Rd WW main extension - not costed as likely post 2050				
		Provisional Cost				
		None				\$ -
		Net Construction Cost Estimate				\$ 1,818,994
		Main Contractor On-site overheads (P&G)	20%	%	\$ 1,818,994	\$ 363,799
		Gross Construction Cost Estimate				\$ 2,182,792
		Design Development Contingency	10%	%	\$ 2,182,792	\$ 218,279
		Construction Contingency	20%	%	\$ 2,401,071	\$ 480,214
		Total Construction Budget				\$ 2,881,286
		Professional Fees	13%	%	\$ 2,881,286	\$ 374,567
		Procurement Fees	3%	%	\$ 2,881,286	\$ 86,439
		Client-owned project costs	10%	%	\$ 2,182,792	\$ 218,279
		Total Expected Concept Capital Cost Estimate				\$ 3,561,000

CAPITAL COST ESTIMATE - Te Kowhai Water						
Project	Item	Description	Quantity	Units	Rate \$	Subtotal \$
<i>New Pipes - All PE100 PN12.5, in road, 1m cover</i>						
TK1	1	New 17.5m Diam x 6m Height Te Kowhai Reservoirs - assume steel (2x 1,400 m3)	2	No.	\$ 2,590,000	\$ 5,180,000
TK2	2	OD250 PE100 PN12.5 Ngaruawahia to Te Kowhai main along Horotiu Road	7200	m	\$ 597	\$ 4,301,352
TK3	3	OD315 PE100 PN12.5 Trunk reticulation main	1200	m	\$ 733	\$ 879,276
TK4	4	OD250 PE100 PN12.5 Trunk reticulation main	1900	m	\$ 562	\$ 1,067,363
TK5	5	OD180 PE100 PN12.5 Trunk reticulation main	4000	m	\$ 538	\$ 2,150,840
TK6	6	Booster pump station at new reservoir outlet 22L/s	1	No.	\$ 820,000	\$ 820,000
TK7	7	Chlorine dosing system at Te Kowhai reservoir	1	No.	\$ 75,000	\$ 75,000
TK8	8	OD250 PE100 PN12.5 along Horotiu Road	2100	m	\$ 597	\$ 1,254,561
TK9	9	Flow control valve at Te Kowhai reservoir inlet	1	No.	\$ 25,000	\$ 25,000
Provisional Cost						
		Provisional allowance for hydrants and valves (TBC with client)	1	PS	\$ 965,339	\$ 965,339
Net Construction Cost Estimate						\$ 16,718,731
		Main Contractor On-site overheads (P&G)	20%	%	\$ 16,718,731	\$ 3,343,746
Gross Construction Cost Estimate						\$ 20,062,477
		Design Development Contingency	10%	%	\$ 20,062,477	\$ 2,006,248
		Construction Contingency	20%	%	\$ 22,068,725	\$ 4,413,745
Total Construction Budget						\$ 26,482,470
		Professional Fees	13%	%	\$ 26,482,470	\$ 3,442,721
		Procurement Fees	3%	%	\$ 26,482,470	\$ 794,474
		Client-owned project costs	10%	%	\$ 20,062,477	\$ 2,006,248
Total Expected Concept Capital Cost Estimate						\$ 32,726,000

CAPITAL COST ESTIMATE - Te Kowhai Wastewater						
Project	Item	Description	Quantity	Units	Rate \$	Subtotal \$
	1	DN225 PN16 PE rising main	4500	m		Refer Metro DBC
	2	DN250 PN10 PE Gravity main	1400	m		Refer Metro DBC
	3	DN450 PN10 PE Gravity main	450	m		Refer Metro DBC
	4	Stage 1 Pump Station - Supply and installation of 3 x submersible sewage pumps; 22 kW - 25 L/s and 54m TDH.		No.		Refer Metro DBC
	5	Emergency Storage; 265m ³ , allow for buried GRP tanks manifolded.		No.		Refer Metro DBC
	6	Trunk wastewater mains within township 150mm NB PVC (incl manholes)	1900	m	\$ 522	\$ 991,382
		Net Construction Cost Estimate				\$ 991,382
		Main Contractor On-site overheads (P&G)	20%	%	\$ 991,382	\$ 198,276
		Gross Construction Cost Estimate				\$ 1,189,658
		Design Development Contingency	10%	%	\$ 1,189,658	\$ 118,966
		Construction Contingency	20%	%	\$ 1,308,624	\$ 261,725
		Total Construction Budget				\$ 1,570,349
		Professional Fees	13%	%	\$ 1,570,349	\$ 204,145
		Procurement Fees	3%	%	\$ 1,570,349	\$ 47,110
		Client-owned project costs	10%	%	\$ 1,189,658	\$ 118,966
		Total Expected Concept Capital Cost Estimate				\$ 1,941,000

Northern Business Case - Pumping and Conveyance

Comparative Concept Cost Estimate Summary

A

Ref	Description	Capital Costs - Option A		Timing Assumptions
		Most Likely Estimate	P95 Estimate	
1.0	Conveyance			
1.1	Te Kowhai to Horotiu	\$9,590,000	\$10,770,000	Construct 2030-31
1.2	Horotiu to Ngaruawahia (stage1)			Construct 2030-31
1.3	Horotiu to Ngaruawahia (stage 2)			Construct 2060-61
1.4	Taupiri to Ngaruawahia WWTP (stage 1)	\$11,140,000	\$12,660,000	Construct 2030-31
1.5	Taupiri to Ngaruawahia WWTP (stage 2)	\$7,090,000	\$8,320,000	Construct 2060-61
1.6	Ngaruawahia to Horotiu (stage1)	\$45,350,000	\$51,870,000	Construct 2030-31
1.7	Ngaruawahia to Horotiu (stage 2)	\$5,250,000	\$6,000,000	Construct 2060-61
1.8	Horotiu to Pukete WWTP (All northern flows - stage1)	\$33,910,000	\$38,670,000	Construct 2030-31
1.9	Horotiu to Pukete WWTP (All northern flows - stage 2)	\$5,810,000	\$6,650,000	Construct 2060-61
1.10	Horotiu to Pukete WWTP (Te Kowhai and Horotiu only -stage1)			Construct 2030-31
1.11	Horotiu to Pukete WWTP (Te Kowhai and Horotiu only - stage 2)			Construct 2060-61
	TOTAL ESTIMATE - Rounded	\$118,140,000	\$134,940,000	
	Construct 2030-31	\$99,990,000	\$113,970,000	
	Construct 2060-61	\$18,150,000	\$20,970,000	
	% civil and structural	95%	95%	

General Estimate Exclusions

- 0.0 Goods and services Tax (GST).
- 0.1 Incurred costs to date.
- 0.2 Fast track or accelerated programme.
- 0.3 Work outside normal working hours.
- 0.4 Costs associated with staging of the works.

0.5 Project Specific Exclusions

- 0.6 Cost escalation and impact of Forex rate changes.
- 0.7 Property costs including land purchases and easements.
- 0.8 Contaminated ground and hazardous materials.
- 0.9 Relocating existing services. Subject to further investigations
- 1.0 Power supply network upgrades. Pump station estimates assume sufficient capacity is available at site boundary.
- 1.1 Ground improvements and piling beneath pump station and other structures.
- 1.2 Architectural treatment to exterior of buildings and structures.
- 1.3 Landscaping to proposed pump station sites. Estimates includes allowances for restoring surfaces disturbed by construction works with topsoil and grass.
- 1.4 Costs of impacts associated with extraordinary global events (such as the current COVID-19 outbreak).

1.5 Assumptions

- 1.6 All quantities and dimensions are approximate and are subject to design development.
- 1.7 The basis of the estimate is the concept design information prepared by the Beca design team. This includes details for the pipelines and pump stations and approximate scheme alignment plans.
- 1.8 Elements of cost included within this estimate are based on costs from similar projects and other Beca cost benchmarks.
- 1.9 We assume that projects will be undertaken by a single 'Main Contractor' through a single contract for the project.
- 2.0 We assume that a robust tendering process will be followed and that a minimum of 3 sub-contractor tenders (where possible) are received for the project as part of the agreed procurement process.
- 2.1 We assume that all works are carried out during normal daytime working hours.
- 2.2 We assume that the Contractor will have unobstructed access to the whole site throughout the construction phase.
- 2.3 All base prices are current to 3rd quarter 2022. No allowance for future cost escalation has been included in the estimate.
- 2.4 The allowances for Professional Fees are high-level indicative allowances only and have not been based on a detailed work breakdown structure.

2.5 Expected Estimate Range:

2.6 Estimate range is an indication of the degree to which the final cost outcome for a given project will vary from the estimated cost – it is not an additional Contingency. Range is expressed as a +/- percentage range around the point of estimate after the application of contingency, with a stated level of confidence that the actual cost outcome would fall within this range. As the level of project definition increases and the tender date draws nearer, the expected range of the estimate tends to improve, as indicated by a tighter +/- range.

2.7 The estimates are deemed to be Class 5 estimates in terms of the AACE Cost Estimate Classification System guidelines. The probable accuracy range of the estimate is likely to be no better than -30% to +50%.

2.8

2.9 **Risks**

3.0 Risks with a potential cost effect include:

3.1 Design development.

3.2 Foreign exchange rates cost risk.

3.3 General cost escalation for plant, labour, and materials.

3.4 Cost associated with sequencing or staging of the works.

3.5 Ground conditions and ground water levels and temporary work requirements; geotechnical requirements.

3.6 Integration with existing infrastructure and working around existing services.

3.7 Property costs, specifically land purchase and access (easements etc.).

3.8 Costs of impacts associated with extraordinary global events (such as the current COVID-19 outbreak).

3.9 **General Considerations and Limitations.**

4.0 These estimates are solely for our Client's use for the purpose for which they were intended in accordance with the agreed scope of work. They 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 Beca has not given its prior written consent, is at that person's own risk.

4.1 The high-level cost estimates presented in this section have been developed solely for the purpose of comparing and evaluating competing options. They are sufficiently accurate to serve this purpose. We recommend that they are not used for budget-setting purposes as common elements between options may have been omitted and/or the works not fully scoped. A functional design should be undertaken if a budget estimate is required.

CONCEPT STAGE COST ESTIMATE

Northern Business Case - Pumping and Conveyance

Option A: Te Kowhai to Horotui

Supply and installation of PE Pipe, pump station and associated equipment and fittings.

Item	Unit	Quantity	Rate	Total - Most Likely	Quantity			Rate \$			Most Likely \$	
					Min	ML	Max	Min	ML	Max		
1.0 WASTEWATER RISING MAIN												
1.1	Supply and install PE100 PN16 rising main generally trenched 0-2.0m deep; including, but not limited to: welding, excavation, bedding, backfilling, and reinstatement outside road.											
1.1A	DN225 PN16	m	4,500	\$ 325	\$ 1,462,500	4,050	4,500	4,950	\$ 293	\$ 325	\$ 406	\$ 1,462,500
1.2	Extra over for additional deeper trenching 2-3m deep.											
1.3	Extra over item to reinstate sealed road.											
1.4	Extra over item to reinstate berm/unsealed road.											
1.5	Air Valve. Assume offline configuration and located in an above-ground chamber at the side of the road.											
1.6	Isolation Valve. Assume direct buried.											
1.7	Scour Valve. Assume offline configuration and located in a below-ground chamber at the side of the road.											
1.8	Hydrostatic testing of wastewater pipeline.											
1.9	Allowance for minor stream crossing											
1.10	Allowance for major stream crossing											
1.11	Allowance for bridge crossing											
1.12	Allowance for railway crossing											
Subtotal - Wastewater Rising Main				\$ 2,075,500								
2.0 WASTEWATER GRAVITY MAIN												
2.1	Supply and install PE100 PN10 rising main generally trenched 0-2.0m deep; including, but not limited to: welding, excavation, bedding, backfilling, and reinstatement outside road.											
2.1A	DN250 PN10	m	1,400	\$ 400	\$ 560,000	1,260	1,400	1,540	\$ 360	\$ 400	\$ 500	\$ 560,000
2.1B	DN450 PN10	m	450	\$ 647	\$ 291,150	405	450	495	\$ 582	\$ 647	\$ 809	\$ 291,150
2.2	Extra over for additional deeper trenching 3-6m deep.											
2.3	Extra over item to reinstate sealed road.											
2.4	Extra over item to reinstate berm/unsealed road.											
2.5	1050mm dia manholes (assume one every 150 m plus at bends)											
2.6	New discharge structure ; allow 1200mm dia manhole with DN500 knife gate valve and extended spindle											
2.7	Green dome odour control at discharge structure											
Subtotal - Wastewater Gravity Main				\$ 1,353,150								
3.0 WASTEWATER PUMP STATION												
New Pump Station												
3.1	Supply and installation of 2m diameter, 5-6m deep pre-fabricated GRP wet well, including cover slab & McBerns type cover. Assumes some local gravity network to be intercepted											
3.2	Supply and installation of 3 x submersible sewage pumps; 22 kW - 25 L/s and 54m TDH.											
3.3	Supply and installation of valve chamber including 3 x non-return valves, 3 x isolation valves, DN100.											
3.4	Emergency Storage; 265m3, allow for buried GRP tanks manifolded.											
3.5	Electrical installation. Including supply and installation of local cabinet/MCC, supply and installation of level instrumentation, power and comms cabling and ducts from main switchboard, emergency generator connection, and flowmeter in chamber.											
3.6	Civil site works including a small controls building.											
3.7	Supply and install of permanent standby generator											
3.8	Commissioning of pump station.											
Subtotal - Wastewater Pump Station				\$ 1,698,000								
Subtotal - Net Construction Cost Estimate					\$ 5,126,650							
4.0 MAIN CONTRACTOR OVERHEAD COSTS												
4.1 On-site Overheads:												
4.1A	Pipelines	15%	15%	\$ 3,428,650	\$ 514,298	13%	15%	20%	\$ 3,428,650	\$ 3,428,650	\$ 3,428,650	\$ 514,298
4.1B	Pump Stations	%	25%	\$ 1,698,000	\$ 424,500	20%	25%	30%	\$ 1,698,000	\$ 1,698,000	\$ 1,698,000	\$ 424,500
4.1C	Traffic management	m	6,350	\$ 50	\$ 317,500	6350	6350	6350	\$ 20	\$ 50	\$ 60	\$ 317,500
Check: % 9%												
4.2 Off-site Overheads:												
Main Contractor Off-site Overheads and Profit Margin is included in the rates.												
Subtotal - Main Contractor Overheads			25%	\$ 1,256,298								
Subtotal - Gross Construction Cost Estimate					\$ 6,382,948							
5.0 FEES												
5.1	Professional Fees for design and MSQA - Pipelines											
5.2	Professional Fees for design and MSQA - Pump Stations											
5.3	Client project-related internal costs											
5.4	Consenting costs											
5.5	Procurement costs											
Subtotal - Fees			20%	\$ 1,296,917								
6.0 PROPERTY COSTS												
6.1	Property costs - land purchase											
6.2	Property costs - easements											
Subtotal - Property Costs				\$ -								
Subtotal					\$ 7,679,865							
7.0 RISK ALLOWANCES												
7.1	Allowance for Design Development Contingency											
7.2	Allowance for Construction Phase Risk Contingency											
7.3	FOREX risk supply costs											
7.4	General cost escalation											
Subtotal - Risk Allowances			30%	\$ 1,914,884								
Rounding												
Total Expected Estimate			Most Likely	\$ 9,590,000								
				Check:	\$ 9,590,000							

Summary	Estimate	% of Base
Base Estimate	8,100,000	
Most Likely Estimate (P50)	9,590,000	118%
P95 Confidence Level Estimate	10,770,000	133%
Maximum Estimate	13,800,000	170%

CONCEPT STAGE COST ESTIMATE
Northern Business Case - Pumping and Conveyance
Option A: Taupiri to Ngaruawahia WWTP (2041)
Supply and Installation of PE Pipe, pump station and associated equipment and fittings.

Item	Unit	Quantity	Rate	Total - Most Likely	Quantity			Rate \$			Most Likely \$	
					Min	ML	Max	Min	ML	Max		
1.0 WASTEWATER RISING MAIN												
1.1												
1.1A	Supply and install PE100 PN16 rising main generally trenched 0-2.0m deep; including, but not limited to: welding, excavation, bedding, backfilling, and reinstatement outside road.	m	4,600	\$ 430	\$ 1,978,000	4,140	4,600	5,060	\$ 387	\$ 430	\$ 538	\$ 1,978,000
1.2	Extra over for additional deeper trenching 2-3m deep.	m	1,000	\$ 160	\$ 160,000	900	1,000	1,100	\$ 144	\$ 160	\$ 200	\$ 160,000
1.3	Extra over item to reinstate sealed road.	m	2,300	\$ 180	\$ 414,000	2,070	2,300	2,530	\$ 162	\$ 180	\$ 225	\$ 414,000
1.4	Extra over item to reinstate berm/unsealed road.	m	2,300	\$ 30	\$ 69,000	2,070	2,300	2,530	\$ 27	\$ 30	\$ 38	\$ 69,000
1.5	Air Valve. Assume offline configuration and located in an above-ground chamber at the side of the road.	each	8	\$ 15,000	\$ 120,000	8	8	9	\$ 13,500	\$ 15,000	\$ 18,750	\$ 120,000
1.6	Isolation Valve. Assume direct buried.	each	6	\$ 10,000	\$ 60,000	6	6	7	\$ 9,000	\$ 10,000	\$ 12,500	\$ 60,000
1.7	Scour Valve. Assume offline configuration and located in a below-ground chamber at the side of the road.	each	8	\$ 16,000	\$ 128,000	8	8	9	\$ 14,400	\$ 16,000	\$ 20,000	\$ 128,000
1.8	Hydrostatic testing of wastewater pipeline.	LS	1	\$ 26,000	\$ 26,000	1	1	1	\$ 23,400	\$ 26,000	\$ 32,500	\$ 26,000
1.9	Allowance for minor stream crossing	No	2	\$ 10,000	\$ 20,000	0	2	2	\$ 9,000	\$ 10,000	\$ 12,500	\$ 20,000
1.10	Allowance for major stream crossing	No	0	\$ 100,000	\$ -	0	0	0	\$ 90,000	\$ 100,000	\$ 125,000	\$ -
1.11	Allowance for bridge crossing. Railway over pass - assume 50m x DN300 SS pipe with 4 x SS ballows	No	1	\$ 140,000	\$ 140,000	1	1	1	\$ 126,000	\$ 140,000	\$ 175,000	\$ 140,000
1.12	Allowance for railway crossing - assume 15m x DN350 steel sleeve (micro tunneled/ pipe jacked)	No	2	\$ 100,000	\$ 200,000	1	2	1	\$ 90,000	\$ 100,000	\$ 125,000	\$ 200,000
	Subtotal - Wastewater Rising Main			\$ 3,315,000								
2.0 WASTEWATER PUMP STATION												
	New Pump Station											
2.1	Supply and installation of 3.5m diameter, 5-6m deep pre-fabricated GRP wet well, including cover slab & McBerns type cover. Assumes some local gravity network to be intercepted	LS	1	\$ 420,000	\$ 420,000	1	1	1	\$ 378,000	\$ 420,000	\$ 630,000	\$ 420,000
2.2	Supply and installation of 3 x submersible sewage pumps; 45 kW - 57 L/s and 46m TDH.	LS	1	\$ 260,000	\$ 260,000	1	1	1	\$ 234,000	\$ 260,000	\$ 390,000	\$ 260,000
2.3	Supply and installation of valve chamber including 3 x non-return valves, 3 x isolation valves, DN200.	LS	1	\$ 110,000	\$ 110,000	1	1	1	\$ 99,000	\$ 110,000	\$ 165,000	\$ 110,000
2.4	Emergency Storage; 474m3, allow for buried GRP tanks manifolded.	LS	1	\$ 1,200,000	\$ 1,200,000	1	1	1	\$ 1,080,000	\$ 1,200,000	\$ 1,500,000	\$ 1,200,000
2.5	Electrical installation. Including supply and installation of local cabinet/MCC, supply and installation of level instrumentation, power and comms cabling and ducts from main switchboard, emergency generator connection, and flowmeter in chamber.	LS	1	\$ 155,000	\$ 155,000	1	1	1	\$ 139,500	\$ 155,000	\$ 232,500	\$ 155,000
2.6	Civil site works including a small controls building.	LS	1	\$ 200,000	\$ 200,000	1	1	1	\$ 180,000	\$ 200,000	\$ 300,000	\$ 200,000
2.7	Supply and install of permanent standby generator	LS	1	\$ 80,000	\$ 80,000	1	1	1	\$ 72,000	\$ 80,000	\$ 120,000	\$ 80,000
2.8	Commissioning of pump station.	LS	1	\$ 10,000	\$ 10,000	1	1	1	\$ 9,000	\$ 10,000	\$ 15,000	\$ 10,000
	Subtotal - Wastewater Pump Station			\$ 2,435,000								
	Subtotal - Net Construction Cost Estimate			\$ 5,750,000								
3.0 MAIN CONTRACTOR OVERHEAD COSTS												
3.1	On-site Overheads:											
3.1A	Pipelines	%	15%	\$ 3,315,000	\$ 497,250	13%	15%	20%	\$ 3,315,000	\$ 3,315,000	\$ 3,315,000	\$ 497,250
3.1B	Pump Stations	%	25%	\$ 2,435,000	\$ 608,750	20%	25%	30%	\$ 2,435,000	\$ 2,435,000	\$ 2,435,000	\$ 608,750
3.1C	Traffic management	m	4,600	\$ 50	\$ 230,000	4600	4600	4600	\$ 20	\$ 50	\$ 60	\$ 230,000
	Check:	%	7%									
3.2	Off-site Overheads:											
	Main Contractor Off-site Overheads and Profit Margin is included in the rates.	LS	1		included				\$ -	\$ -	\$ -	\$ -
	Subtotal - Main Contractor Overheads		23%	\$ 1,336,000								
	Subtotal - Gross Construction Cost Estimate			\$ 7,086,000								
4.0 FEES												
4.1	Professional Fees for design and MSQA - Pipelines	%	8%	\$ 4,085,233	\$ 326,819	6%	8%	10%	\$ 4,085,233	\$ 4,085,233	\$ 4,085,233	\$ 326,819
4.2	Professional Fees for design and MSQA - Pump Stations	%	15%	\$ 3,000,767	\$ 450,115	12%	15%	17%	\$ 3,000,767	\$ 3,000,767	\$ 3,000,767	\$ 450,115
4.3	Client project-related internal costs	%	8%	\$ 7,086,000	\$ 566,880	7%	8%	9%	\$ 7,086,000	\$ 7,086,000	\$ 7,086,000	\$ 566,880
4.4	Consenting costs	%		\$ 7,086,000	excluded				\$ 7,086,000	\$ 7,086,000	\$ 7,086,000	\$ -
4.5	Procurement costs	%	2%	\$ 7,086,000	\$ 141,720	1%	2%	3%	\$ 7,086,000	\$ 7,086,000	\$ 7,086,000	\$ 141,720
	Subtotal - Fees		21%	\$ 1,485,534								
5.0 PROPERTY COSTS												
5.1	Property costs - land purchase	LS	1		excluded	0	0	0	\$ 100,000	\$ -	\$ 300,000	\$ -
5.2	Property costs - easements	LS	1		excluded	0	0	0	\$ 20,000	\$ -	\$ 70,000	\$ -
	Subtotal - Property Costs			\$ -								
	Subtotal			\$ 8,571,534								
6.0 RISK ALLOWANCES												
6.1	Allowance for Design Development Contingency	%	20%	\$ 8,571,534	\$ 1,714,307	10%	20%	30%	\$ 8,571,534	\$ 8,571,534	\$ 8,571,534	\$ 1,714,307
6.2	Allowance for Construction Phase Risk Contingency	%	10%	\$ 8,571,534	\$ 857,153	8%	10%	20%	\$ 8,571,534	\$ 8,571,534	\$ 8,571,534	\$ 857,153
6.3	FOREX risk supply costs	%	10%	\$ 8,571,534	excluded	2%	10%	15%	\$ 8,571,534	\$ 8,571,534	\$ 8,571,534	\$ -
6.4	General cost escalation	%	10%	\$ 8,571,534	excluded	7%	10%	15%	\$ 8,571,534	\$ 8,571,534	\$ 8,571,534	\$ -
	Subtotal - Risk Allowances		36%	\$ 2,571,460								
	Rounding	LS	1	-\$ 2,994	-\$ 2,994							
	Total Expected Estimate	Most Likely		\$ 11,140,000								
	Check:			\$ 11,140,000								

Summary	Estimate	% of Base
Base Estimate	9,230,000	
Most Likely Estimate (P50)	11,140,000	121%
P95 Confidence Level Estimate	12,660,000	137%
Maximum Estimate	15,470,000	168%

CONCEPT STAGE COST ESTIMATE
Northern Business Case - Pumping and Conveyance
Option A: Ngaruawahia to Horotui (2041)
Supply and Installation of PE Pipe, pump station and associated equipment and fittings.

Item	Unit	Quantity	Rate	Total - Most Likely	Quantity			Rate \$			Most Likely \$	
					Min	ML	Max	Min	ML	Max		
1.0 WASTEWATER RISING MAIN												
1.1	Supply and install PE100 PN16 rising main generally trenched 0-2.0m deep; including, but not limited to: welding, excavation, bedding, backfilling, and reinstatement outside road.											
1.1A	DN500 PN16	m	10,400	\$ 838	\$ 8,715,200	9,360	10,400	11,440	\$ 754	\$ 838	\$ 1,048	\$ 8,715,200
1.1B	DN315 PN16	m	10,400	\$ 514	\$ 5,345,600	9,360	10,400	11,440	\$ 463	\$ 514	\$ 643	\$ 5,345,600
1.2	Extra over for additional deeper trenching 2-3m deep.											
1.3	Extra over item to reinstate sealed road.											
1.4	Extra over item to reinstate berm/unsealed road.											
1.5	Air Valve. Assume offline configuration and located in an above-ground chamber at the side of the road.											
1.6	Isolation Valve. Assume direct buried.											
1.7	Scour Valve. Assume offline configuration and located in a below-ground chamber at the side of the road.											
1.8	Hydrostatic testing of wastewater pipeline.											
1.9	Allowance for minor stream crossing											
1.10	Allowance for major stream crossing											
1.11	Allowance for bridge crossing											
1.12	Allowance for railway crossing - assume 10m x DN550 steel sleeve (micro tunneled/ pipe jacked)											
1.13	Allowance for railway crossing - assume 10m x DN400 steel sleeve (micro tunneled/ pipe jacked)											
Subtotal - Wastewater Rising Main				\$ 20,018,800								
2.0 WASTEWATER PUMP STATION												
New Pump Station												
2.1	Supply and installation of 4m diameter, 5-6m deep pre-fabricated GRP wet well, including cover slab & McBerns type cover. Assumes some local gravity network to be intercepted											
2.2	Supply and installation of 3 x submersible sewage pumps; 186 kW - 209 L/s and 54m TDH.											
2.3	Supply and installation of valve chamber including 3 x non-return valves, 3 x isolation valves, DN250											
2.4	Emergency Storage; 1719m3, allow for buried GRP tanks manifolded.											
2.5	Electrical installation. Including supply and installation of local cabinet/MCC, supply and installation of level instrumentation, power and comms cabling and ducts from main switchboard, emergency generator connection, and flowmeter in chamber.											
2.6	Civil site works including a small controls building.											
2.7	Supply and install of permanent standby generator											
2.8	Commissioning of pump station.											
Subtotal - Wastewater Pump Station				\$ 4,160,000								
Subtotal - Net Construction Cost Estimate				\$ 24,178,800								
3.0 MAIN CONTRACTOR OVERHEAD COSTS												
3.1	On-site Overheads:											
3.1A	Pipelines	%	15%	\$ 20,018,800	\$ 3,002,820	13%	15%	20%	\$ 20,018,800	\$ 20,018,800	\$ 20,018,800	\$ 3,002,820
3.1B	Pump Stations	%	25%	\$ 4,160,000	\$ 1,040,000	20%	25%	30%	\$ 4,160,000	\$ 4,160,000	\$ 4,160,000	\$ 1,040,000
3.1C	Traffic management	m	20,800	\$ 50	\$ 1,040,000	20800	20800	20800	\$ 20	\$ 50	\$ 60	\$ 1,040,000
	Check:	%	5%									
3.2	Off-site Overheads:											
	Main Contractor Off-site Overheads and Profit Margin is included in the rates.											
		LS	1		included				\$ -	\$ -	\$ -	\$ -
Subtotal - Main Contractor Overheads				21%	\$ 5,082,820							
Subtotal - Gross Construction Cost Estimate					\$ 29,261,620							
4.0 FEES												
4.1	Professional Fees for design and MSQA - Pipelines											
4.2	Professional Fees for design and MSQA - Pump Stations											
4.3	Client project-related internal costs											
4.4	Consenting costs											
4.5	Procurement costs											
Subtotal - Fees				19%	\$ 5,619,507							
5.0 PROPERTY COSTS												
5.1	Property costs - land purchase											
5.2	Property costs - easements											
Subtotal - Property Costs												
Subtotal					\$ 34,881,127							
6.0 RISK ALLOWANCES												
6.1	Allowance for Design Development Contingency											
6.2	Allowance for Construction Phase Risk Contingency											
6.3	FOREX risk supply costs											
6.4	General cost escalation											
Subtotal - Risk Allowances				36%	\$ 10,464,338							
	Rounding											
	LS	1		\$ 4,535	\$ 4,535							
Total Expected Estimate			Most Likely		\$ 45,350,000							
				Check:	\$ 45,350,000							

Summary	Estimate	% of Base
Base Estimate	38,430,000	
Most Likely Estimate (P50)	45,350,000	118%
P95 Confidence Level Estimate	51,870,000	135%
Maximum Estimate	64,400,000	168%

CONCEPT STAGE COST ESTIMATE
Northern Business Case - Pumping and Conveyance
Option A: Ngaruawahia to Horotui (2061)
Supply and Installation of PE Pipe, pump station and associated equipment and fittings.

Item	Unit	Quantity	Rate	Total - Most Likely	Quantity			Rate \$			Most Likely \$	
					Min	ML	Max	Min	ML	Max		
1.0 WASTEWATER RISING MAIN												
1.1	Supply and install PE100 PN16 rising main generally trenched 0-2.0m deep; including, but not limited to: welding, excavation, bedding, backfilling, and reinstatement outside road.											
1.1A	DN500 PN16	m	0	\$ 838	\$ -	0	0	0	\$ 754	\$ 838	\$ 1,048	\$ -
1.1B	DN315 PN16	m	0	\$ 514	\$ -	0	0	0	\$ 463	\$ 514	\$ 643	\$ -
1.2	Extra over for additional deeper trenching 2-3m deep.											
	m	0	\$ 320	\$ -	0	0	0	\$ 288	\$ 320	\$ 400	\$ -	
1.3	Extra over item to reinstate sealed road.											
	m	0	\$ 360	\$ -	0	0	0	\$ 324	\$ 360	\$ 450	\$ -	
1.4	Extra over item to reinstate berm/unsealed road.											
	m	0	\$ 60	\$ -	0	0	0	\$ 54	\$ 60	\$ 75	\$ -	
1.5	Air Valve. Assume offline configuration and located in an above-ground chamber at the side of the road.											
	each	0	\$ 15,000	\$ -	0	0	0	\$ 13,500	\$ 15,000	\$ 18,750	\$ -	
1.6	Isolation Valve. Assume direct buried.											
	each	0	\$ 10,000	\$ -	0	0	0	\$ 9,000	\$ 10,000	\$ 12,500	\$ -	
1.7	Scour Valve. Assume offline configuration and located in a below-ground chamber at the side of the road.											
	each	0	\$ 16,000	\$ -	0	0	0	\$ 14,400	\$ 16,000	\$ 20,000	\$ -	
1.8	Hydrostatic testing of wastewater pipeline.											
	LS	0	\$ 100,000	\$ -	1	0	0	\$ 90,000	\$ 100,000	\$ 125,000	\$ -	
1.9	Allowance for minor stream crossing											
	No	0	\$ 20,000	\$ -	0	0	0	\$ 18,000	\$ 20,000	\$ 25,000	\$ -	
1.10	Allowance for major stream crossing											
	No	0	\$ 100,000	\$ -	0	0	0	\$ 90,000	\$ 100,000	\$ 125,000	\$ -	
1.11	Allowance for bridge crossing											
	No	0	\$ 1,500,000	\$ -	0	0	0	\$ 1,350,000	\$ 1,500,000	\$ 1,875,000	\$ -	
1.12	Allowance for railway crossing - assume 10m x DN550 steel sleeve (micro tunneled/ pipe jacked)											
	No	0	\$ 80,000	\$ -	0	0	0	\$ 72,000	\$ 80,000	\$ 100,000	\$ -	
1.13	Allowance for railway crossing - assume 10m x DN400 steel sleeve (micro tunneled/ pipe jacked)											
	No	0	\$ 80,000	\$ -	0	0	0	\$ 72,000	\$ 80,000	\$ 100,000	\$ -	
Subtotal - Wastewater Rising Main				\$ -								
2.0 WASTEWATER PUMP STATION												
New Pump Station												
2.1	Supply and installation of 2.5m diameter, 5-6m deep pre-fabricated GRP wet well, including cover slab & McBerns type cover. Assumes some local gravity network to be intercepted											
	LS	1	\$ 340,000	\$ 340,000	1	1	1	\$ 306,000	\$ 340,000	\$ 510,000	\$ 340,000	
2.2	Supply and installation of 3 x submersible sewage pumps; 78 kW - 61 L/s and 73m TDH.											
	LS	1	\$ 320,000	\$ 320,000	1	1	1	\$ 288,000	\$ 320,000	\$ 480,000	\$ 320,000	
2.3	Supply and installation of valve chamber including 3 x non-return valves, 3 x isolation valves, DN200											
	LS	1	\$ 115,000	\$ 115,000	1	1	1	\$ 103,500	\$ 115,000	\$ 172,500	\$ 115,000	
2.4	Emergency Storage; 543m3, allow for buried GRP tanks manifolded.											
	LS	1	\$ 1,400,000	\$ 1,400,000	1	1	1	\$ 1,260,000	\$ 1,400,000	\$ 1,750,000	\$ 1,400,000	
2.5	Electrical installation. Including supply and installation of local cabinet/MCC, supply and installation of level instrumentation, power and comms cabling and ducts from main switchboard, emergency generator connection, and flowmeter in chamber.											
	LS	1	\$ 200,000	\$ 200,000	1	1	1	\$ 180,000	\$ 200,000	\$ 300,000	\$ 200,000	
2.6	Civil site works including a small controls building.											
	LS	1	\$ 200,000	\$ 200,000	1	1	1	\$ 180,000	\$ 200,000	\$ 300,000	\$ 200,000	
2.7	Supply and install of permanent standby generator											
	LS	0	\$ 80,000	\$ -	1	0	1	\$ 72,000	\$ 80,000	\$ 120,000	\$ -	
2.8	Commissioning of pump station.											
	LS	1	\$ 10,000	\$ 10,000	1	1	1	\$ 9,000	\$ 10,000	\$ 15,000	\$ 10,000	
Subtotal - Wastewater Pump Station				\$ 2,585,000								
Subtotal - Net Construction Cost Estimate				\$ 2,585,000								
3.0 MAIN CONTRACTOR OVERHEAD COSTS												
3.1	On-site Overheads:											
3.1A	Pipelines	%	15%	\$ -	\$ -	13%	15%	20%	\$ -	\$ -	\$ -	\$ -
3.1B	Pump Stations	%	25%	\$ 2,585,000	\$ 646,250	20%	25%	30%	\$ 2,585,000	\$ 2,585,000	\$ 2,585,000	\$ 646,250
3.1C	Traffic management	m	0	\$ 50	\$ -	0	0	0	\$ 20	\$ 50	\$ 60	\$ -
	Check:	%	0%									
3.2	Off-site Overheads:											
	Main Contractor Off-site Overheads and Profit Margin is included in the rates.											
	LS	1		included					\$ -	\$ -	\$ -	\$ -
Subtotal - Main Contractor Overheads				25%	\$ 646,250							
Subtotal - Gross Construction Cost Estimate					\$ 3,231,250							
4.0 FEES												
4.1	Professional Fees for design and MSQA - Pipelines											
	%	8%	\$ -	\$ -	6%	8%	10%	\$ -	\$ -	\$ -	\$ -	
4.2	Professional Fees for design and MSQA - Pump Stations											
	%	15%	\$ 3,231,250	\$ 484,688	12%	15%	17%	\$ 3,231,250	\$ 3,231,250	\$ 3,231,250	\$ 484,688	
4.3	Client project-related internal costs											
	%	8%	\$ 3,231,250	\$ 258,500	7%	8%	9%	\$ 3,231,250	\$ 3,231,250	\$ 3,231,250	\$ 258,500	
4.4	Consenting costs											
	%		\$ 3,231,250	excluded				\$ 3,231,250	\$ 3,231,250	\$ 3,231,250	\$ -	
4.5	Procurement costs											
	%	2%	\$ 3,231,250	\$ 64,625	1%	2%	3%	\$ 3,231,250	\$ 3,231,250	\$ 3,231,250	\$ 64,625	
Subtotal - Fees				25%	\$ 807,813							
5.0 PROPERTY COSTS												
5.1	Property costs - land purchase											
	LS	1		excluded	0	0	0	\$ 100,000	\$ -	\$ 300,000	\$ -	
5.2	Property costs - easements											
	LS	1		excluded	0	0	0	\$ 20,000	\$ -	\$ 70,000	\$ -	
Subtotal - Property Costs					\$ -							
Subtotal					\$ 4,039,063							
6.0 RISK ALLOWANCES												
6.1	Allowance for Design Development Contingency											
	%	20%	\$ 4,039,063	\$ 807,813	10%	20%	30%	\$ 4,039,063	\$ 4,039,063	\$ 4,039,063	\$ 807,813	
6.2	Allowance for Construction Phase Risk Contingency											
	%	10%	\$ 4,039,063	\$ 403,906	8%	10%	20%	\$ 4,039,063	\$ 4,039,063	\$ 4,039,063	\$ 403,906	
6.3	FOREX risk supply costs											
	%	10%	\$ 4,039,063	excluded	2%	10%	15%	\$ 4,039,063	\$ 4,039,063	\$ 4,039,063	\$ -	
6.4	General cost escalation											
	%	10%	\$ 4,039,063	excluded	7%	10%	15%	\$ 4,039,063	\$ 4,039,063	\$ 4,039,063	\$ -	
Subtotal - Risk Allowances				38%	\$ 1,211,719							
	Rounding											
	LS	1	-\$ 781	-\$ 781								
Total Expected Estimate			Most Likely		\$ 5,250,000							
				Check:	\$ 5,250,000							

Summary	Estimate	% of Base
Base Estimate	4,660,000	
Most Likely Estimate (P50)	5,250,000	113%
P95 Confidence Level Estimate	6,000,000	129%
Maximum Estimate	7,380,000	158%

CONCEPT STAGE COST ESTIMATE
Northern Business Case - Pumping and Conveyance
Option A: Horotui to Pukete WWTP (2041)
Supply and Installation of PE Pipe, pump station and associated equipment and fittings.

Item	Unit	Quantity	Rate	Total - Most Likely	Quantity			Rate \$			Most Likely \$	
					Min	ML	Max	Min	ML	Max		
1.0 WASTEWATER RISING MAIN												
1.1	Supply and install PE100 PN16 rising main generally trenched 0-2.0m deep; including, but not limited to: welding, excavation, bedding, backfilling, and reinstatement outside road.											
1.1A	DN610 PN16	m	5,500	\$ 1,124	\$ 6,182,000	4,950	5,500	6,050	\$ 1,012	\$ 1,124	\$ 1,405	\$ 6,182,000
1.1B	DN315 PN16	m	5,500	\$ 514	\$ 2,827,000	4,950	5,500	6,050	\$ 463	\$ 514	\$ 643	\$ 2,827,000
1.2	Extra over for additional deeper trenching 2-3m deep.											
1.3	Extra over item to reinstate sealed road.											
1.4	Extra over item to reinstate berm/unsealed road.											
1.5	Air Valve. Assume offline configuration and located in an above-ground chamber at the side of the road.											
1.6	Scour Valve. Assume offline configuration and located in a below-ground chamber at the side of the road.											
1.7	Hydrostatic testing of wastewater pipeline.											
1.8	Allowance for minor stream crossing											
1.9	Allowance for major stream crossing											
1.10	Allowance for bridge crossing											
1.11	Allowance for railway crossing											
Subtotal - Wastewater Rising Main				\$ 11,021,000								
2.0 WASTEWATER PUMP STATION												
New Pump Station												
2.1	Supply and installation of 5m diameter, 6-7m deep pre-fabricated GRP wet well, including cover slab & McBerns type cover. Assumes some local gravity network to be intercepted											
2.2	Supply and installation of 3 x submersible sewage pumps; 138 kW - 304 L/s and 32m TDH.											
2.3	Supply and installation of valve chamber including 3 x non-return valves, 3 x isolation valves, DN400.											
2.4	Emergency Storage; 2565m3, allow for buried GRP tanks manifolded.											
2.5	Electrical installation. Including supply and installation of local cabinet/MCC, supply and installation of level instrumentation, power and comms cabling and ducts from main switchboard, emergency generator connection, and flowmeter in chamber.											
2.6	Civil site works including a small controls building.											
2.7	Supply and install of permanent standby generator											
2.8	Commissioning of pump station.											
Subtotal - Wastewater Pump Station				\$ 6,685,000								
Subtotal - Net Construction Cost Estimate				\$ 17,706,000								
3.0 MAIN CONTRACTOR OVERHEAD COSTS												
3.1 On-site Overheads:												
3.1A	Pipelines											
3.1B	Pump Stations											
3.1C	Traffic management											
	Check:	%	6%									
3.2 Off-site Overheads:												
	Main Contractor Off-site Overheads and Profit Margin is included in the rates.											
Subtotal - Main Contractor Overheads			23%	\$ 3,984,400								
Subtotal - Gross Construction Cost Estimate				\$ 21,690,400								
4.0 FEES												
4.1	Professional Fees for design and MSQA - Pipelines											
4.2	Professional Fees for design and MSQA - Pump Stations											
4.3	Client project-related internal costs											
4.4	Consenting costs											
4.5	Procurement costs											
Subtotal - Fees			21%	\$ 4,477,525								
5.0 PROPERTY COSTS												
5.1	Property costs - land purchase											
5.2	Property costs - easements											
Subtotal - Property Costs				\$ -								
Subtotal				\$ 26,167,925								
6.0 RISK ALLOWANCES												
6.1	Allowance for Design Development Contingency											
6.2	Allowance for Construction Phase Risk Contingency											
6.3	FOREX risk supply costs											
6.4	Allowance for gravity section via microtunnelling/extra lift station (P95 only)											
Subtotal - Risk Allowances			36%	\$ 7,850,378								
	Rounding											
Total Expected Estimate			Most Likely	\$ 34,020,000								
				Check:	\$ 33,910,000							

Summary	Estimate	% of Base
Base Estimate	28,250,000	
Most Likely Estimate (P50)	33,910,000	120%
P95 Confidence Level Estimate	38,670,000	137%
Maximum Estimate	47,330,000	168%

CONCEPT STAGE COST ESTIMATE
Northern Business Case - Pumping and Conveyance
Option A: Horotui to Pukete WWTP (2061)
Supply and Installation of PE Pipe, pump station and associated equipment and fittings.

Item	Unit	Quantity	Rate	Total - Most Likely	Quantity			Rate \$			Most Likely \$
					Min	ML	Max	Min	ML	Max	
1.0	WASTEWATER RISING MAIN										
1.1	Supply and install PE100 PN16 rising main generally trenched 0-2.0m deep; including, but not limited to: welding, excavation, bedding, backfilling, and reinstatement outside road.										
1.1A	m	0	\$ 1,124	\$ -	0	0	0	\$ 1,012	\$ 1,124	\$ 1,405	\$ -
1.1B	m	0	\$ 514	\$ -	0	0	0	\$ 463	\$ 514	\$ 643	\$ -
1.2	m	0	\$ 460	\$ -	0	0	0	\$ 414	\$ 460	\$ 575	\$ -
1.3	m	0	\$ 440	\$ -	0	0	0	\$ 396	\$ 440	\$ 550	\$ -
1.4	m	0	\$ 80	\$ -	0	0	0	\$ 72	\$ 80	\$ 100	\$ -
1.5	each	0	\$ 35,000	\$ -	0	0	0	\$ 31,500	\$ 35,000	\$ 43,750	\$ -
1.6	each	0	\$ 40,000	\$ -	0	0	0	\$ 36,000	\$ 40,000	\$ 50,000	\$ -
1.7	LS	0	\$ 100,000	\$ -	0	0	0	\$ 90,000	\$ 100,000	\$ 125,000	\$ -
1.8	No	0	\$ 10,000	\$ -	0	0	0	\$ 9,000	\$ 10,000	\$ 12,500	\$ -
1.9	No	0	\$ 100,000	\$ -	0	0	0	\$ 90,000	\$ 100,000	\$ 125,000	\$ -
1.10	No	0	\$ 150,000	\$ -	0	0	0	\$ 135,000	\$ 150,000	\$ 187,500	\$ -
1.11	No	0	\$ 200,000	\$ -	0	0	0	\$ 180,000	\$ 200,000	\$ 250,000	\$ -
Subtotal - Wastewater Rising Main			\$ -								
2.0	WASTEWATER PUMP STATION										
New Pump Station											
2.1	LS	1	\$ 380,000	\$ 380,000	1	1	1	\$ 342,000	\$ 380,000	\$ 570,000	\$ 380,000
2.2	LS	1	\$ 260,000	\$ 260,000	1	1	1	\$ 234,000	\$ 260,000	\$ 390,000	\$ 260,000
2.3	LS	1	\$ 110,000	\$ 110,000	1	1	1	\$ 99,000	\$ 110,000	\$ 165,000	\$ 110,000
2.4	LS	1	\$ 1,700,000	\$ 1,700,000	1	1	1	\$ 1,530,000	\$ 1,700,000	\$ 2,125,000	\$ 1,700,000
2.5	LS	1	\$ 200,000	\$ 200,000	1	1	1	\$ 180,000	\$ 200,000	\$ 300,000	\$ 200,000
2.6	LS	1	\$ 200,000	\$ 200,000	1	1	1	\$ 180,000	\$ 200,000	\$ 300,000	\$ 200,000
2.7	LS	0	\$ 80,000	\$ -	0	0	1	\$ 72,000	\$ 80,000	\$ 120,000	\$ -
2.8	LS	1	\$ 10,000	\$ 10,000	1	1	1	\$ 9,000	\$ 10,000	\$ 15,000	\$ 10,000
Subtotal - Wastewater Pump Station			\$ 2,860,000								
Subtotal - Net Construction Cost Estimate			\$ 2,860,000								
3.0	MAIN CONTRACTOR OVERHEAD COSTS										
On-site Overheads:											
3.1A	%	15%	\$ -	\$ -	13%	15%	20%	\$ -	\$ -	\$ -	\$ -
3.1B	%	25%	\$ 2,860,000	\$ 715,000	20%	25%	30%	\$ 2,860,000	\$ 2,860,000	\$ 2,860,000	\$ 715,000
3.1C	m	0	\$ 60	\$ -	0	0	0	\$ 20	\$ 50	\$ 60	\$ -
	Check:	%	0%								
Off-site Overheads:											
3.2	LS	1		included				\$ -	\$ -	\$ -	\$ -
Subtotal - Main Contractor Overheads			25%	\$ 715,000							
Subtotal - Gross Construction Cost Estimate				\$ 3,575,000							
4.0	FEES										
4.1	%	8%	\$ -	\$ -	6%	8%	10%	\$ -	\$ -	\$ -	\$ -
4.2	%	15%	\$ 3,575,000	\$ 536,250	12%	15%	17%	\$ 3,575,000	\$ 3,575,000	\$ 3,575,000	\$ 536,250
4.3	%	8%	\$ 3,575,000	\$ 286,000	7%	8%	9%	\$ 3,575,000	\$ 3,575,000	\$ 3,575,000	\$ 286,000
4.4	%		\$ 3,575,000	excluded				\$ 3,575,000	\$ 3,575,000	\$ 3,575,000	\$ -
4.5	%	2%	\$ 3,575,000	\$ 71,500	1%	2%	3%	\$ 3,575,000	\$ 3,575,000	\$ 3,575,000	\$ 71,500
Subtotal - Fees			25%	\$ 893,750							
5.0	PROPERTY COSTS										
5.1	LS	1		excluded	0	0	0	\$ 100,000	\$ -	\$ 300,000	\$ -
5.2	LS	1		excluded	0	0	0	\$ 20,000	\$ -	\$ 70,000	\$ -
Subtotal - Property Costs											
Subtotal				\$ 4,468,750							
6.0	RISK ALLOWANCES										
6.1	%	20%	\$ 4,468,750	\$ 893,750	10%	20%	30%	\$ 4,468,750	\$ 4,468,750	\$ 4,468,750	\$ 893,750
6.2	%	10%	\$ 4,468,750	\$ 446,875	8%	10%	20%	\$ 4,468,750	\$ 4,468,750	\$ 4,468,750	\$ 446,875
6.3	%	10%	\$ 4,468,750	excluded	2%	10%	15%	\$ 4,468,750	\$ 4,468,750	\$ 4,468,750	\$ -
6.4	%	10%	\$ 4,468,750	excluded	7%	10%	15%	\$ 4,468,750	\$ 4,468,750	\$ 4,468,750	\$ -
Subtotal - Risk Allowances			38%	\$ 1,340,625							
	LS	1	\$ 625	\$ 625							
Total Expected Estimate			Most Likely	\$ 5,810,000							
				Check:	\$ 5,810,000						

Summary	Estimate	% of Base
Base Estimate	4,950,000	
Most Likely Estimate (P50)	5,810,000	117%
P95 Confidence Level Estimate	6,650,000	134%
Maximum Estimate	8,110,000	164%