

Land Development Report

Irongate York Hastings

For HERETAUNGA TAMATEA SETTLEMENT TRUST

Date October 2022

stratagroup
CONSULTING ENGINEERS

Irongate York, Hastings

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1. INTRODUCTION

Strata Group Consulting Engineers Ltd (SGL) has been engaged by **Heretaunga Tamatea Settlement Trust** to undertake the site-specific three waters engineering requirements for a proposed residential development at York Road, Flaxmere, Hastings.

The subject site is currently located across 3 titles being legal descriptions: Section 1 SO 454705 5.076 hectares, Section 22 SO 438108 6.848 Hectares, Section 20 SO 438108 1.127 hectares and Section 18 SO 438108 14.480 hectares. The total development area is 27.53 Hectares, subject to survey.

The site is currently zoned Plains Production under Hastings District Council (HDC) Territorial Authority, the site is currently being used for viticulture and horticulture production.

Access to the site is from Dundee Drive and via 238 Stock Road. There is no access off Flaxmere Avenue or from State Highway 2.

The civil engineering aspects of the proposal considered by this report are stormwater, water supply and wastewater.



Figure 1: Site Location, Flaxmere, Hastings

2. STORMWATER

CURRENT SITUATION

The site has about 1m (0.35%) fall from west to east and the ground levels are between 2m and 3m above the base of the Irongate Stream and it's tributary that cuts through the site. There is a low area that was formed by a borrow pit on the site that was used to extract river gravel for construction of the expressway. The extents of the borrow pit is identified on Figure 2 below.

According to HDC Engineering Code of Practice 2020 (ECoP) Table D4 - Estimated Permeability Classes: Heretaunga Plains Adjacent to Hastings Urban Area, we can assume soil texture within the site are likely to be a combination of sand and stony gravels.

Therefore, the current flood and/or ponding risk posed within the site is constrained to existing water courses and channelised natural ground.

An approximation of the existing stormwater runoff generated from the 27.53 Ha site can be calculated using the rational method as follows:

$$Q = F C i A$$

Where Q = peak discharge [L/s]

F = units conversion factor

C = dimensionless runoff coefficient

i = 20% AEP rainfall intensity for 30 min duration (equal to catchment time of concentration) [mm/hr]

A = catchment area [ha]

$$\begin{aligned} q \text{ (existing 20\% AEP)} &= 2.78 \times C \times i \times A \\ &= 2.78 \times 0.3 \times 28.5 \times 27.53 \\ &= 654 \text{ L/s} \end{aligned}$$



Figure 2: Existing Public Primary Stormwater Network

SITE SPECIFIC STORMWATER

The proposed stormwater system for the residential development will involve soakage to the underlying gravels, a primary piped network to convey the 20% AEP rainfall to the Wellwood Drain and secondary overland flow paths along the roads capable of conveying the 1% AEP rainfall event.

The development will result in increased stormwater runoff from the site. The rainfall intensities selected for design purposes have been adopted from the High Intensity Rainfall System by NIWA. This system includes allowance for the predicted effects of climate change out to 2081-2100 AD. All rainfall intensities that will be used in the detailed design phase include allowance for the predicted effects of climate change.

As a comparison with the pre-development flow, the 20% AEP stormwater runoff for the site can be calculated with the rational method.

$$Q = F C i A$$

Where Q = peak discharge [L/s]

F = units conversion factor

C = dimensionless runoff coefficient

i = 20% AEP rainfall intensity for 30 min duration (equal to catchment time of concentration) [mm/hr]

A = catchment area [ha]

$$\begin{aligned} q \text{ (existing 20\% AEP)} &= 2.78 \times C \times i \times A \\ &= 2.78 \times 0.68 \times 38 \times 27.53 \\ &= 1,978 \text{ L/s} \end{aligned}$$

A large proportion of the site has good potential for stormwater disposal directly to the ground via soakholes. The area west of the existing Wellwood Drain will be used for soakage to ground. The area East of the Drain is generally not suitable for soakage. Stormwater disposal via on-site soakage will involve draining the roofs of all new residential buildings directly to soakholes. This will significantly reduce the load on the rest of the stormwater system.

As mentioned, the primary stormwater network will discharge into the Wellwood Drain. The Wellwood Drain and Irongate Stream also convey surface water from upstream catchments through the site. The Irongate is a natural stream and it will be protected throughout the construction works. The Wellwood Drain is a formed channel dating from the 1960s; it is therefore an artificial channel that may be altered. The upstream section of the drain will be piped so that it discharges into a new stormwater management area (SMA) along the south-eastern boundary.

The stormwater management area will ensure the development does not have negative environmental impacts on stream flows, water quality, and on downstream flood levels in the Irongate Stream. Treating the first flush of rainwater runoff from the site will achieve water quality goals. The water quantity goal and controlling the downstream flood level will be met by ensuring that the 1% AEP flow from the site is restricted to 80% of the existing pre-development flow, as measured at the SH2 culvert immediately downstream of the site. This includes restricting the runoff from the proposed development and the flow from existing upstream catchments.

Achieving the stormwater and environmental goals will require a number of stormwater management devices. These include the re-formed Wellwood Drain channel, first flush treatment bays, constructed stormwater detention areas and control structures such as culverts and overflow weirs specifically designed for the site. An area of two (2) hectares has been set aside within the site for stormwater treatment and detention. The specific design of the stormwater management area is being undertaken by specialist design consultant e2 Environmental.



Figure 3: Stormwater Management Area

3. WATER SUPPLY

CURRENT SITUATION

The public water supply network for Flaxmere is north-west of the site. Hastings DC officers have indicated the existing network has capacity to service the proposed development without the need for any major system upgrades.

The site currently has an existing 150mm diameter bore (HBRC No.3317) with consent to irrigate up to 20 hectares of horticulture and viticulture land. The total annual water take consent volume is 65,610 cubic meters. The bore will be de-commissioned and concrete capped on completion of the development work.

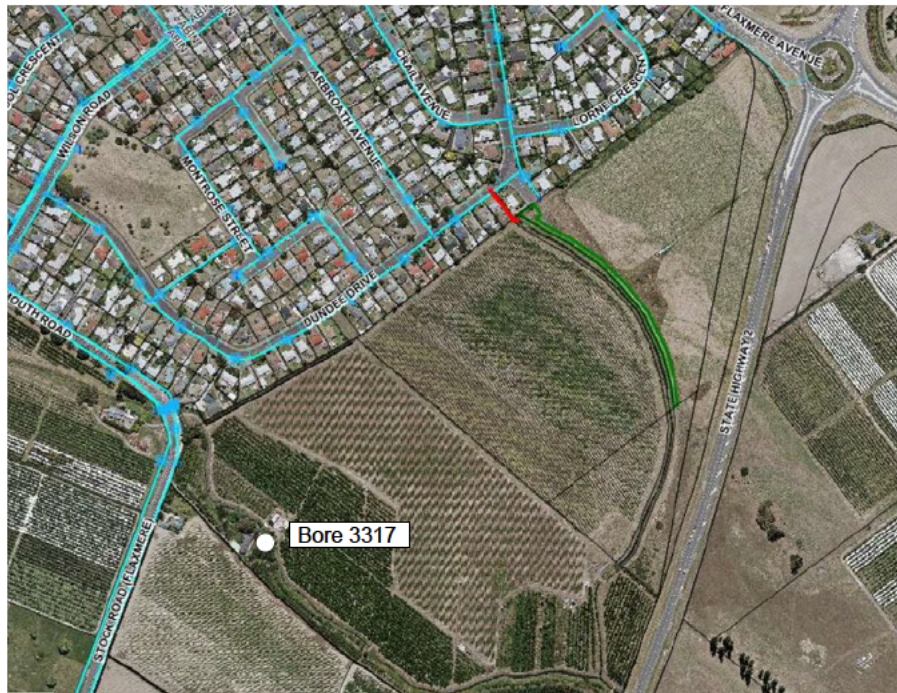


Figure 4: Existing Public Water Supply Network and Private Site Bore

SITE SPECIFIC WATER SUPPLY

The HDC ECoP specifies a minimum daily demand of 400 litres per person per day for residential development. An expected equivalent person (EP) of 3.5 per dwelling unit has been adopted. The average daily demand rate for the proposed development is calculated as follows.

Proposed Development AADD: $400 \text{ l/p/day} \times 3.5 \text{ (EP)} \times 530 \text{ dwellings} = 742 \text{ m}^3 / \text{day}$

The tabulated design water demand (consumption) with peak factors for the proposed development are indicated in the table below:

Water Demand		
Parameter	Value	Unit
Typical demand	400	l/person/day
Application lots	530	lots
Equivalent Person per unit*	3.5	(EP)
Average daily demand	742,000	l/day
Peak daily demand factor	2.0	
Peak daily demand	1,484,000	l/day
Average Peak Daily Demand	61,833	L/hour
Peak hourly demand factor	5.0	
Peak hourly demand	309,167	l/hour

*Equivalent person per unit of 3.5 in accordance with Schedule E of HDC ECOP.

The proposed development will be serviced with potable water by connecting to the Hastings DC water supply network at four (4) points along the north-east site boundary. The new subdivision network will be sized accordance with HDC Engineering Code of Practice (ECOP).

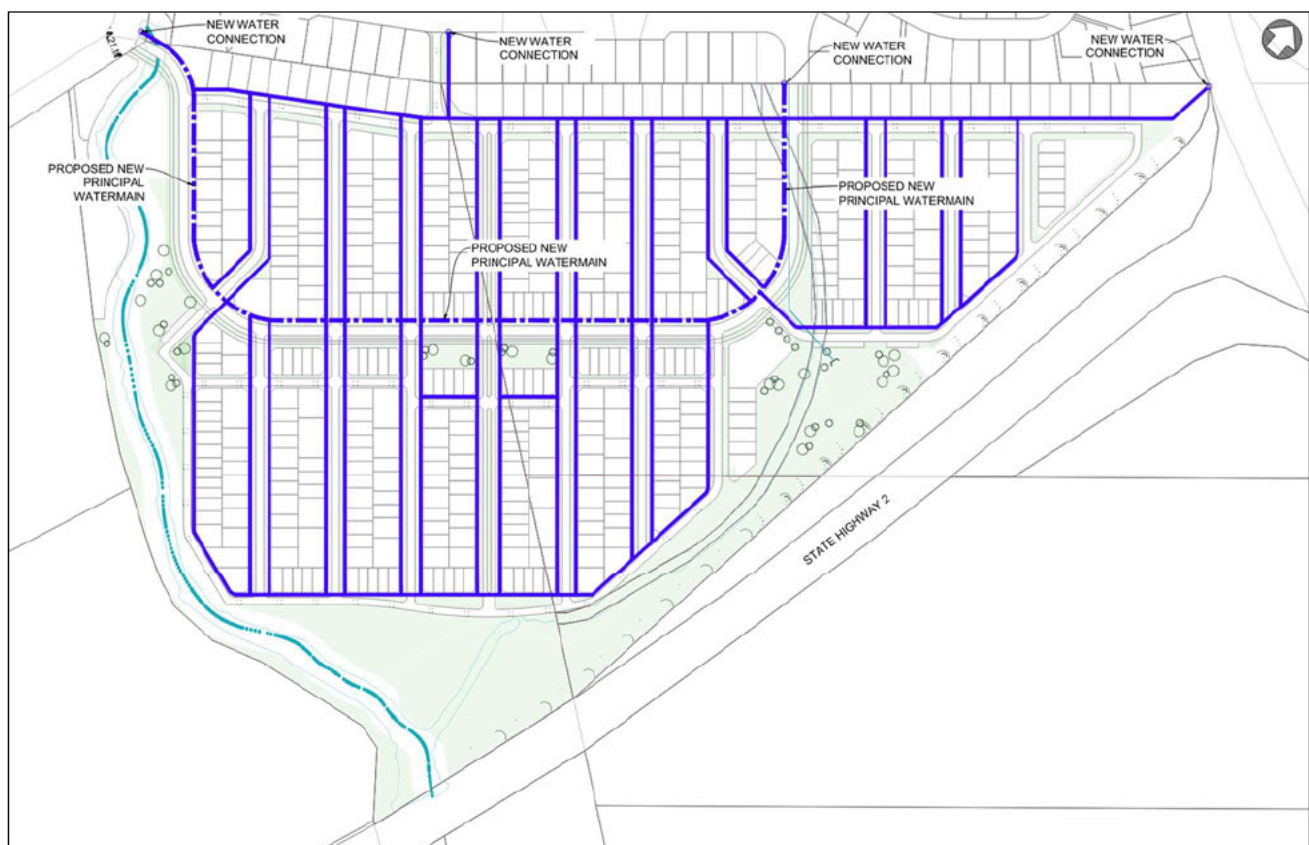


Figure 5: Proposed Water Supply Network

4. WASTEWATER

CURRENT SITUATION

The proposed development site is currently flanked by potential sewer connections on Dundee Drive and Flaxmere Avenue. However, Hastings DC officers have indicated the current network has limitations that preclude adding the wastewater from the proposed development.

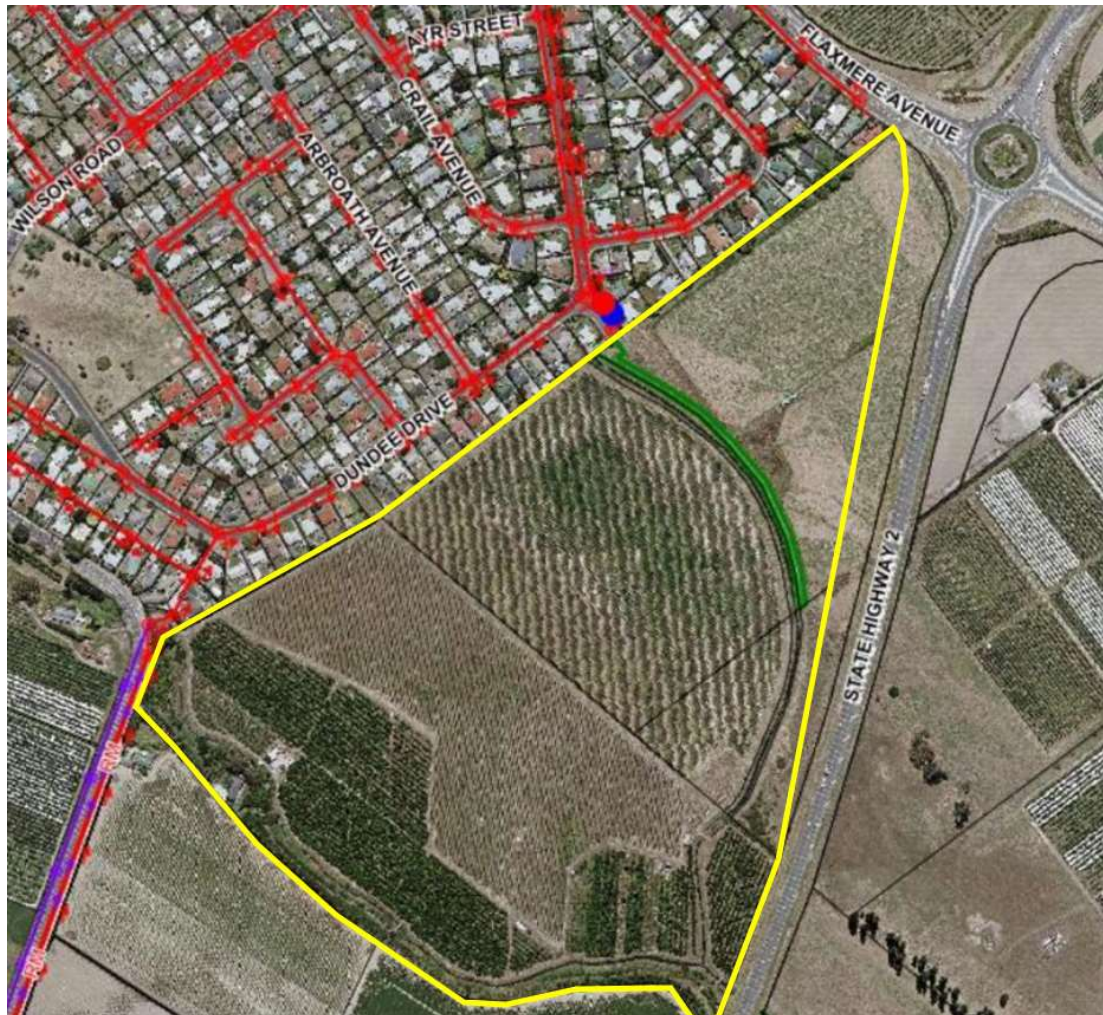


Figure 6: Existing Public Sanitary Sewer Network

SITE SPECIFIC WASTEWATER OPTIONS

The proposed development has the potential to generate the following additional wastewater volumes.

The HDC ECoP specifies the average dry wastewater flow (ADWF) of 250 litres per person per day and an equivalent person (EP) of 3.5 per dwelling. The ADWF rate for the proposed development is calculated as follows.

Proposed Development ADWF: $250 \text{ l/p/day} \times 3.5 \text{ (EP)} \times 530 \text{ dwellings} = 463.75 \text{ m}^3/\text{day}$

The proposed wastewater network will involve gravity sewers draining to three (3) new wastewater pump stations within the development.

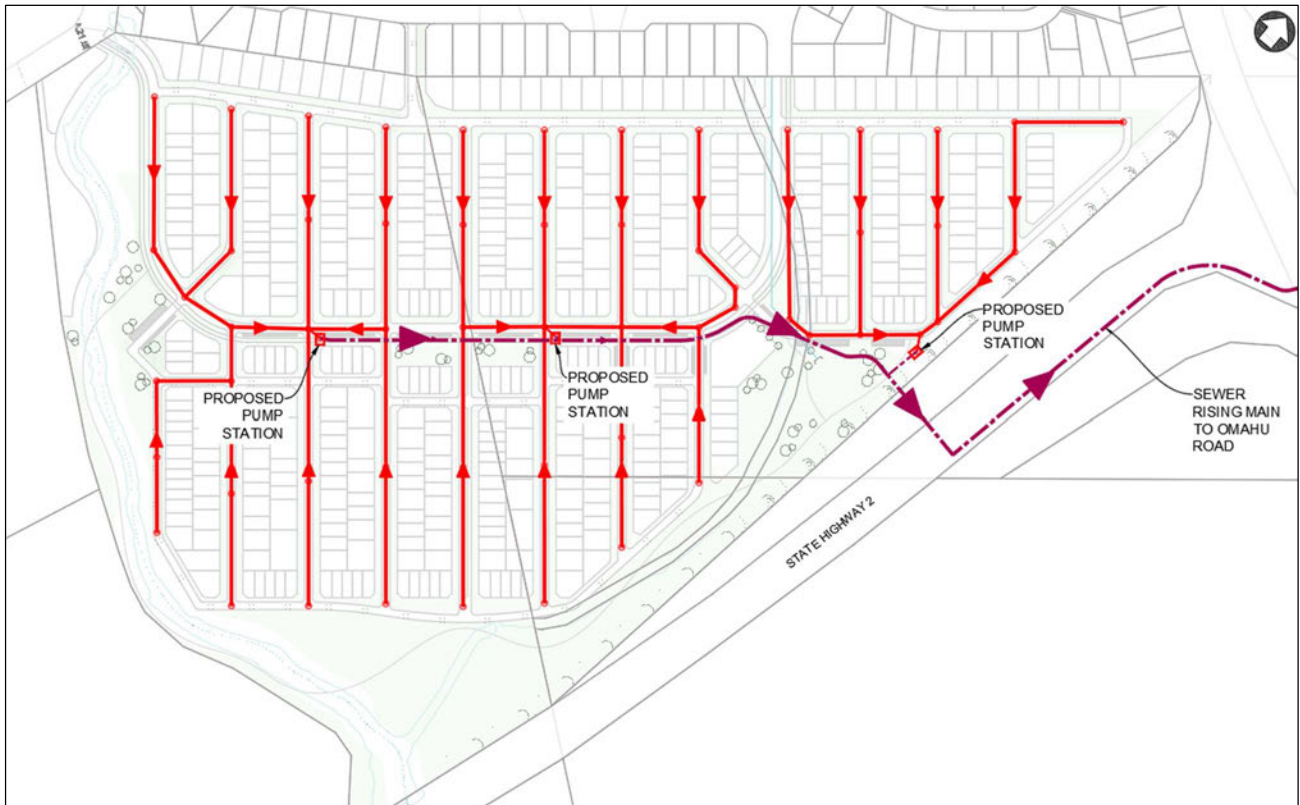


Figure 7: Proposed Wastewater Network

The three pump stations will form the start point of a new sewer rising main from the development along State Highway 2 to Omaha Rd, where it will discharge into the existing Hastings DC trunk gravity sewer. The trunk sewer on Omaha Rd has adequate capacity for this development.

The new rising main will be 2.3km in length along the expressway (SH2). Hastings DC will undertake the planning and construction of the rising main that lies outside the site. This will include gaining approvals to occupy the SH2 road reserve from Waka Kotahi NZ Transport Agency.

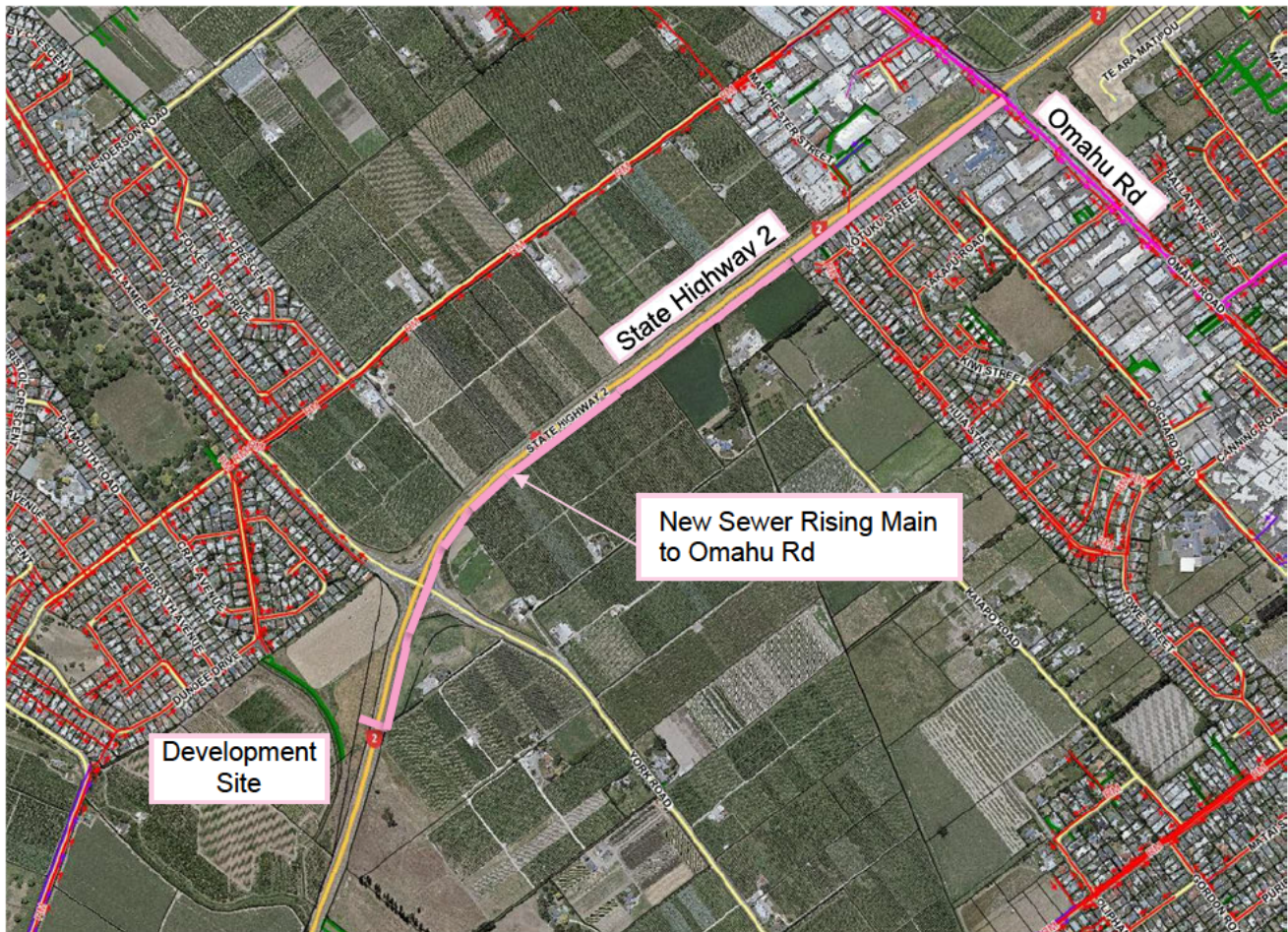


Figure 8: Proposed Sewer Rising Main to Omaha Rd

5. SUMMARY

This report has outlined the proposed servicing of the development with stormwater, water supply and wastewater services. Sufficient work has been completed to date to ensure that the solutions are technically feasible, practical to construct and will meet the requirements of the regulatory authorities.

The stormwater solution demands the most land area; some 2 hectares of the site has been set aside for the stormwater management area. The proposed stormwater management measures represent a significant environmental improvement of the existing situation.

The water supply solution benefits from close proximity to the existing public network with adequate spare capacity to serve the new development.

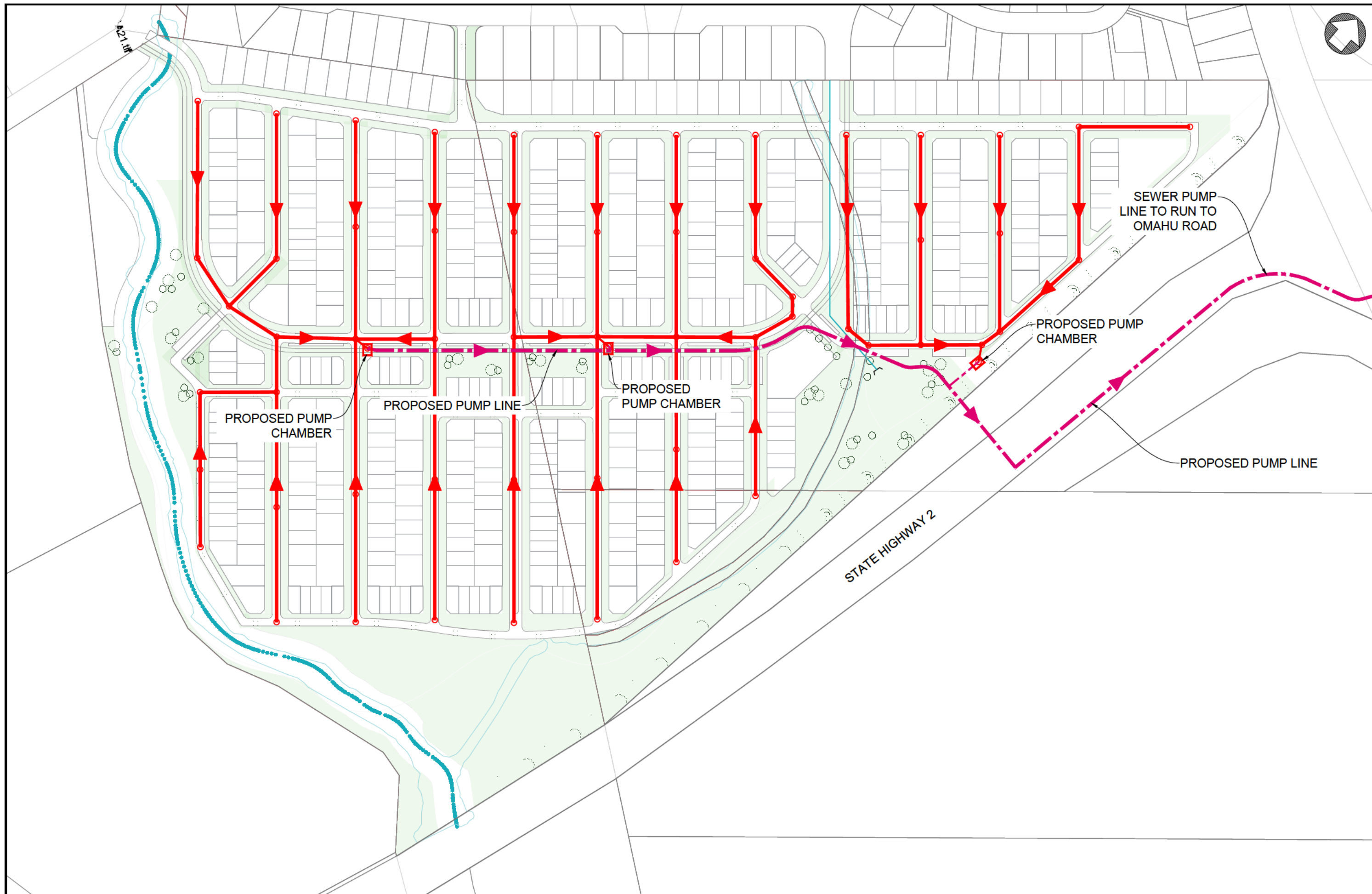
The wastewater solution is technically straight-forward and is supported by Hastings District Council, who will gain the necessary agreement of Waka Kotahi.

The three waters infrastructure described in this report will be vested with Hastings District Council as public assets on completion of the development.



SAFETY IN DESIGN ALL REASONABLY PRACTICABLE STEPS HAVE BEEN TAKEN TO ENSURE SAFETY IN DESIGN HAS BEEN CONSIDERED WITHIN STRATA GROUP'S SCOPE OF WORK FOR THIS DESIGN IN ACCORDANCE WITH PENZ PRACTICE NOTE 07 'DESIGN FOR SAFETY IN BUILDINGS AND OTHER STRUCTURES (JULY 2008)'. IT REMAINS THE RESPONSIBILITY OF THE OWNER AND/OR OPERATOR TO ENSURE APPROPRIATE PRACTICES ARE IN PLACE TO PROTECT THE SAFETY OF THE WORKERS AND THE PUBLIC IN THE OPERATION OF THE FACILITY.		THE CONTRACTOR IS TO BE AWARE OF ALL INSPECTIONS TO BE MADE BY THE ENGINEER AS A REQUIREMENT OF THE PRODUCER STATEMENT PS4 CONSTRUCTION REVIEW DOCUMENTATION. THE ENGINEER WILL REQUIRE 24 HOURS PRIOR NOTIFICATION FOR ALL INSPECTIONS.		stratagroup CONSULTING ENGINEERS P 06 876 7646 F 06 876 7645 www.stratagroup.net.nz PO BOX 758 Business HQ 1/308 Queen Street East Hastings, New Zealand Structural Fire Civil Project Management		CLIENT HERETAUNGA TAMATEA SETTLEMENT TRUST		PROJECT HERETAUNGA TAMATEA DEVELOPMENT PROJECT		TITLE OVERLAND FLOW / STORMWATER SITE PLAN		DESIGNED EM DRAWN EM CHECKED SDH DATE OCT 22 PROJECT NO. J5844 SHEET C001 REVISION 1 PRELIMINARY NOT FOR CONSTRUCTION	
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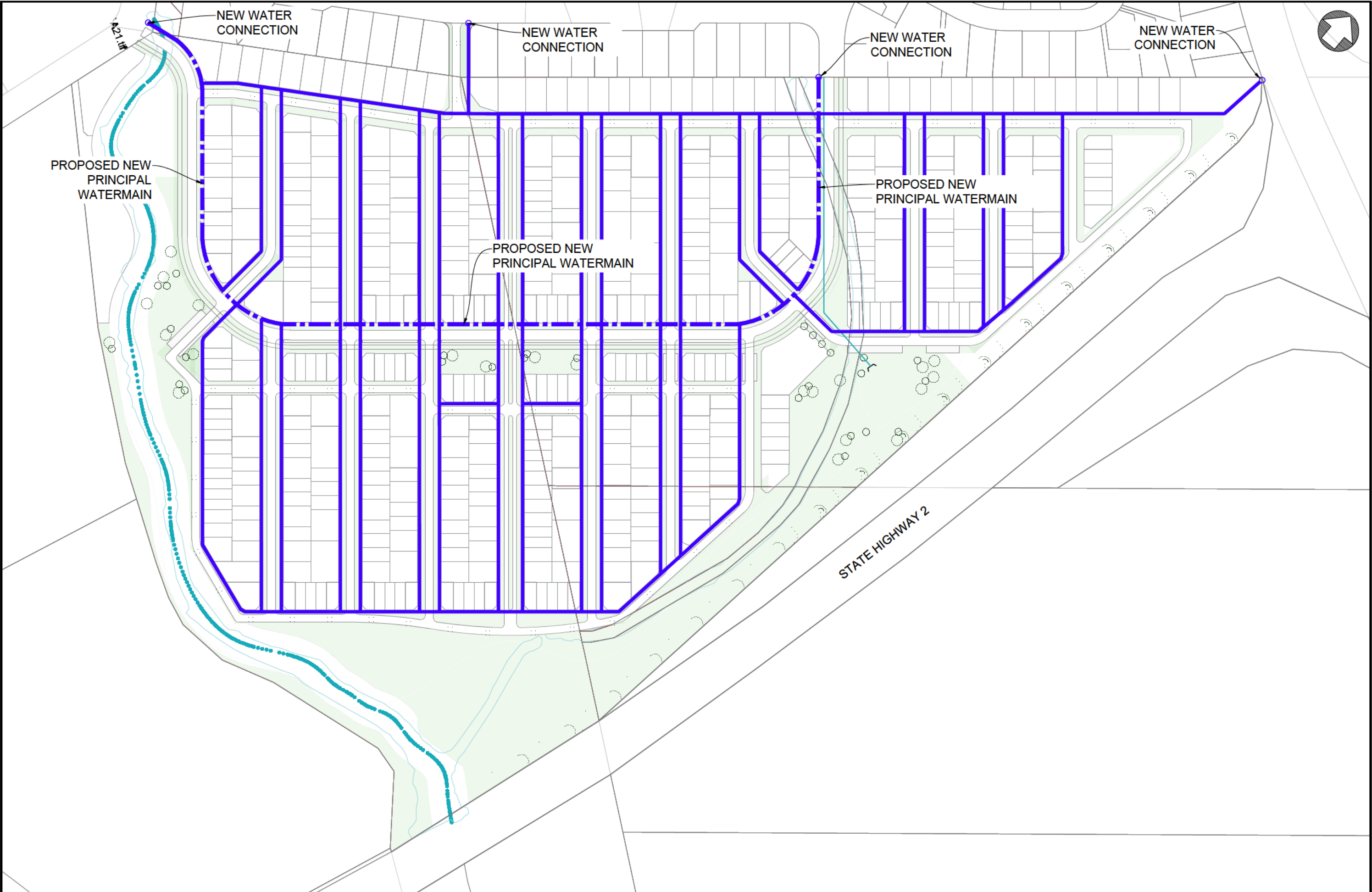
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TITLE
SEWER OVERVIEW

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