

Gardon Trust



**Fraser Thomas**

ENGINEERS • RESOURCE MANAGERS • SURVEYORS




O'HARA WAIUKU PLAN  
CHANGE

ENGINEERING REPORT –  
45A, 92 & 130 CONSTABLE  
RD

Gardon Trust

O'HARA WAIUKU PLAN  
CHANGE

# ENGINEERING REPORT – 45A, 92 & 130 CONSTABLE RD

Project No.	32897	Approved for Issue	
Version No.	4	Name	Sean Finnigan
Status	Final	Signature	
Authors	A Chen, T Bohles, S Finnigan		
Reviewer	S Finnigan, G Maddren	Date	10 March 2022

## Fraser Thomas Limited

Consulting Engineers, Licensed Surveyors  
Planners & Resource Managers  
21 El Kobar Drive, East Tamaki, Auckland 2013  
PO Box 204006, Highbrook, Auckland 2161  
Auckland, New Zealand  
Tel : +64 9 278-7078 : Fax : +64 9 278-3697  
Email: [sfinnigan@ftl.co.nz](mailto:sfinnigan@ftl.co.nz)[@ftl.co.nz](mailto:ftl.co.nz)

**GARDON TRUST  
O’HARA WAIUKU PLAN CHANGE – 45A, 92 AND 130 CONSTABLE ROAD**

**ENGINEERING REPORT**

**EXECUTIVE SUMMARY**

This report has been prepared on behalf of Gardon Trust in support of a proposed Plan Change application to Auckland Council to change the zoning of the sites located at 45A, 92 and 130 Constable Road from ‘Rural – Rural Mixed’ zone to ‘Residential – Mixed Housing Suburban’ Zone. The sites have a combined total area of approximately 33ha.

This report addresses the aspects of the proposed change of zoning in terms of geotechnical constraints, contaminated land, earthworks, stormwater, water supply and wastewater management and utility services. It provides a brief overview of proposed stormwater management measures with these being described in full in the separate Stormwater Management Plan (SMP).

It focuses on the No 92 and 130 Constable Road properties, but including information relating to No 45A where relevant. A separate infrastructure report covering No 45A has been prepared by Crang Consulting Ltd.

**Proposed Development**

The proposed development under the Plan Change would involve subdivision of the site into approximately 700 residential lots with associated roading and extensive open space network.

Under the Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 (Enabling Housing Act, EHA) which comes into effect in August 2022, there is potential for the site to be developed at a higher density (medium density residential standard (MDRS)), resulting in approximately 910 residential lots, allowing for design having already been undertaken for a scheme plan for 55 lots on 45A Constable Road and no changes being made to that for a higher density.

**Staging**

The likely staging sequence, subject to further planning and design work, is tabulated below:

<b>Sequence</b>	<b>Stages served</b>	<b>Essential Infrastructure Prerequisites</b>	<b>Comments</b>
0	1B2, 1C2, 2 (stormwater only)	Wetland	SRPs will be converted into wetland, with planting undertaken as early as practical based on planting seasons. This will allow maximum time for wetland plants to become established prior to the construction of impervious areas.

Sequence	Stages served	Essential Infrastructure Prerequisites	Comments
1	1A, 1B1, 1C1	New Constable Road stormwater and wastewater lines; new water supply ring main and booster pumps (TBC)	New wastewater reticulation line required along Constable Rd for all development; new stormwater line would be installed at same time for cost efficiencies
2	Part 1B2, 1C2 and 2	New wastewater pump station and associated rising main	

### Earthworks

Minor recontouring is proposed across the site to facilitate stormwater management. Cut-fill earthworks are proposed over a total site area of 28.8ha involving 100,000m<sup>3</sup> of cut to fill, achieving a cut/fill balance, based on a 1.15 compaction factor for cut to fill. This represents an average 350mm earthworks depth across the entire site, demonstrating that relatively minor earthworks, are required, albeit over a large area, to achieve the required landform changes.

### Geotechnical

The FTL geotechnical assessment concluded that in general terms and within the limits of the high-level geotechnical assessment undertaken, the site is suitable for the proposed plan change from Mixed Rural Zone to Mixed Housing Suburban Zone and associated future subdivisional development. Two main potential geotechnical hazards within the site were identified relating to slope instability and settlement/subsidence. The site was grouped into three hazard risk zones, with blue (Zone 1) being low risk, yellow (Zone 2) having moderate risk and red (Zone 3) high risk. Zone 3 comprises the more steeply sloping sections of the site close to Constable Road. Site earthworks will regrade this area and reduce the extent of the Zone 2 and 3 areas in the south-eastern corner of the site.

### Soil Contamination

The FTL Preliminary Site Investigation (PSI) involved a desktop study, site walkover and reporting associated with potential land contamination issues on No 92 and 130. This found that the NESCS and the contaminated land provisions of the Auckland Unitary Plan: Operative in Part (AUP:OP) apply to both No 92 & 130. These properties have essentially been used for livestock grazing purposes for the last 80 years. However, during this time, the following potential or actual HAIL activities have occurred on-site:

- Historical application of lead based paint and burning of unknown materials (potential I);
- Stock loading ramps and potential spray races (A8); and
- Asbestos products in a deteriorated state (E1) (92 Constable Road only).

The two properties are considered suitable for proposed residential development. However, there are localised potential contamination issues at the subject sites that may present a risk to the health of site workers or residents from future residential developments. Hence, prior to subdivision or soil disturbance works, a Detailed Site Investigation will be required for both of these properties, which will determine the extent and severity of soil contamination (if any), the consent

status of these areas under the NESCS and AUP:OP, and the need for any remedial works (if required).

### **Stormwater**

The proposed stormwater management measures satisfy the requirements for “greenfield developments” set out under the regional Stormwater Network Discharge Consent, in relation to the essential components of a Stormwater Management Plan (SMP) which is provided as a separate report, addressing water quality, stream hydrology, flooding: 10% AEP property/pipe capacity and flooding: 1% AEP – buildings, as well as the requirements for a private stormwater discharge consent under Section E8, Activity A10 of the AUP:OP as a **discretionary** activity, should this be required.

To meet these requirements, stormwater from the proposed development will be managed in the following ways:

- Treatment of impervious areas including roofing (except where relatively inert roofing materials are used), paving and roading.
- Retention of 5mm of rainfall from all impervious areas.
- Detention of the difference in runoff volume from pre development to post development for a 95th percentile storm.
- No increases in peak flow for a 10% Annual Exceedance Probability (AEP) event from the site.
- No increases in downstream flooding for a 1% AEP event, for those areas where downstream flooding is currently a problem.

Key features of this approach are minor recontouring of the site so as to redirect runoff from stormwater problem areas (i.e. Breaker Grove/O’Sullivan Place area) through a large constructed treatment/retention/detention wetland to the Rangiwhea Stream, which has significant flow and volume capacity, whilst a new 825-1200mm diameter stormwater pipeline will also be provided along Constable Road. The latter goes beyond the minimum compliance requirements of the Regional Stormwater Network Discharge Consent, further alleviating existing stormwater and flooding problems in the Breaker Grove/O’Sullivan Place area. The proposed stormwater management measures have been assessed against recommendations from the Cultural Values Assessment and the NDC Schedule 4 requirements and show strong alignment with both documents.

### **Household/Population Projections versus Available Residential Land**

It is important that future development on the Plan Change land is capable of being serviced with essential infrastructure. The purpose of this section is to estimate the quantities and timing of demand for water and wastewater services based on projections for the likely residential growth in Waiuku over the next couple of decades.

The position outlined is based on the best information made available by Watercare and other information sources, at the time of completing this Report. Further information has been requested from Watercare, and there is ongoing dialogue over the Plan Change, and how it relates

to existing and future planned services capacity for Waiuku. It is expected that Watercare will make a submission on the Plan Change and this will further progress the overall understanding of servicing options.

Household and population projections were undertaken for the following projections:

- Low (NZ Statistics projections) – 34 new houses per year till 2030 and then 32/yr after that.
- Medium – 60 new houses per year till 2030 and then 35/yr after that, representing an intermediate scenario between the low and high projections.
- High – 120 new houses per year till 2030 (from the Urban Economics report) and then reducing to 70/yr after that, equivalent to approximately twice the NZ Statistics projection for 2028-2038.

Urban Economics have estimated that the maximum capacity for new dwellings in the existing urban zoned area is approximately 309 based on AUP:OP zonings, but this has the potential to increase to 536 based on the anticipated more intensive medium density Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021 zonings (referred to here as the “**Enabling Housing Act**”). The O’Hara Plan Change would add an estimated additional 700 and 910 dwellings to the available capacity for the AUP:OP Mixed House Suburban (**MHS**) zoning and the Housing Enabling Act Medium Density Residential Standard (**MDRS**) respectively.

Comparing these numbers with the population projections, and based on the information currently available, the estimated number of years to reach the maximum estimated capacity for residential housing in Waiuku is summarised below:

Scenarios			Estimated New dwellings	No of Yrs to Reach Capacity			Maximum estimated population
No	Urban Area	Zoning		Low	Medium	High	
1	Without O'Hara PC	AUP MHS	309	9.1	5.2	2.6	10,521
2		EHA MDRS	536	16.3	9.6	4.5	11,168
3	With O'Hara PC	AUP MHS	1009	31.0	23.1	8.4	12,516
4		EHA MDRS	1446	44.7	35.6	14.9	13,761

Note: EHA = Enabling Housing Act; MHS = mixed house suburban; MDRS = medium density residential scenario. Max estimated population based on 2020 NZ Stats population of 9640 and estimated new dwellings x 2.85 per dwelling

The O’Hara Plan Change area is therefore considered to be required to meet projected residential demand within the Waiuku area beyond the timeframes set out above for scenarios 1 and 2. These time frames represent forward capacity of 2.6-9.1 years for AUP MHS existing zoning (scenario 1) and 4.5-16.3 years for EHA MDRS zoning (scenario 2).

## Water Supply

It is understood that the Auckland Council resource consent WAT60071034 allows Watercare to take up to 1,453,000m<sup>3</sup>/yr of groundwater from 30 June 2020 to 30 June 2052 for a municipal water supply for Waiuku. Condition 5 of this consent limits the amount of groundwater abstracted to specified stepped volumes covering five year increments.

Water demand forecasting for these scenarios shows that the water demand to 2050 falls within the understood Watercare forecasts and allowable groundwater take to 2050 for the low and medium projections, but would exceed the Watercare forecasts and allowable take by 2030 for the high growth projection.

However, by comparison with the household capacity assessment (with the Plan Change area included) Waiuku is predicted to run out of residential land in 8.4 years (under AUP MHS zonings) and in 14.9 years under the more intensive Enabling Housing Act MDRS zonings. Hence, for this scenario to eventuate, more intensive development would need to occur across Waiuku compared with existing AUP zonings and/or more land would need to be rezoned for residential use in addition to the O'Hara Plan Change area.

Our assessment has further shown that the Watercare consent groundwater take limit is only estimated to be reached for the high growth scenario around 2040, reaching a requirement of 1,652,029m<sup>3</sup>/yr by 2052 (198,209m<sup>3</sup> above the maximum limit) but further rezoning of land (beyond the Ohara Plan Change) for residential development would be required to meet this limit.

Consent condition 5 states that the allocation of water to the consent holder under this permit is unfettered, but the take is to be staged, initially in accordance with the Watercare forecasted water demand and then in accordance with the revised water demand forecasts that the consent holder is to provide on a five yearly basis in their Water Supply Demand Management Plan. The first of these reports was due in September 2020 and thereafter at five yearly intervals.

The advice note under this condition appears to allow Watercare to revise the staged allocation should there be an unexpected increase in the demand for water during any 'time period', by providing an updated forecast and request the Council (Team Leader Consents and Compliance – Water Allocation) to revise the staged allocation. FTL are continuing to engage with Watercare and Council to fully understand the future availability of water under this existing take.

A summary of the latest available information, provided by Auckland Council's Coastal & Water Allocation Team, is set out below:

- The Watercare Waiuku consent Hearing application process set availability for the Waiuku Kaawa aquifer as 3,203,000m<sup>3</sup>/yr. Council records show that the present allocations total 3,001,660m<sup>3</sup>/yr. That allows for the final allocation of the staged allocation to WSL Waiuku as per the Commissioner's decision. Hence, there is potentially 201,340m<sup>3</sup>/yr remaining, not allowing for RMA s14(3)(b) use. There are no outstanding applications.
- However, the new AC S14 model had total S14 use as 301,230m<sup>3</sup>/yr, so on this basis the aquifer is over-allocated by about 100,000m<sup>3</sup>/yr. Council are uncertain that the AC S14 model output is a correct estimate and are working to resolve that. A recent s14 estimate by the

Water Specialist Unit based on the area of High producing exotic grassland have been less than the 2019 model value.

- It is also possible that some Waiuku Kaawa consent holders may not have the need for all of the allocation that their consent provides (for whatever reason) and would be willing to surrender part of that allocation or transfer part of their allocation.

Hence, the availability of additional groundwater for Waiuku above the consented limit needs to be confirmed and this will be discussed as part of ongoing consultation with Council and Watercare.

Funds are allocated in the Watercare AMP to update the water treatment plant (WTP) for completion in 2025, and it is understood that a business case would be developed before project timing and final funding can be confirmed. Watercare have advised that the new plant is likely to have a modular design initially for a population of about 12,500. Infrastructure growth charges (IGCs) from new developments associated with the forecast population growth will contribute towards these costs. Campbell Brown Planning have provided estimates of the ICGs for the Plan Change and they would make a significant contribution to upgrade works to increase capacity.

### **Water Reticulation**

It is proposed to connect into the existing water supply network at two locations along Constable Road (180mm existing main) and King Street (280mm existing main), creating a new ring main to service the proposed Plan Change area. A static water network assessment, based on available hydrant flow test data has shown that the existing water supply network has sufficient capacity to cater for the proposed plan change area subject to booster pumps potentially being required to achieve the Watercare 250kPa minimum design pressure across the majority of the site within the proposed ring main loop. Subsequent detailed modelling can then refine the water reticulation network at the resource consent application stage. This applies both for the 700 and MDRS 910 residential lot developments.

Watercare in their letter of 15 December 2021 have advised that based on a fire flow of FW2 (25L/s), and sufficient new pipe infrastructure from King St to supply the proposed development, no wider network pressure issues are expected.

### **Wastewater Treatment and Disposal**

Watercare have allowed for the proposed South-west Wastewater System upgrade to service a Waiuku population equivalent of 16,000 by 2050 and a total population of 30,000-50,000, with the higher figure allowing for higher growth in the Kingseat area. Review of Watercare's wastewater projections shows that this figure is approximately equivalent to an adjusted population projection for Waiuku for 2050 of **13,472** on a per person basis.

FTL has estimated the required population equivalent for the Waiuku component of the new WWTP to be 14,561, 16,237 and 21,226 in 2050 for the low, medium and high projections, with the medium projection being slightly above the 16,000 design provision and the high projection being well above it.



However, for the high projection, the 16,000 PE limit is reached around 2030, when the estimated population reaches 13,060, which is in excess of the maximum projected population under existing AUP zonings for Waiuku, including the Plan Change area, and hence means development to the denser Enabling Housing Act MDRS zonings would be required to achieve it. Furthermore, when the population reaches 13,761 (maximum estimated development under EHA MDRS zonings, including the Plan Change area) around 3.5yrs after 2030 according to the high projection, additional land would need to be rezoned urban residential for any more growth to occur. The maximum theoretical population of 13,761 under EHA MDRS zonings including the Plan Change area is equivalent to a 17,132 PE, which is 7% above the Watercare 16,000 design PE.

Various information from Watercare indicates the capacity of the existing Waiuku WWTP to be in the range of 17,000-20,000 people. This means that Watercare are understood to be effectively allowing for the new WWTP (16,000 PE) to serve a smaller Waiuku population than the current system (17,000-20,000 people depending on source), therefore reducing the future proofing built into the existing Waiuku WWTP.

At a public WSL online meeting for the Southwest Wastewater project, held on 29 September 2021, WSL advised that they have advanced further investigation and design work for this project and were now in the process of working through a shortlist of potential site locations. They advised that construction work is scheduled to commence in the next two years and the new WWTP is required to be operational by June 2026, as outlined in the Environment Court consent order. They indicated that funding is now available for this project – their 2021-41 AMP shows available funding to be \$216M for the period 2021-31 and \$23M for the period 2031-41, of which the Waiuku share on a population proportional basis is estimated to be \$76-127M. The Plan Change area would contribute towards the costs of this scheme through the Watercare IGCs.

It is understood that there is concern in the Council and Watercare about the funding of infrastructure for the Plan Change. FTL is aware that the developers are exploring a number of infrastructure funding options, including:

- (a) Applying under the Infrastructure and Financing Act to create a Special Purpose Vehicle (SPV) which would reduce DCs with a targeted rate applied over 30 years.
- (b) Applying to the government's Infrastructure Acceleration Fund for funding, this being separate but complementary to the SPV mechanism.

It is usual practice for a development agreement to be entered into regarding the servicing of a Plan Change, as recently occurred with Plan Change 55 at Patumahoe. FTL understand that the Ohara Plan Change land owners are willing to enter into an agreement with Watercare at an appropriate time. At this stage further work is required, in collaboration with Watercare, to work towards agreement on;

- (a) forecast likely residential demand in Waiuku,
- (b) what existing or planned network capacity may be available for the Plan Change that would be paid for with ICGs in the usual manner;
- (c) subject to the conclusions above, what additional public infrastructure may be required to provide capacity to service the development; and
- (d) the timing and cost of any additional public service capacity.

Constructive engagement with Watercare to work through the questions above has already commenced. The landowners and FTL look forward to continuing to work with Watercare to identify technical options/solutions to service the Plan Change, and enable much needed housing to be provided.

### **Wastewater Reticulation**

Waiuku is serviced by a reticulated wastewater network that discharges to the Waiuku Wastewater Treatment Plant (WWTP) which is located adjacent to the Clarks Beach golf course. The nearest wastewater reticulation networks are located along King St to north of the site and Constable Road to the east of the site. These networks combine near the King St/Constable Rd junction and continue to the King St Wastewater Pump Station (WWPS).

Two viable wastewater reticulation options have been developed for the Plan Change area.

The first option (Option B) involves a new wastewater line along Constable Road to service the 45A/92/130 development area, based on the existing wastewater system in this area being under capacity to take the 45A area, let alone the 92 and 130 areas. This line would involve 938m of new 225mm diameter pipe running from King St to adjacent to 47 Constable Road. For this option, the final 47m section of existing pipe at the King St end also needs to be upgraded to 300mm diameter. Details are shown on Crang Civil drawings C556 (plan) and C561 (long-section). For this option, wastewater from the majority of the 92/130 Constable Rd development area can be conveyed by gravity to the new Constable Road line. Up to approximately 3.4ha of the development area may still need to be serviced by a relatively small wastewater pump station, located by the proposed wetland. It may be possible to reduce the size of the pump station catchment as part of further design work as there is potential to lower the upper portion of the new Constable Rd line by around 1.7m. This layout is shown on Fraser Thomas drawing 32897/303.

The second option involves:

- 45A development (Option A): A new wastewater line comprising 200mm diameter pipes of length 412m running from King St to just south of Leonard St to service the 45/45A development. This option also involves upgrading the final 47m section of existing pipe at the King St end to 300mm diameter to accommodate increased flows from the wastewater line along King St (taking 92/130 development wastewater) joining into it. Details are shown on the Crang Civil drawings C555 (plan) and long-section (C560). Additional upgrades as discussed in this report would apply for the MDRS 910 lot development.
- 92/130 development (Option C): A gravity wastewater collection system to a new pump station on the site and a new rising main to connect into the existing wastewater system along King St, with the King St system to be upgraded. For properties along Constable Road, a deep gravity line or a local pump station that discharges to a gravity line at the ridge of the site will be required to service these lots. The King St upgrade would involve an estimated 436m of 150dia pipe being upgraded to 200dia and 47m of 200dia pipe being upgraded to 300dia (also required for Option A), or installing a new separate duplicate line or falling main within the road reserve along King St directly into the King St Wastewater Pump Station. This option would also involve a new rising main through the Proposed Plan Change area and through

existing recreational/sportsfield land to connect into the King St system. This layout is shown on FTL drawing 32897/302.

Some additional upgrades as discussed in this report would apply for the MDRS 910 lot development.

### **Utilities**

There are existing power and telecommunication services in the Constable Road berm. These are currently being extended to service the 45 Constable Road subdivision and can be further extended to service No 45A, 92 and 130. Counties Power have advised that upgrades of existing network infrastructure will be necessary to accommodate this development, while Chorus has advised that they would confirm any upgrades required to support the proposed development once a new connection request is lodged.

### **Conclusion**

This engineering report has shown that the proposed change of zoning for No 45A, 92 and 130 Constable Road is appropriate in terms of geotechnical constraints, contaminated land, earthworks, and the provision of stormwater management. While further information, and engagement with Watercare, will help to clarify the final water and wastewater infrastructure requirements for the proposed Plan Change it is considered that the development is technically capable of being serviced in the future. Therefore, the Plan Change can meet the requirements of the Resource Management Act, AUP:OP, NPS-UD, and the Auckland Regional Stormwater NDC.

## GARDON TRUST

### O’HARA WAIUKU PLAN CHANGE – 45A, 92 AND 130 CONSTABLE ROAD

#### ENGINEERING REPORT

#### TABLE OF CONTENTS

1.0	INTRODUCTION .....	1
2.0	SITE CHARACTERISTICS.....	1
2.1	EXISTING LAND USE.....	2
2.1.1	45/45A CONSTABLE ROAD.....	2
2.1.2	92 CONSTABLE ROAD .....	2
2.1.3	130 CONSTABLE ROAD .....	3
2.2	TOPOGRAPHY .....	3
2.3	GEOLOGY .....	3
2.4	OVERLAYS .....	4
2.5	DRAINAGE AND FLOODING .....	4
2.6	GROUNDWATER AQUIFERS.....	4
2.7	ECOLOGY .....	5
2.8	MARINE RECEIVING ENVIRONMENT .....	5
2.9	WATER SUPPLY .....	6
2.10	WASTEWATER .....	7
2.11	UTILITIES.....	8
3.0	PROPOSED DEVELOPMENT CONSIDERATIONS .....	8
3.1	PROPOSED DEVELOPMENT .....	8
3.2	IWI CONSIDERATIONS .....	9
3.3	DEVELOPMENT OF 45/45A CONSTABLE ROAD .....	12
3.3.1	APPROVED ENGINEERING PLANS .....	12
3.3.2	PROPOSED FURTHER CHANGES – JULY 2021 .....	13
3.4	EARTHWORKS.....	14
3.5	GEOTECHNICAL.....	14
3.5.1	ZONE 1 – LOW RISK .....	15
3.5.2	ZONE 2 – MODERATE RISK .....	15
3.5.3	ZONE 3 – HIGH RISK.....	15
3.5.4	ZONING CHANGES AS A RESULT OF PROPOSED EARTHWORKS.....	16
3.6	POTENTIAL SOIL CONTAMINATION.....	16

3.7	ROADING AND GREENWAYS .....	16
4.0	STORMWATER.....	17
5.0	WAIUKU GROWTH FORECASTS AND WATER/WASTEWATER DEMAND PROJECTIONS.....	18
5.1	POPULATION AND HOUSEHOLD GROWTH PROJECTIONS .....	18
5.2	HIGH LEVEL CONSTRAINTS MAPPING .....	19
5.3	TIMING FOR ALL RESIDENTIAL CAPACITY TO BE UTILISED .....	26
5.4	WATER DEMAND PROJECTIONS.....	27
5.4.1	METHODOLOGY.....	27
5.4.2	AVAILABLE RESOURCE .....	28
5.4.3	LOW (NZ STATISTICS) PROJECTION .....	29
5.4.4	MEDIUM (UE 60/35) PROJECTION.....	30
5.4.5	HIGH (UE 120/70) PROJECTION .....	30
5.4.6	DISCUSSION .....	31
5.4.7	POTENTIAL TO INCREASE MAXIMUM GROUNDWATER TAKE.....	31
5.5	WASTEWATER .....	32
5.5.1	WATERCARE FORECASTS.....	32
5.5.2	CAPACITY OF EXISTING WAIUKU WWTP .....	34
5.5.3	STATUS OF SOUTHWEST WASTEWATER PROJECT .....	35
5.5.4	FTL FORECASTS.....	36
5.6	INFRASTRUCTURE FUNDING .....	37
5.7	STAGING .....	38
5.7.1	WATER .....	39
5.7.2	WASTEWATER.....	40
6.0	WATER RETICULATION .....	40
6.1	WATER CONNECTION .....	40
6.2	DEVELOPMENT WATER SUPPLY DEMAND .....	42
6.3	WATER RETICULATION CAPACITY ASSESSMENT .....	42
6.3.1	ASSESSMENT CRITERIA .....	42
6.3.2	CAPACITY ASSESSMENT.....	43
6.3.3	ASSESSMENT SUMMARY .....	45
6.4	FUTURE POTENTIAL INTENSIFICATION UNDER RMA AMENDMENT BILL .....	45
7.0	WASTEWATER RETICULATION.....	46
7.1	EXISTING INFRASTRUCTURE .....	46
7.2	PROPOSED DEVELOPMENT .....	46
7.2.1	WASTEWATER GENERATION .....	46
7.2.2	WASTEWATER RETICULATION – CONSTABLE ROAD OPTION.....	47
7.2.3	WASTEWATER RETICULATION – PUMP STATION, RISING MAIN AND KING ST CONNECTION OPTION 47	
7.3	PRELIMINARY CONSULTATION WITH WATERCARE.....	48
7.4	WASTEWATER STATIC NETWORK ASSESSMENT .....	48
7.4.1	CONNECTION ONTO CONSTABLE ROAD NETWORK.....	49
7.4.2	CONNECTION ONTO KING ST NETWORK.....	49

7.4.3	EXISTING SCENARIO.....	50
7.4.4	PROPOSED SCENARIO.....	50
7.5	WASTEWATER NETWORK UPGRADE.....	50
7.6	FUTURE POTENTIAL INTENSIFICATION (O’HARA PLAN CHANGE) .....	51
7.7	KING ST AND KOHWAI PLACE WASTEWATER PUMP STATIONS .....	52
7.8	WASTEWATER TREATMENT .....	53
8.0	UTILITIES.....	53
9.0	CONCLUSIONS .....	53
10.0	DISCLAIMER.....	53

## FIGURES

Figure 1:	Site Location Plan .....	1
Figure 2:	Quality Sensitive Aquifer Management Area Overlay .....	5
Figure 3:	Existing Public Water Reticulation Network (darker blue lines) in vicinity of site (approx. location of bore on No 92 shown by red star).....	7
Figure 4:	Existing Public Wastewater Reticulation Network (red lines) in vicinity of site .....	7
Figure 5:	O’Hara Plan Change Urban Design Concept.....	8
Figure 6:	Waiuku Household Growth Projection .....	26
Figure 7:	Waiuku Water Demand Forecast – NZ Statistics Projection .....	29
Figure 8:	Waiuku Water Demand Forecast – UE 60/35 Projection.....	30
Figure 9:	Waiuku Water Demand Forecast – UE 60/35 Projection.....	30
Figure 10:	Waiuku Water Demand Forecast – UE 60/35 Projection.....	34
Figure 11:	FTL Waiuku Wastewater Forecast (PE) .....	36
Figure 12:	Proposed Indicative Water Supply Network Extension Layout (Worst Case Layout for Hydraulic Analysis Purposes).....	41
Figure 13:	Water Supply Network (Q vs H) – Linearly Interpolated from Hydrant Test Results.....	43
Figure 14:	EPANET results – Scenario 1: Watercare Design Flow (26.7l/s).....	44
Figure 15:	EPANET results – Scenario 2: NZS4509-2008 Design Flow (42.8l/s) .....	45

## TABLES

Table 1:	Site Details .....	2
Table 2:	CVA Recommendations and Design Response .....	9
Table 3:	Summary of Assessed Subdivision Potential .....	20
Table 4:	High Level Constraints Mapping Summary.....	22
Table 5:	Summary of Assessed Subdivision Potential .....	26
Table 6:	Summary of Watercare’s Forecasted Water Demand and Maximum Allowable Take.....	28
Table 7:	Watercare Growth Projections in the South-west Growth Area .....	32
Table 8:	Watercare 2021-41 AMP Funding Allocation – Waiuku Water and Wastewater .....	37
Table 9:	Assessed Flow Scenarios and Required Minimum Pressures.....	43
Table 10:	Proposed water demand allowing for 910 total lots.....	46
Table 11:	Proposed Wastewater Flows.....	46
Table 12:	Proposed wastewater flow allowing for 910 total lots .....	51
Table 13:	King Street WWPS Storage Requirements .....	52

## DRAWINGS

32897/22	Potential Subdivision Parcels (AUP and no Aerial Overlay)
32897/23	Potential Subdivision Parcels (Geology Overlay)
32897/24	Existing Hazard Map within Potential Parcels (Sheet 1 of 5)
32897/25	Existing Hazard Map within Potential Parcels (Sheet 2 of 5)
32897/26	Existing Hazard Map within Potential Parcels (Sheet 3 of 5)
32897/27	Existing Hazard Map within Potential Parcels (Sheet 4 of 5)
32897/28	Existing Hazard Map within Potential Parcels (Sheet 5 of 5)
32897/101	Proposed Development Plan
32897/102	Proposed Earthworks Cut and Fill Plan
32897/103	Proposed Site Drainage Long-sections
32897/104	Geotechnical Risk Zones for Proposed Ground Levels
32897/105	Preliminary Staging Plan
32897/301	Public Wastewater Catchment Plan
32897/302	Proposed Wastewater Reticulation – Options A and C
32897/303	Proposed Wastewater Reticulation – Option B
32897/304	Option C - Under Capacity Network – Existing
32897/305	Option C - Under Capacity Network – Proposed
32897/306	Option C - Existing Services Plan – Sheet 1 of 2
32897/307	Option C - Existing Services Plan – Sheet 2 of 2
32897/308	Option C - Wastewater Network Upgrade Plan (indicative)
32897/401	Water Supply Assessment Plan

## APPENDICES

A	Water Calculations
B	Wastewater Calculations
C	Counties Power Correspondence
D	Topographical Survey Data
E	Potential Subdivision Areas High Level Constraints Mapping
F	Population/Household Projections and Water Demand/Wastewater Forecasts

**GARDON TRUST**  
**O'HARA WAIUKU PLAN CHANGE – 45A, 92 AND 130 CONSTABLE ROAD**

**ENGINEERING REPORT**

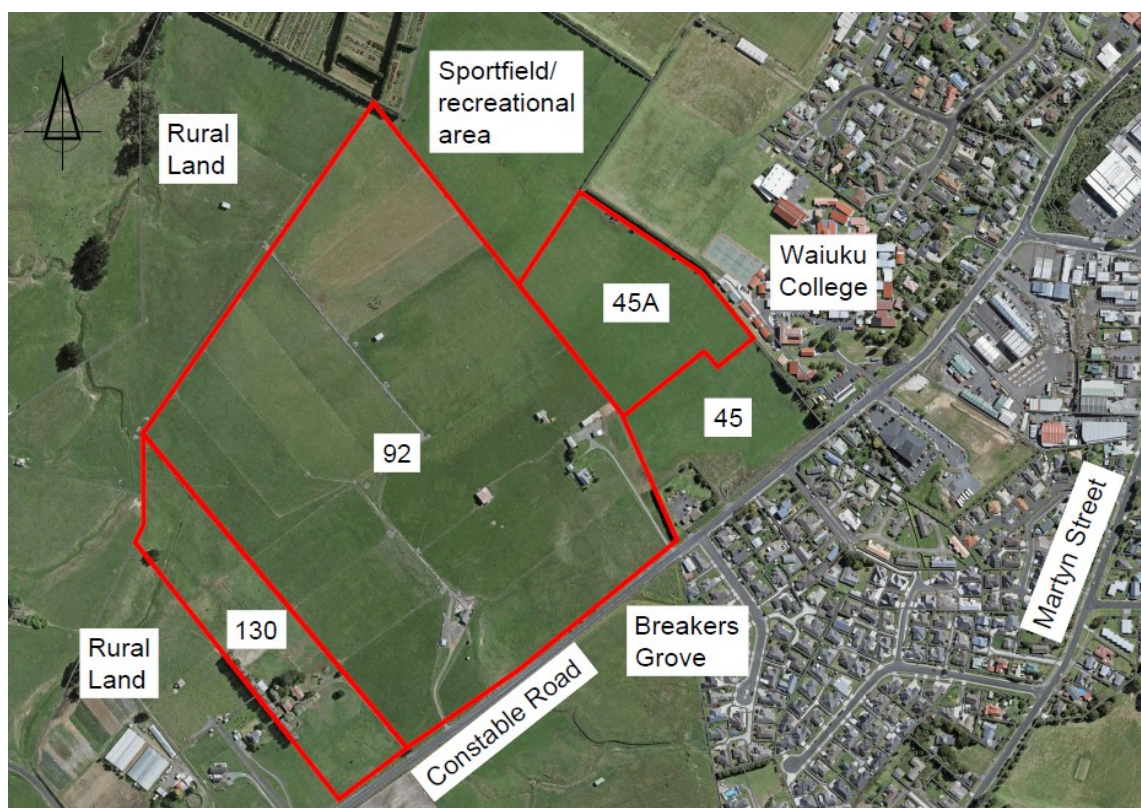
## 1.0 INTRODUCTION

This report has been prepared on behalf of Gardon Trust in support of a proposed Plan Change application to Auckland Council to change the zoning of the sites located at 45A, 92 and 130 Constable Road from 'Rural – Rural Mixed' zone to 'Residential – Mixed Housing Suburban' Zone. The sites have a combined total area of approximately 33ha.

This report addresses the aspects of the proposed change of zoning in terms of geotechnical constraints, contaminated land, earthworks, stormwater, water supply and wastewater management and utility services. It provides a brief overview of proposed stormwater management measures with these being described in full in the separate Stormwater Management Plan (SMP).

## 2.0 SITE CHARACTERISTICS

The site is located on the northern side of Constable Road on the south-western side of the Waiuku township, abutting the current urban zoning boundary. It is surrounded by urban residential land to the east (Breaker Grove/Martyn Street area), rural land to the south and west, recreational land to the north-west and Waiuku College to the north-east. The site location and extent is shown in Figure 1 below.



**Figure 1: Site Location Plan**



The Plan Change site comprises three separate parcels of land, as listed in Table 1.

**Table 1: Site Details**

Registered Owner	Address	Legal Description	Title	Area (ha)	Zoning; Land Use
Pokorua Holdings Ltd	45A Constable Rd	SEC 1 SO 65397	NA85A/37	3.6434	Rural-Residential; Former pasture – currently subject to earthworks
Annette Therese Black, Donna Goettler, Gary Ian Goettler	92 Constable Rd	Pt Lot 4 Deeds Reg WHAU 29 DISTRICT	NA771/107	24.9033	Rural-Residential; Pasture
Terry Short	130 Constable Rd	Lot 3 DP 64198	NA26B/939	4.0448	Rural-Residential; Pasture
Total				32.5915	

**Note:** 45/45A Constable Road are shown as a single lot in Geomaps and other cadastral software. No 45 is zoned “residential-mixed housing suburban” while No 45A is zoned “rural-rural mixed”. The 45/45A lot has a total area of 6.1477ha. The 45A portion is 3.64ha.

## 2.1 EXISTING LAND USE

The existing land use on each of the lots making up the Plan Change area is described separately in this section.

### 2.1.1 45/45A Constable Road

The No 45/45A site generally comprised gently undulating farm paddocks that has historically been used for grazing and growing maize.

Resource consent has been granted for the proposed residential subdivision of 45 Constable Road (SUB60237908) and for associated earthworks, including earthworks on No 45A (Ref: LUC60111076-A, LUC60271724-A). Bulk earthworks were undertaken on 45/45A Constable Road during the 2020/21 earthworks season. These earthworks include cut to fill across the entire property, with No 45A providing fill material for No 45 and No 45A also been used for stockpiling of unsuitable material and topsoil from the earthworks. It is understood that minor earthworks are still required on No 45A for final grading and establishing overland flowpaths.

### 2.1.2 92 Constable Road

The land is currently used as a dairy overflow for livestock grazing purposes and has been used for pastoral grazing purposes for the last 80 years. Two gravel accessways extend north-west from Constable Road, providing vehicular access to a decommissioned milk shed and paddocks (south-western accessway) and existing dwelling and associated farm buildings (south-eastern accessway).

An existing single-storey dwelling and a number of farm buildings are located adjacent to the north-eastern site boundary in the south-eastern corner of the site. Three additional farm buildings/sheds are located in the central part of the site. The central part of the site generally comprised gently undulating farm paddocks.

### **2.1.3 130 CONSTABLE ROAD**

The property has historically been used for grazing horses and farming practices, which still applies today. A gravel accessway extends north-west from Constable Road, providing vehicular access to the property. An existing single-story dwelling and minor dwelling/garage are located in the western part of the site, while an existing shed is located to the north-west of the existing dwellings. Numerous, up to approximately 10 m tall trees, are located to the north-west and south-east of the existing dwellings and along the south-western site boundary, proximal to the existing dwellings. A horse arena is located approximately 50m north-west of the existing dwellings.

## **2.2 TOPOGRAPHY**

A ridge feature extends from 130 Constable Road to 45A Constable Road across the south-eastern part of the site. North-west of this ridge feature, the site is generally moderately undulating comprising a series of benches up to approximately 1.0 m in vertical height slopes. Low-lying areas within the site have arcuate features, benched and hummocky topography, indicative of localised, shallow-seated slope instability and soil creep features. The low-lying areas of the site generally coincide with overland flow paths and flood prone areas (from Council Geomaps) as shown on the attached Fraser Thomas Ltd drawing 64932/1.

The north-western site boundary generally abuts the crest of a north-west to south-east trending ridge that generally slopes down into 38 Harvey Road, Waiuku at an angle of approximately 8° to the horizontal.

## **2.3 GEOLOGY**

A high level geotechnical assessment has been undertaken of the Plan Change area by Fraser Thomas, involving a desktop review of relevant geological maps, a visual appraisal and geotechnical assessment of the subject site to determine the subsoil conditions beneath the site and their implications for the proposed plan change.

The Institute of Geological and Nuclear Sciences map, scale 1:250,000, geological map 3, 2001, Geology of the Auckland Area and the Provisional Geological Map of New Zealand, scale 1:50,000, Pukekohe, Sheet R12 indicate that the site is in general underlain by Puketoka Formation alluvial soils of the Tauranga Group of Pliocene to Pleistocene Age and Awhitu Group sand dunes and associated facies of Pliocene age.

The subsurface conditions at the site were investigated by means of nine hand augered boreholes and associated dynamic cone (Scala) penetrometer (DCP) tests. The results of the visual appraisal and borehole investigation undertaken for the site, as reported herein, generally confirm that the site is underlain by Tauranga Group alluvial inorganic and organic soils and Awhitu Group sediments. However, a surficial veneer of reworked volcanic ash was encountered in the south half of the site. Surficial material, inferred to be recent alluvial sediments, was also encountered adjacent to overland flow paths.

Refer to the separate geotechnical investigation report for further details.

## 2.4 OVERLAYS

The site is not located within any stormwater related overlays, including Stormwater Management Area Flow (SMAF) or significant ecological areas (SEAs). It is located in an aquifer overlay area as discussed further in section 2.6 of this report.

## 2.5 DRAINAGE AND FLOODING

Drainage and flooding is discussed in full in the separate Stormwater Management Plan, based on Geomaps data, site observations and Waiuku ICMP (Integrated Catchment Management Plan) modelling. This information is not repeated here.

## 2.6 GROUNDWATER AQUIFERS

The Waiuku area overlies three sequences of significant groundwater reserves. These are broadly grouped as:

- Waitemata Group, consisting of interbedded sequences of mudstone and sandstone, some highly fractured; these are overlain by the:
- Kaawa aquifer, consisting of porous shell bed layers, sand and weakly-cemented, fractured sandstone; these, in turn, are overlain by the:
- Glenbrook volcanic aquifer, of basalt lava flows interspersed with scoria, lapilli and tuff deposits. The volcanic aquifer is generally covered by thick soil.

A detailed description of the respective aquifers and their hydrologic regimes is presented in the Auckland Regional Council report, Technical Publication (TP) 133 (2002).

The Kaawa aquifer and the volcanic aquifer are both heavily used and are subdivided, for administrative convenience, into a number of management areas. In the vicinity of Waiuku, the volcanic aquifer is represented by the Glenbrook volcanic management area and the Kaawa aquifer by the Waiuku Kaawa management area. The Waiuku public water supply wells draw from the Kaawa aquifer (Waiuku Kaawa management area). Groundwater from both the volcanic and the Kaawa aquifers is considered to be of excellent quality.

Review of aquifer plans in the WICMP and on the Unitary Plan maps indicates that the subject site is located outside of both the Kaawa and Glenbrook volcanic aquifer management areas, but is underlain by a “quality sensitive aquifer management area” overlay (refer Figure 2).

Auckland Council’s Water Allocation Team have advised that the subject site is underlain by the Waitemata aquifer. This consists of variably indurated, interbedded mudstones and sandstones of the Waitemata Group rocks. Although primary permeability is low, useful quantities of groundwater are obtained from fracture zones. Recharge is by vertical percolation from the surface and leakage from overlying strata, in particular the Kaawa aquifer - where the two overlap.

The Waitemata aquifer at Waiuku is not currently a High-Use Management Area at present and is not used by Franklin District for public supply. Use of the Waitemata aquifer around Waiuku is primarily outside of the footprint of the Glenbrook volcanic and Waiuku Kaawa aquifers (drawings 31671/3 and 4).



**Figure 2: Quality Sensitive Aquifer Management Area Overlay**

## 2.7 ECOLOGY

Golder Associates undertook an ecological assessment of the WICMP area as a sub-consultant to Fraser Thomas in 2008-2010. Their assessment covered:

- Terrestrial vegetation.
- Environmental quality – water and sediment.
- Habitat and ecology.
- Marine ecology (refer section 2.8).

This work is reported on in Section 5 of the WICMP and is summarised in the separate Ecological report by Boffa Miskell.

## 2.8 MARINE RECEIVING ENVIRONMENT

All three catchments drain via different routes to the estuarine receiving environment, referred to as the Waiuku River or Channel, which is a branch of the Manukau Harbour.

Technical Report No 2 of the ARC-TA's Regional Urban Stormwater Strategy (SLG, 1997) identifies the Waiuku Catchment as largely lying within the Waitangi Stream catchment (No 436600) and the receiving environment as being the Waiuku River. The Waiuku River is described as a long, narrow, predominantly shallow waterway and is in fact an estuarial arm of the Manukau Harbour. It has a number of habitats within it, including sandbanks, spits, sandy shores, maritime marsh, and extensive mangrove marshes. Two sites, Pollok Spit, at the entrance to the Waiuku River, and Waipipi Creek, approximately 6 km down the river, are important conservation and bird roosting sites.

The River is home to diverse sandflat and mudflat communities. Common species include cockles, wedge shells, topshells, catseyes and welks. The upper estuarine mudflats support a less diverse community dominated by the mud snail, *Amphibola crenata* and the mud crab, *Helice crassa*. Juvenile species of flounder, snapper, mullet, kahawai use this area as a nursery and refuge.

Waiuku Estuary is an important fishing ground and recreational shellfish gathering occurs.

Further information on the marine environment is provided in Section 5.4 of the WICMP (FTL, August 2010). This includes relevant information extracted from the following reports:

- Tonkin & Taylor (2006) provided an overview of the physical characteristics of the Waiuku Estuary as a part of the development of a comprehensive Coastal Compartment Management Plan (CCMP) for the Waiuku estuary.
- Wildlands Consultants (2005) reviewed what was known about the 'ecology' of the Waiuku estuary as a contribution to the Waiuku Estuary CCMP focussing on the riparian margins and terrestrial vegetation around the estuary.

In summary:

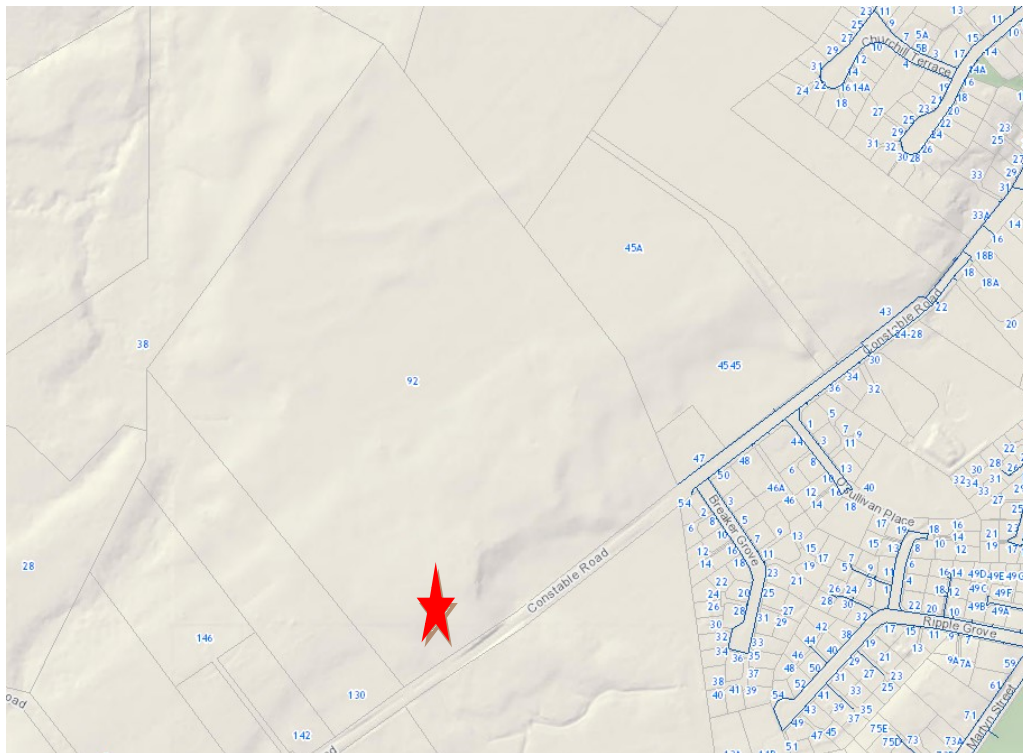
- The upper estuarine arms of Waiuku Inlet below the WICMP area are typical of Manukau Harbour estuaries. They are typically muddy and are dominated by fringing mangroves. Mangroves are a recent addition to the flora of the estuary and have expanded for a number of reasons the principal one being the accumulation of fine sediments, compounded by the colonisation by mangroves.
- The fauna and flora of the upper Inlet intertidal areas is likely to be typical of similar habitat within the Manukau Harbour. Fish and bird will be typical of what is present in neighbouring estuaries.
- Assessment of sediment quality in the upper tidal creeks showed that metal concentrations in sediments were below the ANZECC (2000) ISQG-Low sediment quality guidance values. This would suggest that sediment quality is not likely to be a significant contributor to benthic infaunal community health.

## 2.9 WATER SUPPLY

The existing water supply network for Waiuku extends along Constable Road from the township to 47 Constable Road. This water supply line comprises a 50mm dia PE line connected to a larger 150 diameter uPVC line by 43 Constable Road (Waiuku College). Refer Figure 3.

All three properties comprising the subject site are currently unserviced in relation to a reticulated water supply. No 45A has no buildings or other features on it, requiring a water demand, while No 92 and No 130 rely on roof rain water collection for their water supply, while No 92 also has a groundwater bore by the cowshed which is for stock use.

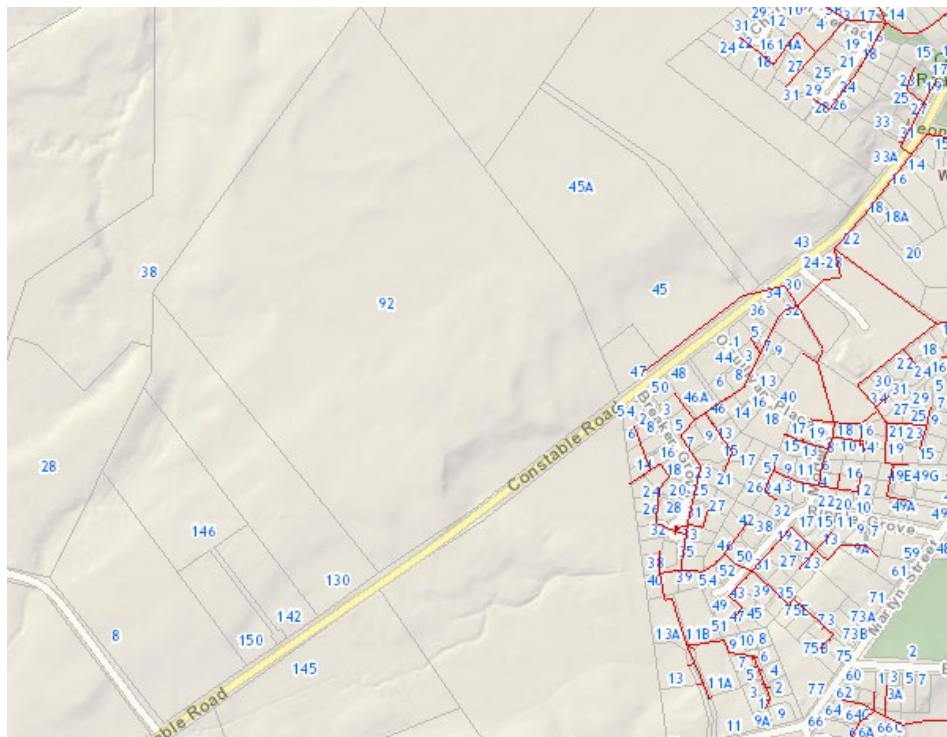
Council records show an additional groundwater bore on No 130 but the owner of this property is not aware of any such bore.



**Figure 3: Existing Public Water Reticulation Network (darker blue lines) in vicinity of site (approx. location of bore on No 92 shown by red star)**

**2.10 WASTEWATER**

The existing wastewater reticulation network for Waiuku extends along Constable Road from the township to 47 Constable Road. This wastewater line comprises a 150mm dia uPVC pipe. Refer Figure 4.



**Figure 4: Existing Public Wastewater Reticulation Network (red lines) in vicinity of site**

All three properties comprising the subject site are currently unserviced in relation to wastewater reticulation. No 45A has no buildings or other features on it, that would produce wastewater, while No 92 and No 130 rely on on-site wastewater treatment and disposal systems.

## 2.11 UTILITIES

There are existing power and telecommunication services in the berm of Constable Road provided by Counties Power and Chorus respectively.

## 3.0 PROPOSED DEVELOPMENT CONSIDERATIONS

### 3.1 PROPOSED DEVELOPMENT

The proposed development under the Plan Change would involve subdivision of the site into approximately 700 residential lots (under MHS zoning), or up to 910 lots if MDRS zoning is applied, with associated roading and extensive open space network, as shown on the Common Ground Urban Design Concept below.

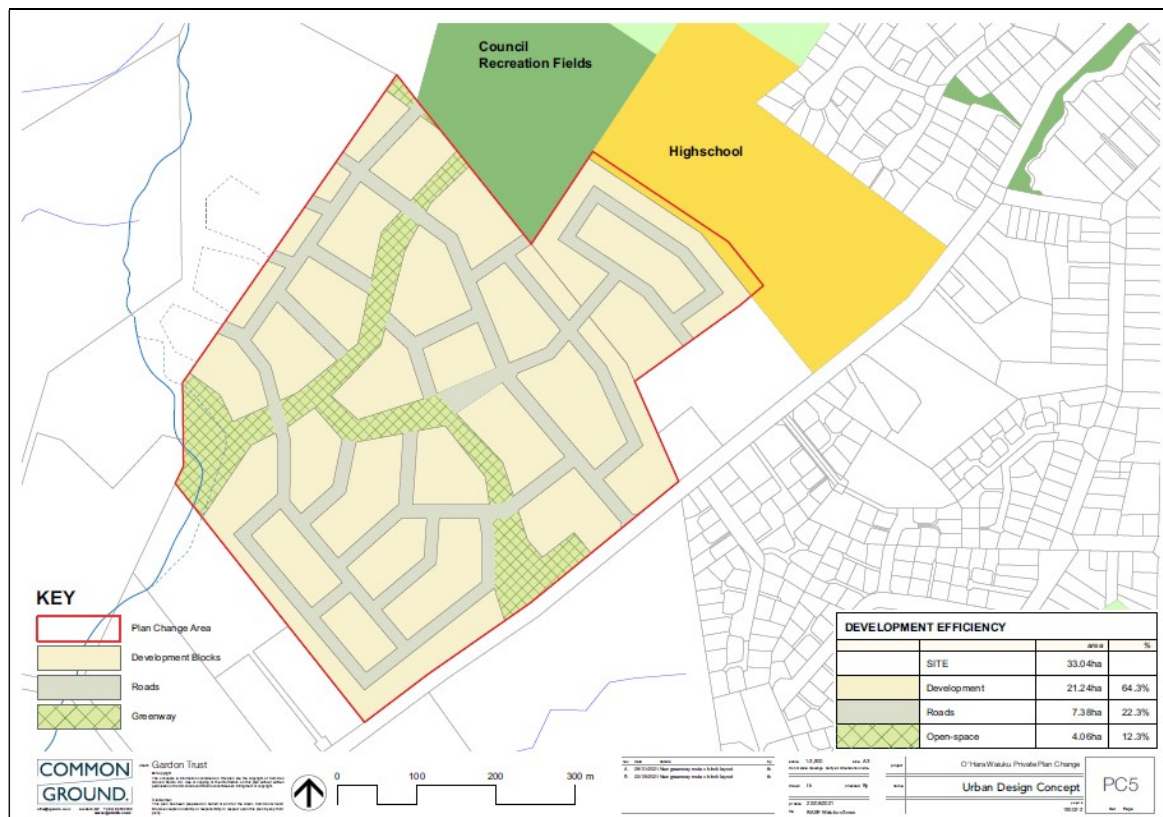


Figure 5: O'Hara Plan Change Urban Design Concept

It is understood that under the Enabling Housing Act, which comes into effect in August 2022, there is potential for the site to be developed at a higher density MDRS, resulting in up to approximately 910 residential lots of planned capacity (compared with what may actually be built). This estimate allows for design having already been undertaken for a scheme plan for 55 lots on 45A Constable Road and no changes being made to that for a higher density.

### 3.2 IWI CONSIDERATIONS

Ngati Te Ata Waiohua have prepared a draft Cultural Values Assessment (CVA) Report for the proposed Plan Change at Constable Road, Waiuku (draft in January 2021 and later made final). Table 2 provides a summary of the main recommendations and aspirations from their report in relation to different issues, as well as a summary of how these issues have been responded to in the engineering design for the Plan Change area. Further specific comments are made in relation to stormwater in the separate SMP.

**Table 2: CVA Recommendations and Design Response**

Item	Recommendation/Aspiration	Proposed Design Response
<b>Heritage protection and recognition</b>		
Physical landscapes	Identify and protect physical landscapes including but not limited to view shafts, hilltops, tuff rings, ridgelines, streams, floodplains, estuaries and coastlines.	Hilltops and ridgelines are maintained. Riparian margin along Rangiwhea Stream. Any natural wetlands to be retained.
<b>Whenua</b>		
Urban development	Ensure in all development proposals that access is retained and improved to water bodies and cultural and/or spiritual sites.	Access to Rangiwhea Stream maintained and improved through greenways and proposed path along the stream
Soil and earthworks	Minimise earthworks and make maximum use of natural ground levels.	Proposed earthworks are minimal, equating to average 350mm soil depth across entire site
	Ensure sufficient erosion and sediment control measures are in place for earthworks.	Best practice erosion and sediment control practices to be followed, in accordance with GD05 (further details to be provided at subdivision consent)
	Riparian planting of appropriate, preferably indigenous, species must be promoted and increased to stabilise riverbanks and reduce erosion in the region.	Riparian planting proposed along Rangiwhea Stream and around proposed treatment/detention wetland.
Erosion and sediment controls	Strive to meet best practice such as GD05.	Best practice erosion and sediment control practices to be followed, in accordance with GD05



Item	Recommendation/Aspiration	Proposed Design Response
		(further details to be provided at subdivision consent)
<b>Wai</b>		
<b>Waterways</b>	<p>Future urban development should protect, rehabilitate and enhance waterways, especially where previous land use has degraded it.</p> <p>Preserve the physical integrity of receiving streams.</p> <p>Streams are well integrated with town centres with use of stream management plans and special policy requirements (green space, infrastructure, wider riparian margins).</p> <p>Development around streams/awa is limited to maintain access, preserve amenity, retain views and protect water quality.</p> <p>Preserves and preferably enhances natural hydrologic functions of the site.</p> <p>Identifies and preserves sensitive areas that affect the hydrology, including streams and their buffers, floodplains, wetlands, steep slopes, high-permeability soils and areas of indigenous vegetation.</p> <p>Maintains recharge of aquifers with clean uncontaminated water.</p> <p>Effectively manages natural hazards.</p> <p>Considers beneficial re-use on-site of stormwater and wastewater.</p> <p>Considers water conservation.</p> <p>Provides for visual amenity consistent with the surrounding environment.</p> <p>Minimising stormwater impacts to the greatest extent practicable by reducing imperviousness, conserving natural resources and ecosystems, maintaining natural drainage courses, reducing use of pipes, and minimising clearing and grading.</p> <p>Providing runoff storage measures dispersed through the site's landscape with a variety of detention, retention, and runoff practices.</p> <p>Where they will be of benefit, encouraging the use of mechanisms such as rainwater harvesting, rain gardens, roof gardens, and onsite storage and retention.</p> <p>Where they will be of benefit, encouraging the use of stormwater treatment devices including on-site treatment systems, allowing for emergency storage and retention structures.</p> <p>For areas that have unavoidable impervious areas, attempt to break up these Impervious areas by installing infiltration devices, drainage swales, and providing retention areas.</p> <p>Minimise imperviousness by reducing the total area of paved surfaces</p>	<p>Rangiwha Stream to be protected and enhanced, with this integrated into proposed development, including adjacent large wetland and connecting greenways.</p> <p>Streams and their buffer to be preserved.</p> <p>Treated stormwater runoff to be discharged to ground soakage where appropriate, particularly in peat and alluvial soil areas.</p> <p>Stormwater reuse and water conservation provided for through roof water harvesting.</p> <p>Integrated approach taken to stormwater management to minimise its impacts, including treatment train, retention, detention &amp; reuse.</p> <p>Existing topography and drainage patterns largely retained.</p>

Item	Recommendation/Aspiration	Proposed Design Response
	Maintain existing topography and pre-development hydrological processes.	
Groundwater, recharge and water allocation	Ensure groundwater recharge to retain base flows within streams, and to keep aquifers recharged.	Groundwater recharge provided where appropriate.
Stormwater	<p>'Clean' and 'contaminated' waters are not mixed i.e. no direct disposal of any waste into waterways, including wetlands.</p> <p>Highest level of stormwater treatment should be used before it is discharged into waterways. This includes, but is not limited to use of 'treatment train' approach; use of raingardens/swales and green roofs; all cesspits to be fitted with a 'stormwater 360 litter trap' or 'enviro-pod'; use of the new GD01 stormwater management devices guideline as an appropriate means to support the mitigation of stormwater issues.</p>	Only clean, treated stormwater will be discharged to waterways.
Wastewater	<p>Land-based treatment of effluent is preferred.</p> <p>Exploration of natural processes rather than mechanical to treat wastewater, including vermiculture.</p>	Wastewater will be conveyed to Watercare's reticulation network and treated at the Waiuku WWTP. Best practical option considering scale of plan change area.
<b>Biodiversity</b>	<p>Promote the use of 'eco-sourced / whakapapa plants' that are indigenous plants and trees from within the Waiuku area.</p> <p>Establish new and enhance existing ecological corridors as a high priority.</p> <p>Implement programmes such as riparian planting and protect sensitive receiving environments and protect and enhance water quality</p>	<p>Eco-sourced plants to be used for all planting.</p> <p>Ecological corridor along Rangiwhea Stream enhanced.</p> <p>Riparian planting to be implemented.</p>
Wetlands	<p>Support the establishment of programmes to restore and expand wetland habitat, including restoring existing wetlands; removing and/or controlling plant and animal pests; using technology such as constructed wetlands where this is feasible; expanding the size of those wetlands where this is feasible;</p> <p>Maintain or enhance water levels.</p> <p>Establish or maintain 'buffer zones' of appropriate indigenous plant species</p> <p>Where appropriate land is available, and it is feasible, flood plains shall be restored to function as natural overflow areas along rivers and streams and to link more naturally with adjacent wetlands.</p>	<p>Any existing natural wetlands to be retained and enhanced where practical.</p> <p>New constructed wetland proposed for stormwater treatment and detention.</p> <p>Floodplain along Rangiwhea Stream maintained and adjacent low lying land utilised for proposed wetland.</p> <p>Multiple soft engineering solutions</p>

Item	Recommendation/Aspiration	Proposed Design Response
		incorporated into development (e.g. rain gardens and swales).
<b>Sustainability</b>		
Sustainable Development	<p>New development should have positive impacts on the environment e.g. enhance water quality, increase biodiversity connections, and remediate contaminated land.</p> <p>Significantly improve stormwater and wastewater management and treatment to acknowledge our cultural values.</p> <p>Support the use of LID (Low impact design) principles in all new subdivisions and developments.</p>	<p>Water quality will be enhanced.</p> <p>Any confirmed contaminated land will be appropriately remediated.</p> <p>Significantly improved stormwater management, including use of LID.</p>
Natural hazards	<p>New land use and structures shall avoid creating actual or potential adverse effects, including an increase to the risk or magnitude of a natural hazard event.</p> <p>Encourage low-lying areas prone to flooding to be turned back into wetlands rather than using for urban development such as housing.</p> <p>‘Soft’ engineering solution should be utilised over a ‘hard’ solution (e.g. the use of swales rather than concrete channels).</p>	<p>Downstream flooding hazard either reduced or similar to existing situation.</p> <p>Low lying area adjacent to Rangiwhea Stream to be used for constructed wetland.</p> <p>Extensive use of swales and rain gardens proposed.</p>
<b>Infrastructure</b>	<p>Actively explore alternative wastewater treatment and disposal options including removal of trade wastes, recycling of grey water, disposal to land (or other innovative methods) and not using water as a waste transport system.</p> <p>Support and encourage the use of water sensitive design in the provision of infrastructure.</p>	<p>Conventional wastewater reticulation system adopted.</p> <p>Water sensitive design adopted.</p>

### 3.3 DEVELOPMENT OF 45/45A CONSTABLE ROAD

#### 3.3.1 Approved Engineering Plans

45 and 45A Constable Road are being separately developed by their owner in two stages. Stage 1 (45 Constable Road) is fully consented, with all Council consents and approvals in place (SSUB60237908, LUC60111076-A, LUC60271724-A). Stage 2 (45A Constable Road) has an earthworks consent, with earthworks for both Stages 1 and 2 largely completed. Crang Civil are the consultant engineers for this project. They have provided the following information for this development in relation to stormwater, water supply and wastewater.

The development of 45 Constable Road provides for installation of a stormwater reticulation network that also caters for the development of 45A Constable Road. The plans have been approved by Healthy Waters (email from David Russell to Crang Civil, dated 24 July 2018). The

approval includes for the upgrade of a 600dia section of pipe downstream along Constable Road and on the other side of Constable Road to 900 diameter to allow for the development of Stage 2. This pipe systems connects into the stormwater reticulation network serving the Breaker Grove/Martyn St area and drains to the Tiware Stream. The approval does not cover overland flowpaths, which are yet to be resolved.

Engineering plan approval has been obtained from Auckland Council (ENG60342237) and Watercare (Application No 97281) for water supply and wastewater infrastructure for 48 proposed dwellings on 45 Constable Road.

The proposed wastewater reticulation involves extension of the existing 150dia uPVC line running to 47 Constable Road through the 45 development with a 150mm diameter connection to the Stage 2 area.

The proposed water supply involves upgrading the existing 50mm diameter pipe from the 150dia watermain connection by the Waiuku College to a 180mm diameter water supply line along Constable Road, with 180 and 63 diameter connections into the Stage 2 area.

### **3.3.2 Proposed Further Changes – July 2021**

Subsequent to the above Council consenting and approval process, one of the Applicants, who has very good knowledge of the stormwater and wastewater infrastructure in this area, having constructed some of it himself as a contractor to Franklin District, advised that the GIS data in this area is incorrect in multiple locations, particularly for wastewater.

In response, a topographical survey was undertaken of the area of concern which the 45/45A development was to connect into. This survey found multiple discrepancies with the GIS data including pipe diameters and invert levels.

Crang Civil have then revised their pipe capacity calculation checks and found that some of the existing wastewater pipe system in the Leonard St area would be under capacity if the 45/45A development were to connect into it. Hence, they have designed two alternative wastewater systems, involving the following:

- Option A (for 45/45A only): New wastewater line from MH12 to MH2 along Constable Road as shown on Crang Civil drawings C555 (plan) and long-section (C560).
- Option B (for 45/45A/92 and 130): New wastewater line from MH2.12 to MH2 along Constable Road, as shown on Crang Civil drawings C556 (plan) and long section (C561). This system has been designed to take the anticipated peak wastewater flow from the proposed development of No 92 and 130 Constable Road under the plan change.

For clarity on the drawings, both lines have been shown running down the road. The final alignment would be determined at the next design stage.

Crang Civil have provided a separate infrastructure report for 45A Constable Road (Stage 2) summarising these options.

### 3.4 EARTHWORKS

Preliminary earthworks design has been undertaken, taking into account the CVA recommendations/aspirations and to facilitate the stormwater design requirements (see section 4) to determine the associated earthworks cut/fill volumes and confirm that the stormwater design concept is feasible and practical from an earthworks perspective.

The proposed development plan showing final contours is shown on drawing 32897/101. The proposed earthworks cut and fill plan is shown on drawing 32897/102 and proposed site drainage long-sections are shown on drawing 32897/103.

Cut-fill earthworks are proposed over a total site area of 28.8ha involving 100,000m<sup>3</sup> of cut to fill, achieving a cut/fill balance, based on a 1.15 compaction factor for cut to fill. This represents an average 350mm earthworks depth across the entire site, demonstrating that relatively minor earthworks, are required, albeit over a large area, to achieve the required landform changes.

Stripped topsoil, based on an average topsoil depth of 0.3m from the geotechnical investigation borehole logs, is estimated to comprise 86,400m<sup>3</sup>, of which some is likely to be surplus to respreading requirements. These volumes exceed permitted earthworks area and volume thresholds and will required consent under both the district and regional earthworks requirements of the Auckland Unitary Plan: Operative in Part (AUP:OP). These consents would be applied for at the resource consenting stage for land use/subdivision.

These earthworks represent preliminary bulk earthworks required primarily to provide for proposed roading and stormwater drainage. They do not allow for earthworks at the individual lot scale, required to form building platforms and parking and manoeuvring areas.

The earthworks operation and associated erosion/sediment controls will be designed, installed and operated in accordance with the Auckland Council GD05 "Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region" (June 2016/005) requirements and taking into account any more recent developments in best practice. Detailed earthworks plans and associated erosion/sediment control plans will be provided at the resource consent stage.

### 3.5 GEOTECHNICAL

The FTL geotechnical assessment concluded that in general terms and within the limits of the high-level geotechnical assessment undertaken, the site is suitable for the proposed private plan change from Mixed Rural Zone to Mixed Housing Suburban Zone and associated future subdivisional development.

The report identified two main potential geotechnical hazards within the site:

1. Slope instability,
2. Settlement/Subsidence.

Three geotechnical risk zones were developed with regard to these hazards in relation to existing topography, as shown on the appended Fraser Thomas drawing 64932/1. The drawing provides a high-level classification of the land suitability to inform a Masterplan, with blue (Zone 1) being low risk, yellow (Zone 2) having moderate risk and red (Zone 3) high risk. The extent of the zones should not be taken as being definitive, but rather, is intended to be a guide to identify areas requiring more detailed geotechnical appraisal. The locations and extents of the hazard zones can be reappraised if further detailed specific geotechnical investigation and appraisal is undertaken.

Residential building development is not precluded from the moderate to high-risk zones but any proposed development within these zones would require a detailed geotechnical investigation and appraisal in support of the consent application, which may show that slope stabilisation or foundation improvement measures are required.

Given the low seismicity risk in the greater Auckland area and that the soils encountered in the boreholes comprise either cohesive silts and clays or dense to very dense sands, it is our opinion that liquefaction and/or lateral spreading does not pose a significant risk to the proposed development.

### **3.5.1 Zone 1 – Low Risk**

This zone generally comprises flat to gently rolling topography that exhibits no signs of significant slope instability and is unlikely to be underlain by compressible organic and/or soft cohesive soils that would be subject to significant settlement under fill or building loads. This zone is considered likely to be suitable for NZS3604 type development, subject to expansive soil requirements and site-specific geotechnical investigation.

### **3.5.2 Zone 2 – Moderate Risk**

This zone generally comprises gently to slightly sloping topography, with evidence of minor slope instability and/or likely underlain by highly compressible organic and/or soft cohesive soils. Development in this zone should be subject to site-specific geotechnical investigations and specific foundation or earthworks design where deemed necessary.

### **3.5.3 Zone 3 – High Risk**

This zone comprises steeply sloping (greater than 1V:4H) topography or areas in close proximity to such slopes, and/or evidence of significant slope instability features. Development in this zone should be subject to geotechnical investigations and slope remediation and/or specific foundation design and/or earthworks where deemed necessary.

### 3.5.4 Zoning Changes as a Result of Proposed Earthworks

Post-earthworks, the extent of the Zone 2 and 3 areas will be reduced through regrading the majority of the steeper portions of the site (refer drawing 32897/104).

### 3.6 POTENTIAL SOIL CONTAMINATION

FTL has undertaken a Preliminary Site Investigation (PSI) for the proposed Private Plan Change at 92 & 130 Constable Road, Waiuku, Auckland. The site at 45A Constable Road was not investigated as part of this work, as this already has a land use consent for earthworks in place and earthworks were in progress at the time of this investigation.

The PSI involved a desktop study, site walkover and reporting associated with potential land contamination issues. It was undertaken in general accordance with the requirements of the Ministry for the Environment 'Contaminated Land Management Guidelines No.5' (CLMG 5) for site investigations and analysis of soils with contamination of this nature and was managed, reviewed and approved by a Suitably Qualified and Experienced Practitioner (SQEP), as defined in the National Environment Standard for Assessing and Managing Contaminants in Soil to Protect Human Health (NESCS).

The PSI undertaken of No 92 and 130 has found:

- The NESCS and the contaminated land provisions of the Auckland Unitary Plan: Operative in Part (AUP:OP) apply to both No 92 & 130.
- These properties have essentially been used for livestock grazing purposes for the last 80 years. However, during this time, the following HAIL activities have occurred on-site:
  - Historical application of lead based paint and burning of unknown materials (I);
  - Stock loading ramps and potential spray races (A8); and
  - Asbestos products in a deteriorated state (E1) (92 Constable Road only).
- The subject sites are considered suitable for proposed residential development. However, there are localised potential contamination issues at the subject sites that may present a risk to the health of site workers or residents from future residential developments.
- Hence, prior to subdivision or soil disturbance works, a Detailed Site Investigation will be required for both of these properties. This will involve soil sampling from the areas of concern for relevant parameters to determine whether the soil contains elevated levels of contaminants at levels in excess of relevant guidelines. Once this sampling is done, the consent status of these areas under the NESCS and AUP:OP will be determined, along with the need for any remedial works (if required).

### 3.7 ROADING AND GREENWAYS

Access roading will be provided generally in accordance with the roading alignments shown in the Common Ground Plan Change layout plans. These are based on four road types:

- Greenways: irregular sized reserves with park-like character, including footpaths and emergency/service vehicles. The proposed greenways provide several important functions, in relation to stormwater, amenity, connectivity and pedestrian/bicycle movements. Specific aspects relating to stormwater are covered in section 4 of this report.

- Living streets: links between greenways and local roads, providing park-like landscaping, with some vehicle access.
- Mews lane: 6-8m width vehicle access inside blocks, with minor landscaping.
- Local road: Typically 16-18m reserve width, with a 6m carriageway, footpaths and parking, with trees and landscaping.

Further details are provided in the separate Common Ground report supporting the Plan Change application.

#### 4.0 STORMWATER

The proposed stormwater management measures satisfy the requirements for “greenfield developments” set out under the regional Stormwater Network Discharge Consent, in relation to the essential components of a Stormwater Management Plan (SMP) which is provided as a separate report, addressing water quality, stream hydrology, flooding: 10% AEP property/pipe capacity and flooding: 1% AEP – buildings, as well as the requirements for a private stormwater discharge consent under Section E8, Activity A10 of the AUP:OP as a **discretionary** activity, should this be required.

To meet these requirements, stormwater from the proposed development will be managed in the following ways:

- Treatment of impervious areas including roofing (except where relatively inert roofing materials are used), paving and roading.
- Retention of 5mm of rainfall from all impervious areas.
- Detention of the difference in runoff volume from pre development to post development for a 95th percentile storm.
- No increases in peak flow for a 10% Annual Exceedance Probability (AEP) event from the site.
- No increases in downstream flooding for a 1% AEP event, for those areas where downstream flooding is currently a problem.

Key features of this approach are minor recontouring of the site so as to redirect runoff from stormwater problem areas (i.e. Breaker Grove/O’Sullivan Place area) through a large constructed treatment/retention/detention wetland to the Rangiwha Stream, which has significant flow and volume capacity, whilst a new 825-1200mm diameter stormwater pipeline will also be provided along Constable Road. The latter goes beyond the minimum compliance requirements of the Regional Stormwater Network Discharge Consent, further alleviating existing stormwater and flooding problems in the Breaker Grove/O’Sullivan Place area.

The proposed stormwater management measures have been assessed against recommendations from the Cultural Values Assessment and the NDC Schedule 4 requirements and show strong alignment with both documents.

Refer to the separate Stormwater Management Plan (SMP) for details.



## 5.0 WAIUKU GROWTH FORECASTS AND WATER/WASTEWATER DEMAND PROJECTIONS

It is important that future development on the Plan Change land is capable of being serviced with essential infrastructure. The purpose of this section is to estimate the quantities and timing of demand for water and wastewater services based on projections for the likely residential growth in Waiuku over the next couple of decades.

The position outlined is based on the best information made available by Watercare and other information sources, at the time of completing this Report. Further information has been requested from Watercare, and there is ongoing dialogue over the Plan Change, and how it relates to existing and future planned services capacity for Waiuku. It is expected that Watercare will make a submission on the Plan Change and this will further progress the overall understanding of servicing options.

This section provides our assessment of possible future water supply and wastewater demand for Waiuku based on the following approach:

- Review of population and household growth projections.
- FTL high level constraints mapping of residential zoned areas within Waiuku to compare with the Urban Economics estimates.
- Estimation of the time for all residential capacity to be utilised with and without the O’Hara Plan Change.
- Water supply demand forecast using the above information and water consumption data supplied by Watercare.
- Wastewater generation forecast using the above information and limited wastewater historical flow data supplied by Watercare.

It also provides a summary of associated funding allocated by Watercare for Waiuku water supply and the South-west Wastewater treatment plant and conveyance project upgrade.

### 5.1 POPULATION AND HOUSEHOLD GROWTH PROJECTIONS

Household and population projections has been based on the information presented in the Urban Economics (UE) report, including the following:

- NZ Statistics actual household and population data for the period 2016-2020.
- **Low estimate:** NZ Statistics household and population projections to 2038, with extrapolation to 2050. This equates to household increases of 34 per year over the period 2020-2028 (extended out to 2030 to be consistent with UE projections) and then 32 per year from then onwards. Corresponding population household increases are 98 from 2020-2030 and then 91 from there till 2050.
- **Medium estimate:** Intermediate growth (between low and high estimates) of 60 households per year from 2020-2030 and then dropping to 35 households per year from then to 2050, this being approximately double the NZ Statistics rate for the first decade. Corresponding population increases are 171 per year from 2020-2030 and 100 per year from then to 2050.
- **High estimate:** Urban Economics population projections based on a higher growth rate of 120 households per year from 2020-2030 and then dropping to 70 households per year from then to 2050, this being approximately four and two times the NZ Statistics rates for the same periods respectively. Corresponding population increases are 342 per year from 2020-2030

and then 200 per year from then to 2050. The Urban Economics report advises that the high projection is considered most likely for the 2020-30 period, based on their extensive assessment of residential demand.

## 5.2 HIGH LEVEL CONSTRAINTS MAPPING

FTL has undertaken a high level constraints mapping exercise of the future development potential for Waiuku based on the following:

(a) Investigation of the following further development scenarios:

- Potential for further subdivision within the “Residential – Large Lot” zone, based on lots with minimum areas of 8,000m<sup>2</sup> or more being subdivided into lots of minimum area 4,000m<sup>2</sup> in accordance with AUP:OP zoning rules;
- Potential for further subdivision in other residential zoned areas based on lots greater than 4,000m<sup>2</sup> and taking into account the minimum lot size for that zone.
- No consideration of further subdivision or infill development on smaller sites, with this being covered by the Urban Economics “infill development” assessment.

No allowance has been made for any plan changes that would result in a change in zoning from less dense to more dense residential development.

(b) Aerial photograph review, including the most recent Google Earth (imagery date = 2022).

(c) Mapping of streams, overland flowpaths and flood plain from two sources:

**Auckland Council Geomaps:** The Geomaps floodplain extents are based on a Rapid Flood Hazard Assessment (RFHA) model from 2009 for the 100 year storm, existing development scenario at that time and with no adjustment for climate change. This approach ignores any pipes and culverts. Furthermore, it does not comply with current Council flood modelling specifications, but provides a high level estimate of flooding. Adoption of the existing development scenario (2009) and not allowing for climate change will tend to under-estimate flooding. Conversely, ignoring any culverts and pipes will tend to over-estimate flooding, particularly where there are significant culverts going under embankments or similar structures associated with roads, rail lines, etc. These two factors will compensate for each other to some extent, but the overall conservatism or non-conservatism of these flood modelling results can only be determined through a detailed flood risk assessment, which is outside the scope of this review. In addition, the Council Stormwater Code of Practice requires partial pipe and culvert blockage to be assessed for overland flowpaths. Furthermore, the Geomaps floodplain extents do not cover the Awaroa Stream, which drains the majority of the southern portion of the Waiuku urban area. It is inferred that this is because this stream flows into the Waikato region.

**Waiuku Integrated Catchment Management Plan (WICMP) Floodplain mapping (2012):** This floodplain mapping was done in 2012 by Stormwater Solutions. It involved updating the MOUSE model originally prepared by Hydraulic Modelling Services Ltd for Waiuku, primarily to incorporate stream cross-section and critical culvert survey data. A number of modelling scenarios were run including the 100 year storm with a 9.3% increase in rainfall to allow for climate change to 2051. This is less than the 16.8% adjustment Auckland Council currently uses to allow for climate change

to 2090 and hence does not strictly comply with Council flood modelling specifications, being non-conservative (i.e. it will under-estimate flooding). The modelling was completed around the time of the transition to the Supercity and hence was never formally approved by Auckland Council. Nevertheless, it provides the best available estimate of flooding along the Awaroa Stream. It has also been overlaid on to the Geomaps results for comparison.

- (d) Mapping of existing water supply and wastewater services to each area, using Council Geomaps data.
- (e) Geotechnical risk assessment, based solely on classifying areas with slopes steeper than 1V:4H. The FTL geotechnical assessment for the O’Hara Plan Change (refer section 3.5 of this report) used the following more complex approach for assessing risk – hence the simplified approach used here will underestimate areas classified as high risk according to the methodology below and does not categorise any medium risk areas.
- (f) No assessment of actual/potential wetlands.

The FTL drawings 32897/22 to 28, appended spreadsheet and following tables summarise the results of this assessment. In summary:

- 49 lots were identified in the residential “large lot” zone having an area of over 8,000m<sup>2</sup>. The maximum subdivision potential from these lots gave 134 lots of minimum size 4,000m<sup>2</sup>. Taking into account providing access, the lot geometry and the constraints described above, the assessed maximum number of new lots reduced to 24 (i.e. 49 lots becomes 73).
- 23 lots were identified in other residential zoned areas having areas of over 4,000m<sup>2</sup>. The maximum subdivision potential from these lots gave 647 lots complying with the minimum permitted lot size for their zoning. Taking into account providing access, the lot geometry and the constraints described above, the assessed maximum number of new lots reduced to 188 (i.e. 23 lots becomes 211).
- Significant portions of these areas are subject to significant hazards, in the form of OLFPs, flooding and/or slope, while access was also estimated to take up a significant portion of the potential development area and lot geometry in some cases placed further constraints on development potential.

**Table 3: Summary of Assessed Subdivision Potential**

Area	No of Lots > Criteria	Maximum Subdivision Potential (total lots)	Assessed Maximum No of New Lots
Residential – Large Lots (>8,000m <sup>2</sup> )	49	134	24
Other residential – lots > 4,000m <sup>2</sup>	23	647	188
Total	72	781	212

**Note:** Maximum subdivision potential based on gross area/minimum lot size and hence is an over-estimate of actual subdivision potential.

These findings have been discussed with Urban Economics. They advised that all but one of the sites identified by FTL as having subdivision potential had been included by them in their

independent analysis either under “subdivision” or “infill” development. Hence, with the limited accuracy of these high level assessments, they consider that they have captured the FTL findings in their work. This appears reasonable as they identified 810 sites in total as having development potential of which they estimated the reasonable expected development potential to be approximately 309 allowing for some owners not wishing to develop their sites.

**Table 4: High Level Constraints Mapping Summary**

Area	Zoning	No of undeveloped lots	No of lots with theoretical development potential	Servicing	OLFPs/ Flooding	Areas steeper than 1V:4H
1	Residential – Large Lot	None	1 lot	Water supply available. Wastewater servicing not available.	An OLFP exists through the north east corner of the site. The Awaroa Stream runs along the site’s south-eastern boundary and flooding affects this portion of the site.	Moderate – one section on eastern side of site as shown on drawing 32897/24.
2	Residential – Large Lot	None	5 lots	Water supply available. Wastewater servicing not available.	Multiple OLFPs through area and flooding from Awaroa Stream affects over 50% of this area.	Minor – one area on eastern side as shown on dwg 32897/24.
3	Residential – Large Lot	None	1 lot	Water supply and wastewater servicing available.	An OLFP exists through the northern portion of this area.	None
4	Residential – Large Lot	None	1 lot	Water supply available. Wastewater servicing not available.	An OLFP and stream runs through the centre of this area. Flooding from the Awaroa Stream affects the centre of the site.	None
5	Residential – Large Lot	1 lot (24 Springvale Rd)	1 lot	Water supply available. Wastewater servicing not available.	An OLFP and stream runs through the north of this area. Flooding from the Awaroa Stream affects the majority of this site.	None
6	Residential – Large Lot	None	1 lot	Water supply available. Wastewater servicing not available.	An OLFP exists to the south of this area.	Moderate – the southern section of this area has slopes >1V:4H. Refer to drawing 32897/25.
7	Residential – Large Lot	None	2 lots	Water supply available. Wastewater servicing not available.	Multiple OLFPs pass through the area. Flooding from Awaroa Stream affects the majority of the western lot.	Major – majority of western lot and western end of eastern lot have slopes greater than 1V:4H. Refer to drawing 32897/25.
8	Residential –	None	1 lot	Water supply and	An OLFP exists to the north of this area	None

	Large Lot			wastewater servicing available.	running along the northern boundary.	
9	Residential – Large Lot	None	3 lots	Water supply available. Wastewater servicing not available.	An OLFP is shown to traverse north towards the Waiuku Stream. A floodplain is shown in the NW corner of this area (from Geomaps).	Major- the majority of the area is subject to slopes >1V:4H. Refer to drawing 32897/25.
10	Residential – Large Lot	None	1 lot	Water supply and wastewater servicing available.	Multiple OLFPs exist in this area. A large floodplain (ex. Geomaps) is shown to cover approx. 40% of this lot. Site is occupied by “Farm Source” commercial retail operation.	None
11	Residential – Large Lot	1 lot (#160 Colombo Rd))	4 lots	Water supply available. Wastewater servicing not available.	Multiple OLFPs exists in this area flowing to the north into the Waiuku Stream which runs along the northern boundary. Multiple floodplains (ex. Geomaps) exist in this area.	Major - the majority of the area is subject to slopes > 1V:4H. Refer to drawing 32897/25.
12	Residential – Large Lot	None	6 lots	Water supply and wastewater servicing available.	Multiple OLFPs exists through this area flowing towards the Waiuku Stream which runs along the southern boundary, with an associated floodplain (ex. Geomaps) covering approximately 30% of this site.	Moderate – all lots within this area are subject to slopes >1V:4H. Refer to drawing 32897/26.
13	Residential – Large Lot	None	1 lot	Water supply available. Wastewater services exist on the neighbouring properties to the east.	An OLFP exists in the south east corner of this area. Site is occupied by large church and carpark.	Minor – a small area to the south west is subject to slopes > 1V:4H.
14	Residential – Large Lot	None	10 lots	Water supply available for this area. Wastewater services exist to SW of this area on Victoria Ave.	Multiple OLFPs and streams in this area. Flooding from Waiuku Stream (ex. Geomaps) extends along northern side and up north-western gully.	Major - majority of the area is subject to slopes >1V:4H. Refer to drawing 32897/26.
15	Residential Mixed Housing Suburban	None	1 lot	Water supply and wastewater servicing available.	None	None
16	Residential – Large Lot	None	1 lot	Water supply and wastewater servicing available.	Multiple OLFPs present. Flooding from Waiuku stream (ex. Geomaps) covers ~70% of this area.	None

17	Residential Mixed Housing Urban	None	1 lot	Water supply and wastewater servicing available.	Multiple OLFPs present. A floodplain covers the centre of the site (~40% of total site area).	Minor – small area on southern side is subject to slopes >1V:4H. Refer to drawing 32897/26.
18	Residential Mixed Housing Suburban	2 lots (#11 (no access and #9 Ron Wyatt Lane)	7 lots	Water supply and wastewater servicing available.	Multiple OLFPs and streams exist on this area which drains towards the west, including significant floodplain through centre of site and lesser floodplain in NE corner.	Moderate – two areas in centre of this area either side of OLFP/floodplain have slopes >1V:4H. Refer to drawing 32897/26.
19	Residential large lot and mixed house suburban	2 lots (#26 and 44 Collingwood Rd)	5 lots (including one operated as Knight & Dickey's contractor's yard)	Water supply available. Wastewater available for the properties on western side.	Multiple OLFPs and floodplains present. Golf Course Creek runs through area.	Minor – 2 small areas with slopes >1V:4H. Refer to drawing 32897/27.
20	Residential – Large Lot	None	3 lots (including two currently operated as commercial garden centre – Smithies The Plantsmith)	Water supply runs along Collingwood Road, but stops at #121. No wastewater services.	Multiple OLFPs and streams in this area, including significant floodplain.	Minor – one small area shown on drawing 32897/27.
21	Residential – Large Lot	None	2 lots	Water and wastewater servicing not available.	Multiple OLFPs and a stream cross through this area. Flooding covers ~30% of the site.	Major - the majority of the area is subject to slopes >1V:4H. Refer to drawing 32897/27.
22	Residential – Large Lot	None	2 lots	Water and wastewater servicing not available.	Multiple OLFPs and stream cross through this area. Flooding covers ~30% of the site.	None
23	Residential – Large Lot	None	3 lots	Water and wastewater servicing not available.	Multiple OLFPs and a stream cross through this area. Flooding covers ~20% of the site.	Moderate – eastern side subject to slopes > 1V:4H. Refer to drawing 32897/27
24	Single House	None	1 lot	Water and wastewater servicing available.	OLFP runs across the site area to the west.	None
25	Mixed Housing Suburban	None	1 lot (Percy Hamilton Trust pensioner flats for	Water and wastewater servicing available.	An OLFP is generated from this area and flows towards the north east. A floodplain is shown on geomaps to affect a small	None

			elderly)		portion of this site area.	
26	Mixed housing suburban	None	1 lot	Water and wastewater servicing available.	None	None
27	Mixed housing suburban	None	1 lot	Water and wastewater servicing available.	OLFP through NE corner, with associated small floodplain	None
28	Mixed housing suburban	None	1 lot	Water and wastewater servicing available.	None	None
29	Mixed housing suburban	None	2 lots	Water and wastewater servicing available.	OLFP and associated floodplain run along access road between sites	None
30	Mixed housing suburban	None	1 lot	Water and wastewater servicing available.	OLFP through NE corner, with associated small floodplain	None

**Notes:**

1. No of undeveloped lots determined from Google Earth aerial. Undeveloped lots refer to parcels which are empty (i.e., no existing dwellings on them).
2. In residential – large lot zone, lots with development potential must have minimum 8,000m<sup>2</sup> (to be able to be subdivided into smaller lots of minimum size 4,000m<sup>2</sup>).



**5.3 TIMING FOR ALL RESIDENTIAL CAPACITY TO BE UTILISED**

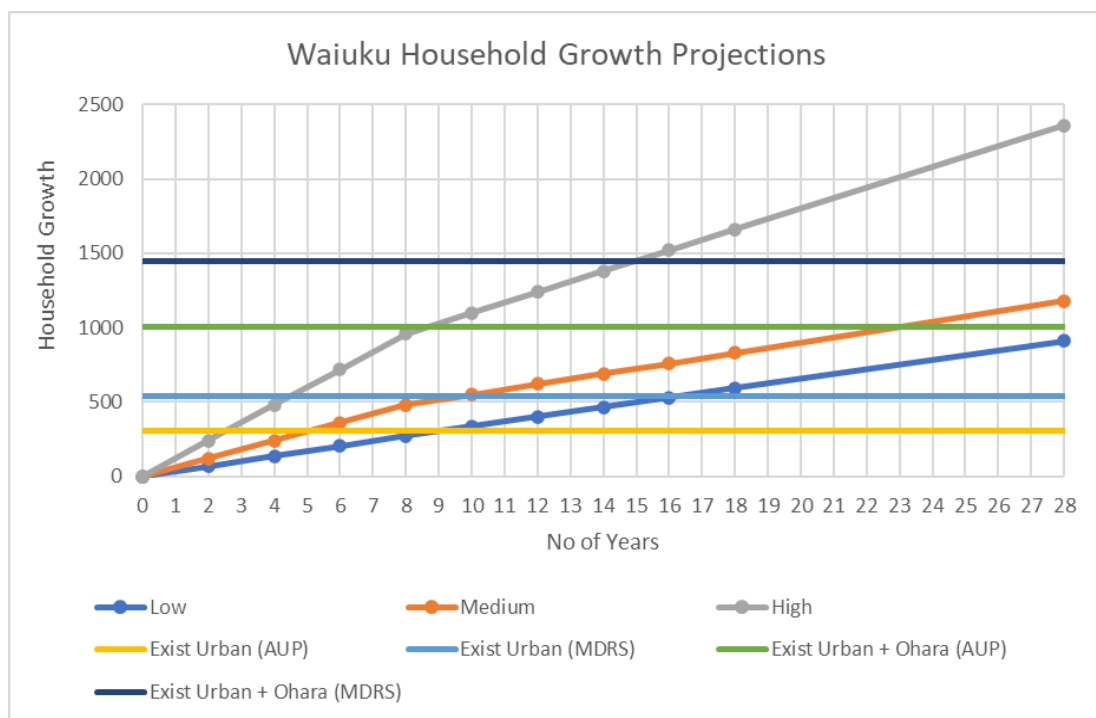
As stated above, Urban Economics have assessed the maximum capacity for new dwellings in the existing urban zoned area to be approximately 309 based on current AUP zonings, but this has the potential to increase to 536 based on the anticipated more intensive MDRS zoning. The O’Hara Plan Change would add an estimated additional 700 and up to 910 dwellings to the available capacity for the AUP Mixed House Suburban (MHS) zoning, and the Housing Enabling Act mandated MDRS (if imposed in the final Decision on the Plan Change), respectively.

Comparing these numbers with the population projections, and based on the information currently available, the estimated number of years to reach the maximum estimated capacity for residential housing in Waiuku is summarised in the following table and figure.

**Table 5: Estimated Number of Years to reach Assessed Housing Capacity**

Scenarios			Estimated New dwellings	No of Yrs to Reach Capacity			Maximum estimated population
No	Urban Area	Zoning		Low	Medium	High	
1	Urban Area	AUP MHS	309	9.1	5.2	2.6	10,521
2	Without O'Hara PC	EHA MDRS	536	16.3	9.6	4.5	11,168
3	With O'Hara PC	AUP MHS	1009	31.0	23.1	8.4	12,516
4		EHA MDRS	1446	44.7	35.6	14.9	13,761

Note: EHA = Enabling Housing Act; MHS = mixed house suburban; MDRS = medium density residential scenario. Max estimated population based on 2020 NZ Stats population of 9640 and estimated new dwellings x 2.85 per dwelling



**Figure 6: Waiuku Household Growth Projection**

From this assessment, the O’Hara Plan Change area is therefore considered to be required to meet projected residential demand within the Waiuku area beyond the timeframes set out above for scenarios 1 and 2. These time frames represent forward capacity of 2.6-9.1 years for AUP MHS existing zoning (scenario 1) and 4.5-16.3 years for Enabling Housing Act MDRS zoning (scenario 2).

## 5.4 WATER DEMAND PROJECTIONS

### 5.4.1 Methodology

Water demand projections for Waiuku have been estimated using the following approach:

- Demand is made up of three components – domestic, non-domestic and non-revenue water (NRW) losses, and using water supply consumption data for Waiuku over the period 2016-2020 for these sources provided by Watercare.
- Using 2020 as the baseline and using Watercare water supply consumption data for there being 3315 household connections to the Waiuku water supply system at that time (this differs slightly from corresponding NZ Statistics actual (3380) and projected household (3318) numbers).
- Projected future household connections based on NZ Statistics, UE120/70 and UE 60/35 projections.
- Average number of 2.85 people per household calculated from NZ Statistics data for households and population.
- Actual domestic per capita water consumption of 157L/capita.d from Watercare 2016-2020 water consumption data. (Watercare used a HUE of 2.5 to convert water use to connections giving a per capita rate of 179L/cap.d, but  $179 \times 2.5 = 157 \times 2.85$ , so the different numbers give the same result).
- Average non-domestic/domestic water consumption ratio of 18.8% over the same period, with this being assumed to remain constant in the future for the NZ Stats (low) projection and increasing by factors of 1.15 and 1.30 for the medium (UE 60/35) and high (UE 120/70) projections respectively, to allow for development of the Fernleigh Business Park increasing non-domestic water demand, over and above increases associated with population growth. These factors were derived through review of the available zoned commercial/industrial land within Waiuku, checking aerial photographs to determine how much of this land is already built on and in use in 2020 and discussions with the Fernleigh Business Park engineers on the staged development of this park and likely timing.
- Actual non-revenue water (NRW) losses in Waiuku in 2020 were 225L/connection/day and have averaged 206L/connection/d over the 2016-20 period. Watercare in their 2021-2041 Asset Management Plan (pg 58) advise that they have investigated the water demand in Waiuku and have implemented a leak reduction scheme to make the best use of the current supply sources. Watercare’s Water Efficiency Plan 2021-2025 states that NRW losses in the Auckland region are about 181L/connection.day and their target is to maintain this at or below 186L/connection/day by 2025. This 186L/connection.d has been adopted for 2025 for Waiuku and it has been assumed that further improvements of a 5% reduction per five year period will be achieved after 2025. This would reduce NRW losses to around 137L/connection.d by 2052

(21.5% of total water demand), which is reasonable by comparison with data from other developed countries.

#### 5.4.2 Available Resource

The **water supply** for Waiuku township comprises a groundwater bore network of four established bores, all drawing water from the Kaawa Formation aquifer. Watercare has two water take consents to allow it to service Waiuku, one from Auckland Council and one from Waikato Regional Council. It is understood that the Auckland Council resource consent WAT60071034 allows Watercare to take up to 1,453,000m<sup>3</sup>/yr of groundwater from 30 June 2020 to 30 June 2052 for a municipal water supply for Waiuku. Condition 5 of this consent limits the amount of groundwater abstracted to the volumes specified below for the identified time periods. Watercare's forecast water demand (m<sup>3</sup>/yr) from the same consent condition is also included below. As the resources straddles the Waikato/Auckland boundary, both authorities administer the remaining aquifer yield conjunctively.

**Table 6: Summary of Watercare's Forecasted Water Demand and Maximum Allowable Take**

Time Period	Forecasted Water Demand (m <sup>3</sup> /yr)	Staged Maximum Abstraction Volume to Meet Growth (m <sup>3</sup> /yr)
Commencement of consent: 30 June 2020	936,032	1,065,080
1 Jul 2020 – 30 Jun 2025	1,065,080	1,132,370
1 Jul 2025 – 30 Jun 2030	1,132,370	1,198,060
1 Jul 2030 – 30 Jun 2035	1,198,060	1,262,050
1 Jul 2036 – 30 Jun 2040	1,262,050	1,326,020
1 Jul 2040 – 30 Jun 2045	1,326,020	1,389,920
1 Jul 2045 – 30 Jun 2050	1,389,920	1,453,820
1 Jul 2050 – 30 Jun 2052	1,453,820	1,453,820

Note: Forecast water demand from Waiuku Water Management Plan 2015, Table 9

Consent condition 5 states that the allocation of water to the consent holder under this permit is unfettered, but the take is to be staged, initially in accordance with the above forecasted water demand and then in accordance with the revised water demand forecasts that the consent holder is to provide on a five yearly basis in their Water Supply Demand Management Plan. The first of these reports was due in September 2020 and thereafter at five yearly intervals. The advice note under this condition states:

Advice note:

*The purpose of the staged allocation is to allow the Auckland Council to ensure the efficient allocation of the water resource, and recognises that the current water demand forecast indicates a reasonable proportion of the water allocated to consent holder will not be required in the near/immediate (<15 years) future.*

*If the Auckland Council allocates water that is otherwise already allocated by this consent it will ensure the consent holder (or the party taking water subject to section 14(3)(b) if that provision applies) is clearly advised in writing that the allocation of water to them is for a limited duration of consent, and their consent may not be able to be 'replaced' upon its expiry due to the allocation to the consent holder, and other parties.*

*Should there be an unexpected increase in the demand for water during any 'time period' the consent holder may provide an updated forecast and request the Council (Team Leader Consents and Compliance – Water Allocation) to revise the staged allocation.*

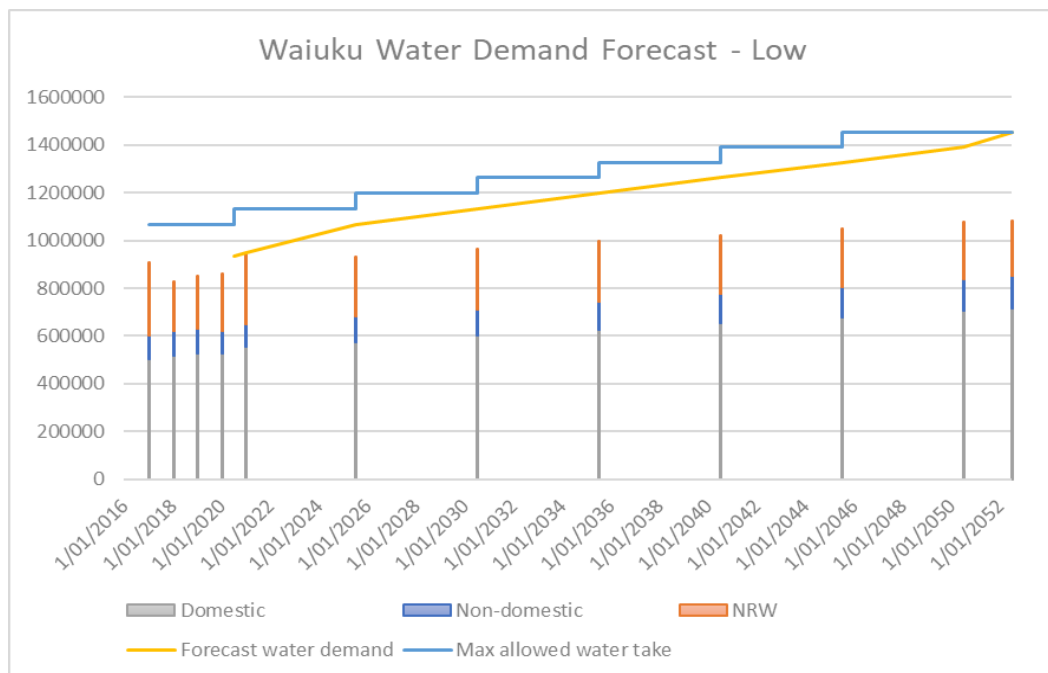
Consent condition 5 provides for the allocation of water to Watercare in accordance with the stated volumes and time periods to have some flexibility, with Watercare having to provide updated forecasts, should the demand increase, and provides a mechanism for staged volumes and time periods to be varied. FTL are continuing to engage with Watercare and Council to fully understand the future availability of water under this existing take and how any increase in the supply would be achieved as may be required.

Watercare in their 15/12/21 letter have advised that the aquifer in Waiuku has capacity to sustain growth in Waiuku for several decades. However, they have advised that current treatment processes are close to capacity, particularly over sustained periods in summer when demand is high, and require upgrades to treat increased flows. Our review of the AC GIS and the water take consents could only identify that within Waiuku the current extraction and treatment assets are submersible pumps (extracting bore water); reservoir storage; booster pumps (pumping water into the watermain network) and treatment (unknown but can be assumed to incorporate chlorination).

Funds are allocated in the AMP (see section 5.6) to update the WTP for completion in 2025, but these funds must be approved in a business case before a project timing can be confirmed. Watercare have advised that the new plant is likely to have a modular design initially for a population of about 12,500. Infrastructure growth charges (IGCs) from new developments associated with the forecast population growth will contribute towards these costs.

**5.4.3 Low Projection**

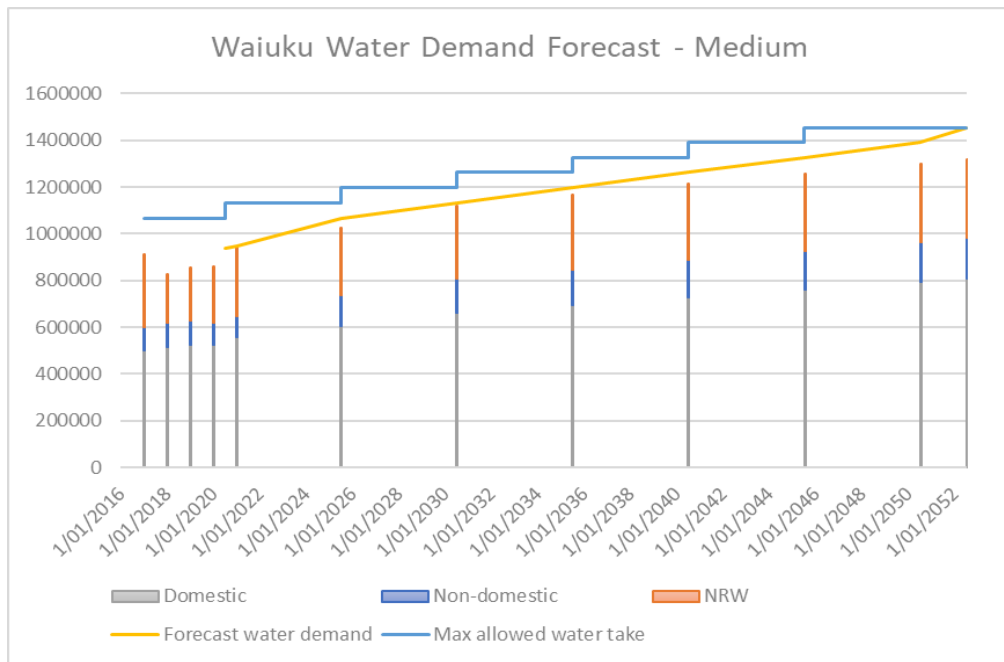
Figure 7 shows that the water demand is within the Watercare forecast, being approximately equal to it at 2021 and being well below it in future years to 2035.



**Figure 7: Waiuku Water Demand Forecast – Low Projection**

### 5.4.4 Medium Projection

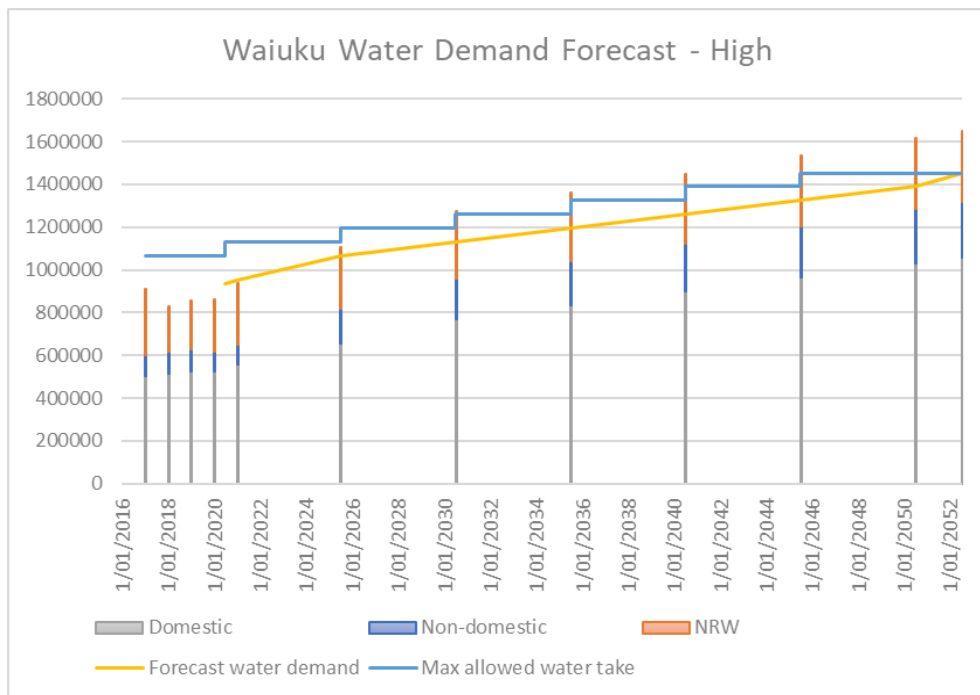
Figure 8 shows that the water demand is within the Watercare forecast, being approximately equal to it over the period 2020-2035 and then dropping being it in future years to 2050.



**Figure 8: Waiuku Water Demand Forecast – Medium Projection**

### 5.4.5 High Projection

Figure 9 shows that the water demand exceeds the maximum allowable take by June 2030 due to the high population growth.



**Figure 9: Waiuku Water Demand Forecast – High Projection**

#### 5.4.6 Discussion

This comparison shows that the low and medium water demand projections are accommodated within the Watercare demand forecasts and staged water allocation. It is only under the high water demand projection, that the Watercare forecasts and allowable water take are exceeded beyond 2030.

However, by comparison with section 5.3, Waiuku is predicted to run out of residential land for more dwellings in 8.4 years (under AUP(OP) zonings and with the O’Hara Plan Change) and in 14.9 years under the more intensive Enabling Housing Act MDRS zonings. Hence, for this scenario to eventuate, more intensive development would need to occur across Waiuku compared with AUP(OP) zonings and/or more land would need to be rezoned for residential use in addition to the O’Hara Plan Change area.

The Watercare groundwater take consent provides a relatively simple mechanism for staged volumes and time periods to be varied, hence potentially allowing the water take to increase more quickly to the allocated maximum value of 1,453,820m<sup>3</sup>/yr. This limit is only estimated to be reached for the high growth scenario around 2040, reaching 1,652,029m<sup>3</sup>/yr by 2052 (198,209m<sup>3</sup> above the maximum take) and further rezoning of land (beyond the Ohara Plan Change) for residential development would be required to meet this limit. Hence, Watercare would need to apply for an increase to take more water after that. The feasibility of this is discussed further in the following section.

#### 5.4.7 Potential to Increase Maximum Groundwater Take

The WRC Consent Evaluation Report includes an assessment of the sustainability and surface water interaction. This states:

*“The production bore is located in the aquifer area identified as the Waiuku – Recharge Zone Allocation Aquifer (“WRZ”) as detailed in Table 3-6 of the WRP. The WRZ covers an area 36.5 km<sup>2</sup> for which a management level of 5500 (x1000) m<sup>3</sup> exists. At this point in time allocation is approximately 17% of this management level. The proposed annual take from the bore can be accommodated within the management level.*

*Policies 4 and 5 of Chapter 3.3 of the Waikato Regional Plan inform me that any effect of interception and depletion of surface water, or aquifer sustainability are provided for within the WRZ management level.”*

Should development of the Plan Change area result in the consent limit being reached earlier, the WRC data indicates it should be possible to apply for an increased take and that any such increased take should be sustainable. However, this has also been checked with Auckland Council. Stephen Crane, Senior Specialist, Coastal & Water Allocation, has provided the following advice by email of 10 March 2022:

- The Watercare Waiuku consent Hearing application process set availability for the Waiuku Kaawa aquifer as 3,203,000m<sup>3</sup>/yr. Council records show that the present allocations total

3,001,660m<sup>3</sup>/yr. That allows for the final allocation of the staged allocation to WSL Waiuku as per the Commissioner's decision. Hence, there is potentially 201,340m<sup>3</sup>/yr remaining, not allowing for RMA s14(3)(b) use. There are no outstanding applications.

- However, the new AC S14 model had total S14 use as 301,230m<sup>3</sup>/yr, so on this basis the aquifer is over-allocated by about 100,000m<sup>3</sup>/yr. Council are uncertain that the AC S14 model output is a correct estimate and are working to resolve that. A recent s14 estimate by the Water Specialist Unit based on the area of high producing exotic grassland have been less than the 2019 model value.
- It is also possible that some Waiuku Kaawa consent holders may not have the need for all of the allocation that their consent provides (for whatever reason) and would be willing to surrender part of that allocation or transfer part of their allocation.

Hence, the availability of additional groundwater for Waiuku above the consented limit needs to be confirmed and this will be discussed as part of ongoing consultation with Council and Watercare.

## 5.5 WASTEWATER

### 5.5.1 Watercare Forecasts

Waiuku's planning for the South Western Wastewater Upgrade Project is based on the following growth projections summarised in the table below (from WSL letter, 15/12/2021). These are expressed as actual population in 2013 and anticipated population in 2050, with the latter being a population equivalent, meaning that it includes non-residential wastewater generation. WSL in their 12/15/2021 letter advised that the Auckland Council i11v3 population model projected a 2050 population of around 11,000 for Waiuku. However, Watercare made the judgement that this was too low relative to the actual growth observed by them and therefore made an allowance of 16,000 population equivalent for Waiuku by 2050, including residential and industrial zoned land and the residential – large lot area.

**Table 7: Watercare Growth Projections in the South-west Growth Area**

Location	Existing Population (2013 census)	Anticipated Population (PE) (2050)
Clarks Beach (including Waiau Beach)	2,136	6,000
Glenbrook Beach (includes Kahawai Point)	310	3,000
Kingseat	415	5,000
Waiuku	8,584	16,000
<b>Total</b>	<b>11,445</b>	<b>30,000</b>

**Note:** PE = population equivalent

Watercare in their 2016 AEE for the South-West Wastewater consent application advised that these growth projections are high level estimates only based on recent information and advice received from Auckland Council, as explained above. They further note that possible further expansion of the Kingseat growth area has been sought which could result in a projected population of 50,000

PE. For both the 30,000 and 50,000 PE scenarios, the projected growth for Waiuku remains at 16,000.

They advised that these estimates will be refined and revised on an ongoing basis through the project using multiple information sources such as population model updates, Auckland Council information and developer enquiries to ensure that the proposed infrastructure is sized appropriately and the discharge consent allows for the maximum flow that can be expected over the next 35 years.

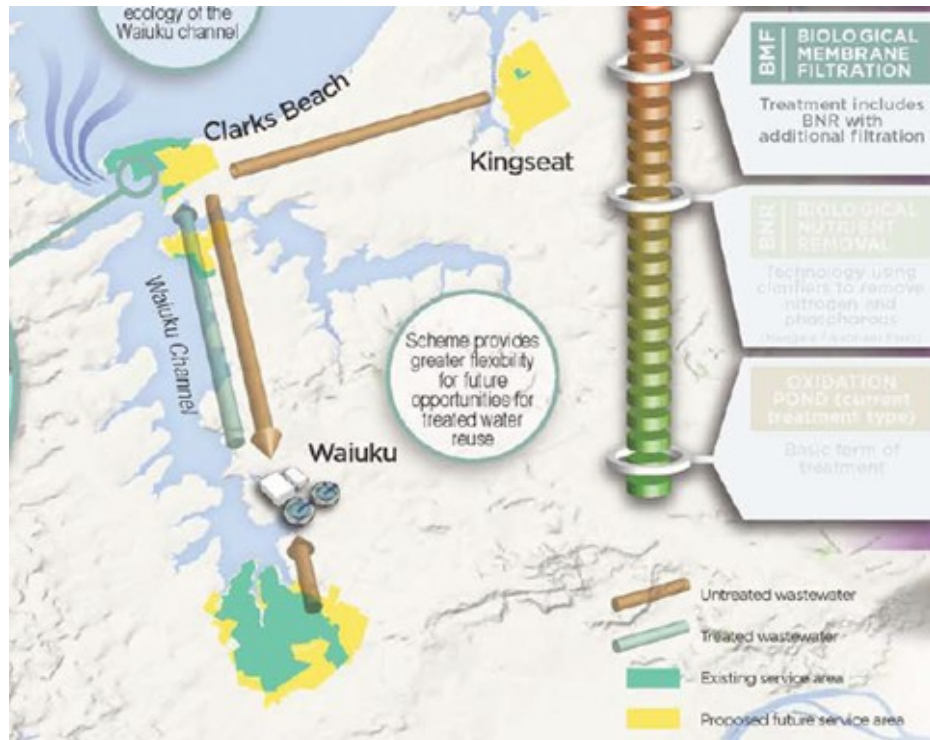
Watercare's water usage summary for Waiuku (from WSL letter, 15/12/2021) showed that non-domestic water usage made up an average of 15.8% (range = 14.2-16.7%) of total domestic and non-domestic water usage over the period 2016-2020. Using the average figure and assuming this applies to wastewater generation, then the adjusted population projection for Waiuku for 2050 on a person basis is **13,472** (this does not include any allowance for non-domestic wastewater generation increasing at a higher than residential due to the Fernleigh Business Park development).

In WSL's online presentation about the Southwestern Wastewater Upgrade project of 29 September 2021, the following image was presented, with yellow showing the proposed future service areas, including land around the outskirts of Waiuku on most sides, but particularly to the south and east. FTL has overlaid this plan onto the Waiuku urban zoned area and it approximately lines up with the current urban boundary (after adjusting to allow for the oblique angle of the WSL image). This is consistent with previous verbal advice from Watercare that the proposed extent of serviced areas are as per the AUP urban zoning extents for towns (where there is no Urban Urban boundary). The yellow "proposed future service area" primarily comprises the following:

- Most of the "Residential – large lot zone" areas;
- Fernleigh Business Park (large commercial/industrial zoned area on eastern side of Waiuku)
- The Waiuku Rugby Club grounds (western side of town off King St).

Watercare have confirmed in their letter dated 15 Dec 2021 that their 16,000 PE projection includes the "large lot" area. We have requested further information on what assumptions they have made regarding development/growth in this area but this has yet to be obtained.





**Figure 10: Waiuku Water Demand Forecast – UE 60/35 Projection**

### 5.5.2 Capacity of Existing Waiuku WWTP

The existing Waiuku WWTP discharge resource consent was renewed in June 2019. Review of the *Application for Resource Consent – Southwest Sub-Regional Wastewater Treatment Plant Discharge to the Waiuku Estuary: Volume 1 Assessment of Environmental Effects* found the following information on the existing Waiuku WWTP:

- The existing Waiuku WWTP consists of Aeration ponds, gravel bed, UV disinfection and Effluent storage ponds.
- The existing Waiuku WWTP maximum consented discharge volume is 5,500 m<sup>3</sup>/day and 33m<sup>3</sup>/day for every 1mm/day of rainfall inclusive, once rainfall exceeds 40mm/week. This data was sourced from the current Waiuku WWTP Resource Consent decision dated April 2019.
- The median flow discharge for the existing Waiuku WWTP during year 2013-2014 was 1790m<sup>3</sup>/day, while the 92<sup>nd</sup> percentile flow discharge during the same period was 3325m<sup>3</sup>/day.
- The median and 92<sup>nd</sup> percentile total nitrogen for the 2013/14 period were both 10.3kg/day, and do not exceed the current consent limit of 20kg/day.
- The average discharge volume for years 2011-2015 for the existing Waiuku WWTP is 1876m<sup>3</sup>/day, well within the current consented limit of 5,500m<sup>3</sup>/day .

Watercare's 2018-2038 AMP states:

The Waiuku and Clarks Beach treatment plants discharge to the Waiuku Estuary, with Waiuku at the head and Clarks Beach at the mouth of the estuarine tributary. As part of Auckland Council's proposed Unitary Plan, the Waiuku Estuary has been largely classified as a significant marine ecological area, affecting discharge consent applications in this area. The Waiuku treatment plant has a current discharge consent that limits the maximum daily dry-weather discharge from the plant to 5500m<sup>3</sup>/d, restricts the time during which discharges can occur, and limits the amount of nutrient load concentrations. The capacity of the plant equates to approximately 20,000 people. The discharge consent is valid until 2019.

Since then, Watercare have further advised that the existing Waiuku WWTP has capacity for a population of around 17,000 people with the current aeration installed on the ponds. Due to this being a pond based WWTP it is designed for removal of the organic load and has limited nutrient removal capacity. The current discharge consent flow limit of 5,500m<sup>3</sup>/d plus rainfall onto the ponds equates to flow generated by a population of roughly 12,000 people. This population enables some growth in areas currently zoned for residential development. Hence, the existing WWTP has capacity to cater for a population increase of 5,000 people within its catchment area.

This means that Watercare are understood to be effectively allowing for the new WWTP (16,000 PE) to serve a smaller Waiuku population than the current system (17,000-20,000 people depending on source), therefore reducing the capacity future proofing built into the existing WWTP.

### 5.5.3 Status of Southwest Wastewater Project

*Excerpts from the Application for Resource Consent – Southwest Sub-Regional Wastewater Treatment Plant Discharge to the Waiuku Estuary: Volume 1 Assessment of Environmental Effects:*

Proposed sub-regional WWTP:

- For the proposed sub-regional WWTP for population of 30,000 PE, the following was consented:
  - Maximum discharge volume of 20,250m<sup>3</sup>/day allowed
  - Maximum discharge flow rate of 727.5L/s allowed
  - Max average dry weather (ADWF) of 6750m<sup>3</sup> per day allowed
  - Total nitrogen median limit of 5mg/L allowed and 92<sup>nd</sup> percentile limit of 20mg/L allowed.
- In the application for resource consent document, it was stated that for the projected population increase (for 30,000PE), a peak flow of 728L/s and ADWF of 243L/s has been calculated as entering the proposed WWTP.
- The Waiuku WWTP has less than minor effects on the Manukau Harbour receiving environment, and no more than minor effect on the upper Waiuku Estuary.
- Estimated nitrogen yields from the Waiuku catchment is 400 T/year (Mostly from agricultural activities).

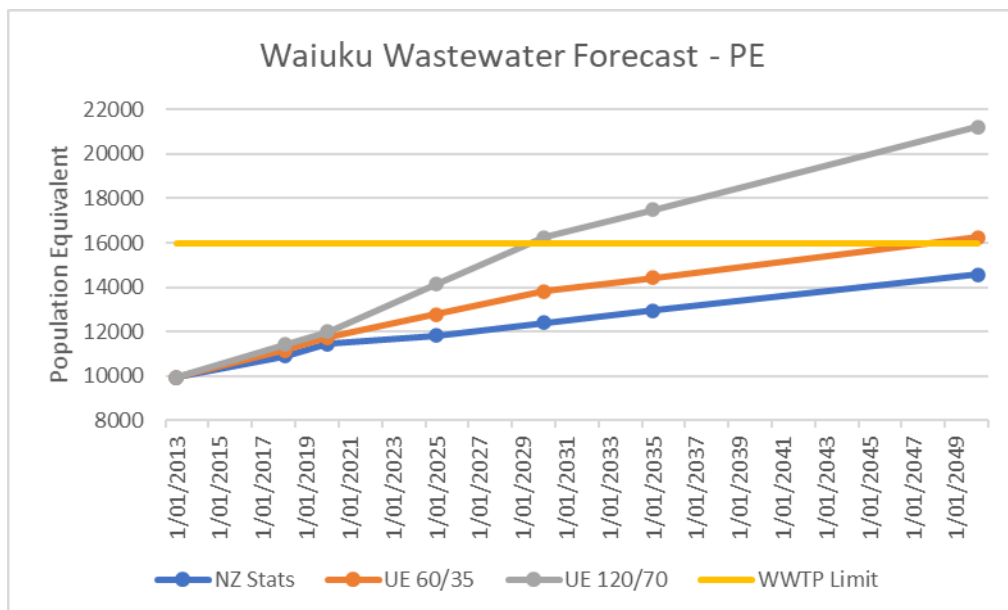
At a public WSL online meeting for the Southwest Wastewater project, held on 29 September 2021, WSL advised that they have advanced further investigation and design work for this project and were now in the process of working through a shortlist of potential site locations. They advised that

construction work is scheduled to commence in the next two years and the new WWTP is required to be operational by June 2026, as required under an Environment Court consent order. They indicated that funding is now available for this project (refer Section 5.6). The Plan Change area would contribute towards the costs of this scheme through the Watercare IGCs.

#### 5.5.4 FTL Forecasts

Wastewater forecasts were based on the following:

- 2013 NZ Statistics population of 8584 and Watercare advice that median flows to the Waiuku WWTP in 2013-14 were  $1790\text{m}^3/\text{d} = 653,798\text{m}^3/\text{yr}$ .
- Using a 180L/cap.d wastewater generation rate.
- Using actual NZ Statistics population data for 2018 and 2020.
- Assessing three population growth scenarios based on:
  - Low (NZ Statistics) population projection.
  - Medium (UE 60/35) projection.
  - High (UE120/70) projection.
- Calculating the non-residential wastewater generation from the 2013-14 data to be 13.7% of total generation and assuming that the non-residential wastewater generation increases to 18.8% of residential generation from 2018 onwards (15.9% of total wastewater), this being the same proportion as for water supply, and again applying the same factors of 1.15 and 1.30 to non-domestic wastewater generation for the medium and high projections to allow for these sources of wastewater growing with the Fernleigh Business Park development.
- Using this approach, the required population equivalent for the Waiuku component of the new WWTP was estimated to be 14,561, 16,237 and 21,226 in 2050 for the low, medium and high projections, with the medium projection being slightly above the 16,000 design provision and the high projection being well above it.



**Figure 11: FTL Waiuku Wastewater Forecast (PE)**

However, for the high projection, the 16,000 PE limit is reached around 2030, when the estimated population reaches 13,060, which is in excess of the maximum projected population under existing AUP zonings for Waiuku, including the Plan Change area, and hence means

development to the denser Enabling Housing Act MDRS zonings would be required to achieve it. Furthermore, when the population reaches 13,761 (maximum estimated development under EHA MDRS zonings, including the Plan Change area) around 3.5yrs after 2030 according to the high projection, additional land would need to be rezoned urban residential for any more growth to occur. The maximum theoretical population of 13,761 under EHA MDRS zonings including the Plan Change area is equivalent to a 17,132 PE, which is 7% above the Watercare 16,000 design PE.

## 5.6 INFRASTRUCTURE FUNDING

Watercare's 2021-2041 AMP shows the funding that has been allocated for the Southern Area Water strategic programme and the Clarks Beach and Waiuku SW sub-regional plant and conveyance strategic programme.

**Table 8: Watercare 2021-41 AMP Funding Allocation – Waiuku Water and Wastewater**

AMP Component	Financial Years 2021-31	Financial Years 2031-41	Total	Estimated Waiuku Portion
Southern Water Strategic Programme <ul style="list-style-type: none"> <li>• Waikato boost pumping</li> <li>• Pukekohe East Reservoir at Runciman Rd</li> <li>• Pukekohe Water Supply</li> <li>• Redoubt Rd reservoir complex expansion</li> <li>• <b>Waiuku water supply</b></li> <li>• Waikato A WTP expansion to 250MLD</li> <li>• Waikato 2 watermain</li> <li>• Waikato A WTP to 325 MLD</li> </ul>	607	556	1163	29-58
Clarks Beach and Waiuku Treatment Plant – Southwest Sub-regional plant and conveyance	216	23	239	76-127
<b>Total</b>				<b>105-185</b>

**Notes:**

1. Watercare have been asked for a breakdown of funding allocated for the Waiuku Water Supply and we look forward to receiving it. A rough estimate is that 2.5-5% of the funding stated may apply to the Waiuku Water supply, based on the inferred relative sizes of the different projects listed, but this needs confirming.
2. Waiuku's share of the WWTP funding is based on Waiuku split as portion of design PE (16,000 out of 30,000-50,000).

As stated in the Plan Change application document, the Plan Change area would generate a Watercare Services Ltd (WSL) Infrastructure Growth Charge (IGC) of approximately \$13,846,000 plus GST and Auckland Council Development Contributions (DCs) of \$16,400,300 plus GST (based on 2020-2021 IGC and DC policy figures and a density of 700 dwellings) which is a significant contribution towards the cost of planned and future projects on comparison with the figures in the above table. As is usual for a project of this scale, development agreements are likely to be entered into with the Council regrading infrastructure and services provision, including funding and timing and possible reduction in DCs/IGCs for infrastructure put in by the developer at their cost.

It is understood that there is concern in the Council and Watercare about the funding of infrastructure for the Plan Change. I am aware that the developers are exploring a number of infrastructure funding options, including:

- (c) Applying under the Infrastructure and Financing Act to create a Special Purpose Vehicle (SPV) which would reduce DCs with a targeted rate applied over 30 years.
- (d) Applying to the government's Infrastructure Acceleration Fund for funding, this being separate but complementary to the SPV mechanism.

It is usual practice for a development agreement to be entered into regarding the servicing of a Plan Change, as recently occurred with Plan Change 55 at Patumahoe. I understand that the Ohara Plan Change land owners are willing to enter into an agreement with Watercare at an appropriate time. At this stage further work is required, in collaboration with Watercare, to work towards agreement on:

- (a) forecast likely residential demand in Waiuku,
- (b) what existing or planned network capacity may be available for the Plan Change that would be paid for with ICGs in the usual manner;
- (c) subject to the conclusions above, what additional public infrastructure may be required to provide capacity to service the development; and
- (d) the timing and cost of any additional public service capacity.

Constructive engagement with Watercare to work through the questions above has already commenced. The landowners and FTL look forward to continuing to work with Watercare to identify technical options/solutions to service the Plan Change and enable much needed housing to be provided.

## **5.7 STAGING**

The development will be undertaken in stages, based on the preliminary staging drawing 32897/105, and explained in the following:

- (a) The Plan Change site comprises three different lots under separate ownership, with each owner planning to develop their property separately but in accordance with the overall Plan Change layout. The Staging Plan allows for the first stage to include land belonging to each owner to facilitate this.
- (b) Development of the site does depend on some internal infrastructure being constructed or upgraded for specific areas, with this being taken into account in sub-staging.
- (c) All earthworks are proposed to be undertaken in one stage. The rationale for this is that the earthworks achieve a cut:fill balance and are relatively minor in terms of volume, comprising 100,000m<sup>3</sup> of cut to fill, representing an average depth of 350mm across the site area of 28.8ha. Doing them in one stage will minimise double handling of material while also creating the landform required to facilitate stormwater management via the greenways and wetland. The site would be split into earthworks catchments of a maximum of 5ha each in accordance with GD05 requirements, with each draining to a Sediment Retention Pond (SRP) or alternative GD05 compliant device.
- (d) The wetland area is referred to as Stage 0. It will initially be used as a SRP and then converted to a wetland prior to receiving discharges from any impervious areas within its contributing catchments - Areas 1B2, 1C2 and 2.

- (e) Stage 1 involves approximately 72% of the site, split into three areas covering each of the Plan Change owner landholdings – i.e. Stages 1A, 1B and 1C. The Stage 1 boundary is based on a proposed ridge line, so that the site is essentially being split along stormwater catchments, as these are more controlling in relation to development constraints than water or wastewater. It is anticipated that Stage 1A (#45A) will be ready to be developed first. The new stormwater line along Constable Rd is needed for the development of the hatched parts of Stage 1 (Areas 1A, 1B1, 1C1). The new wastewater line along Constable Rd is needed for the development of all of Area 1, noting there is a small portion of Areas 1B and 1C that won't be able to be serviced until a wastewater pump station is installed. The Stage 1 split also allows for early construction of the alternative access/dropoff zone to Waiuku College.
- (f) Stage 2 comprises development of the balance of the site on the northern side. A small wastewater pump station is needed to service part of this stage.
- (g) The likely staging sequence, subject to further planning and design work, is tabulated below:

Sequence	Stages served	Essential Infrastructure Prerequisites	Comments
0	1B2, 1C2, 2 (stormwater only)	Wetland	SRPs will be converted into wetland, with planting undertaken as early as practical based on planting seasons. This will allow maximum time for wetland plants to become established prior to the construction of impervious areas.
1	1A, 1B1, 1C1	New Constable Road stormwater and wastewater lines; new water supply ring main and booster pumps (TBC)	New wastewater reticulation line required along Constable Rd for all development; new stormwater line would be installed at same time for cost efficiencies
2	Part 1B2, 1C2 and 2	New wastewater pump station and associated rising main	

The infrastructure upgrades described in the following are set out in chronological order in accordance with the staging proposed above. Further details are then provided in sections 6 and 7 of this report for water and wastewater and in the separate SMP.

### 5.7.1 Water

Water supply provision has been divided into the following:

- Stage 1A (45A Constable Road)
- All other stages
- External infrastructure – i.e. water supply (bore pumps, reservoirs, treatment and distribution pumps)

**Stage 1A (45A Constable Road)** abuts #45 Constable Road. These two properties are being developed by their owner in two stages – #45 first and then #45A (once latter has been through plan change and subdivision consent processes), with #45 nearing completion. Engineering plan approval has been obtained from Auckland Council (ENG60342237) and Watercare (Application No 97281) for water supply and wastewater infrastructure for 48 proposed dwellings on 45 Constable

Road. The proposed water supply for #45 involves upgrading the existing 50mm diameter pipe from the 150dia watermain connection by the Waiuku College to a 180mm diameter water supply line along Constable Road, with 180 and 63 diameter connections into #45A. Hence, Stage 1A (#45A) of the Plan Change area has existing water supply connections in place for it to connect to. The developer of #45A will extend this network through into the Stage 1A area. This work is not dependent on the upgrading of any other external water supply infrastructure, or on the ring main or booster pumps referred to above.

For **all other stages**, water supply provision involves connecting into the existing water supply network at two locations to create a new ring main, and the potential provision of booster pumps to achieve the minimum 250kPA design pressure across the majority of the site. The ring main and booster pumps need to be constructed as part of Stage 1 works. These will provide a reticulation network that can service the entire site, with laterals being constructed off it to service sub-stage areas. This infrastructure will be funded by the developer.

### 5.7.2 Wastewater

Wastewater supply provision has been divided into the following:

- (a) New wastewater line along Constable Rd + internal gravity reticulation system.
- (b) Internal pump station, rising main and associated gravity system
- (c) External infrastructure – Waiuku wastewater pumps, treatment plant and disposal system.

Two options have been presented in this report for wastewater servicing. Whilst selection of a preferred option is subject to further design work and discussions with WSL, “Option B” is currently considered likely to be the better of the two options. Hence, implementation and funding of this option is discussed here.

Option B will service the 45/45A/92/130 development. It involves a new wastewater line from MH2.12 to MH2 along Constable Road, as shown on Crang Civil drawings C556 (plan) and long section (C561). The Option B pipe reticulation system has been sized for design wastewater flows from this entire area. This wastewater line needs to be constructed first and can service approximately 69% of the proposed development by gravity reticulation, comprising the majority of the Stage 1 area and the eastern half of Stage 2. This line would be installed by the developer and funded by them, followed by staged implementation of the internal gravity reticulation in accordance with sub-stage requirements. Ideally, it would be installed at the same time as the new Constable Road stormwater line to achieve some cost efficiencies.

Up to approximately 3.4ha of the development area may still need to be serviced by a relatively small wastewater pump station, located by the proposed wetland. This pump station, rising main and associated gravity reticulation to the pump station would be funded by the developer.

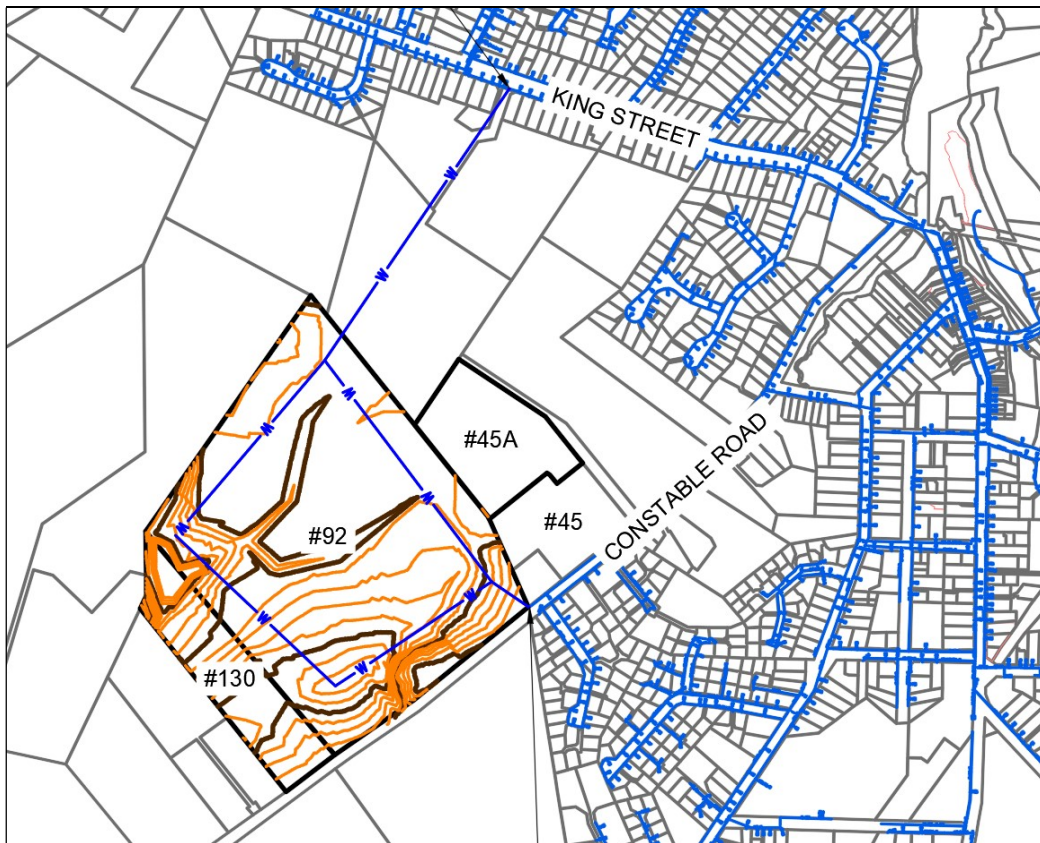
## 6.0 WATER RETICULATION

### 6.1 WATER CONNECTION

45A Constable Road is to be serviced by a previously consented 180mm diameter water main extension (Application #97218 dated 18/11/19) to the southern boundary abutting 45 Constable Road as shown on the Crang Civil Approved Engineering Plan (ENG60342237 dated 16/01/2020).

92 & 130 Constable Road are to be serviced via a new connection onto the previously consented 180mm diameter water main (Application #97218 dated 18/11/19) on the northern side of Constable Road in front of 45 Constable Road as shown on the Crang Civil Approved Engineering Plan (ENG60342237 dated 16/01/2020) and another connection onto the 280mm diameter water main on the southern side of King Street in front of 66 King Street.

The option of connecting into the existing water supply network at two locations along Constable Road and King Street has been investigated, following advice from Watercare that it requires a static water network assessment for this Plan Change application. The proposed water supply reticulation would involve a new extension from both existing lines at the connection locations mentioned above with a new ring main loop formed within the proposed plan change site. This ring main loop alignment represents the worst case for hydraulic assessment. The actual alignment is more likely to follow the roading and greenway layout within the site and will be determined at subdivision consent stage. Refer to FTL Drawing 32897/401 showing the proposed worst case water supply network extension layout which is reproduced below in Figure 12 for ease of reference.



**Figure 12: Proposed Indicative Water Supply Network Extension Layout (Worst Case Layout for Hydraulic Analysis Purposes)**



## 6.2 DEVELOPMENT WATER SUPPLY DEMAND

The calculated peak hourly water supply demand from the proposed plan change sites at 45A, 92 & 130 Constable Road is 26.7L/s. This has been calculated in compliance with the Watercare Code of Practice. Refer to Appendix A for supporting calculations.

## 6.3 WATER RETICULATION CAPACITY ASSESSMENT

Our assessment of the water supply reticulation network is based on GIS information, proposed finish ground levels and Nova Flowtec Services Ltd FW2 hydrant flow testing results of the existing 150mm diameter water main on the southern side of Constable Road undertaken on 13<sup>th</sup> August 2020 for 45 Constable Road (attached in Appendix A).

In the absence of measured pressure testing for the King Street water network, as the existing water main at the connection location along King Street is 280mm diameter and the existing ground elevation at the connection point along King Street is only 5m higher (approx. RL 20m vs RL 15m), it has been assumed that the residual pressure at the connection point along King Street is the same as that measured in the Nova Flowtec Services Ltd FW2 hydrant flow test along Constable Road.

### 6.3.1 Assessment Criteria

The following Code of Practice requirements have been considered in this assessment.

#### **The Watercare Code of Practice for Water Supply:**

##### Section 6.3.5.4 Head losses

- The head loss through the local network pipes and fittings at the design flow rate for peak day - peak hour, shall be less than:
  - 5 m/km for DN ≤150;
  - 3 m/km for DN >150.

##### Section 6.3.5.10 Design pressure

- Unless otherwise specified by Watercare, the design pressure shall be between 250kPa and 800kPa (25 m to 80 m).

#### **The NZS4509-2008 (SNZ PAS) NZ Fire Service Firefighting Water Supplies Code of Practice:**

##### Table 2 - FW2 & Section 5 Running (Dynamic) Pressure

- 12.5L/s is required within 135m and an additional 12.5L/s is required within 270m of the development.

##### Appendix K – Water Supply System Classification

- When the available firefighting flow rates are estimated by running computer models, it is necessary to include background consumer demand concurrently with the fire water flows from hydrants. As a guide, two thirds of the annual peak consumer demand should be used consecutively with fire flows from hydrants, with resulting reticulation pressures not less than 100 kPa.

The assessed flow scenarios and required minimum pressures are tabulated below in Table 9.

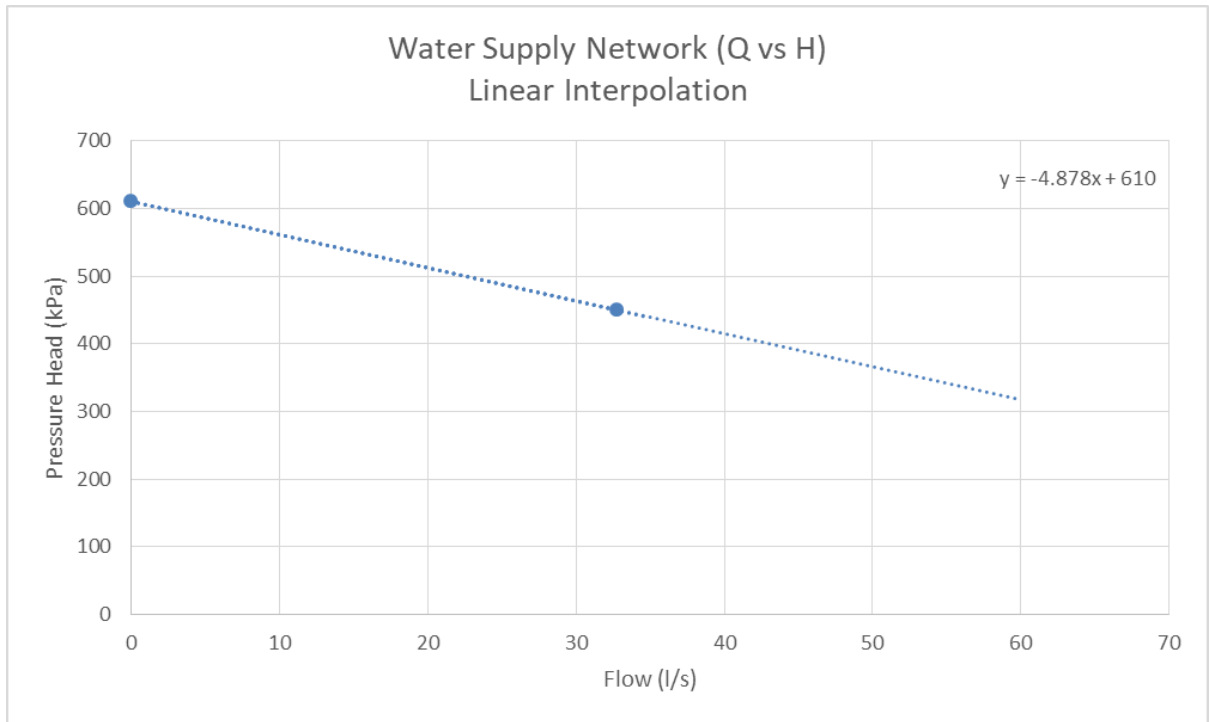
**Table 9: Assessed Flow Scenarios and Required Minimum Pressures**

Scenario	Code of Practice	Design Flow (l/s)	Minimum Pressure (kPa)
1	Watercare - Water Supply	26.7	250
2	NZS4509-2008 (SNZ PAS)	42.8	100

**6.3.2 Capacity Assessment**

We have modelled the proposed water supply extension to service the plan change sites using EPANET software.

The connection location onto the existing water supply line along King Street has been modelled as a reservoir with the network pressure modelled as a pump with a performance curve linearly interpolated from the hydrant test results (Nova Flowtec Services Ltd FW2 hydrant flow testing results undertaken on 13<sup>th</sup> August 2020 for 45 Constable Road). The hydrant test results have been linearly interpolated to produce a performance curve – refer to Figure 13.



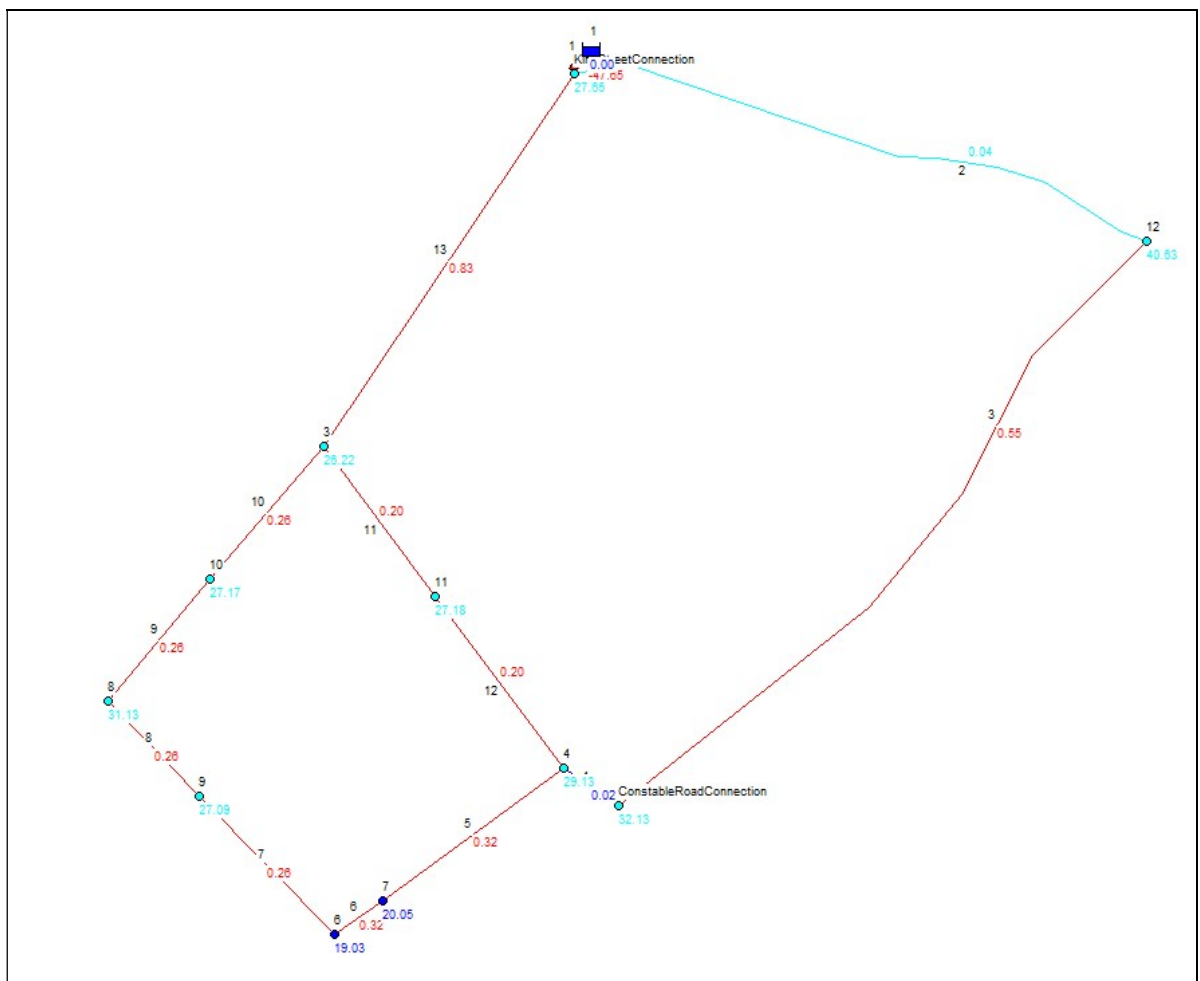
**Figure 13: Water Supply Network (Q vs H) – Linearly Interpolated from Hydrant Test Results**

Within the proposed plan change site, the residual pressure throughout the proposed ring main loop and unit headloss has been modelled assuming a 315mm OD PE water supply main for all sections of the extension.

The EPANET model results for both the Watercare and NZ Fire Service Firefighting Water Supplies Codes of Practice flow scenarios are included below.

**Scenario 1:** The minimum residual pressure within the proposed ring main loop is approximately 19.0m (190kPa) at the localised high point in the southern corner of the site. This is less than the 250kPa minimum design pressure as required by Watercare. However, the modelled residual pressure is reasonably close to the minimum required design pressure. Subsequent detailed modelling drawing on information of the existing network can then refine the water reticulation network to achieve the minimum pressure requirements within the proposed plan change site.

The unit headloss for all pipe sections within the model are less than 3m/km and comply with the maximum unit headloss of 3m/km for pipes of DN > 150mm.



**Figure 14: EPANET results – Scenario 1: Watercare Design Flow (26.7l/s)**

**Scenario 2:** The minimum residual pressure within the proposed ring main loop is approximately 11.1m (111kPa) at the localised high point in the southern corner of the site. This exceeds the 100kPa minimum pressure as required by NZS4509-2008.

The unit headloss for all pipe sections within the model are less than 3m/km and comply with the maximum unit headloss of 3m/km for pipes of DN > 150mm.

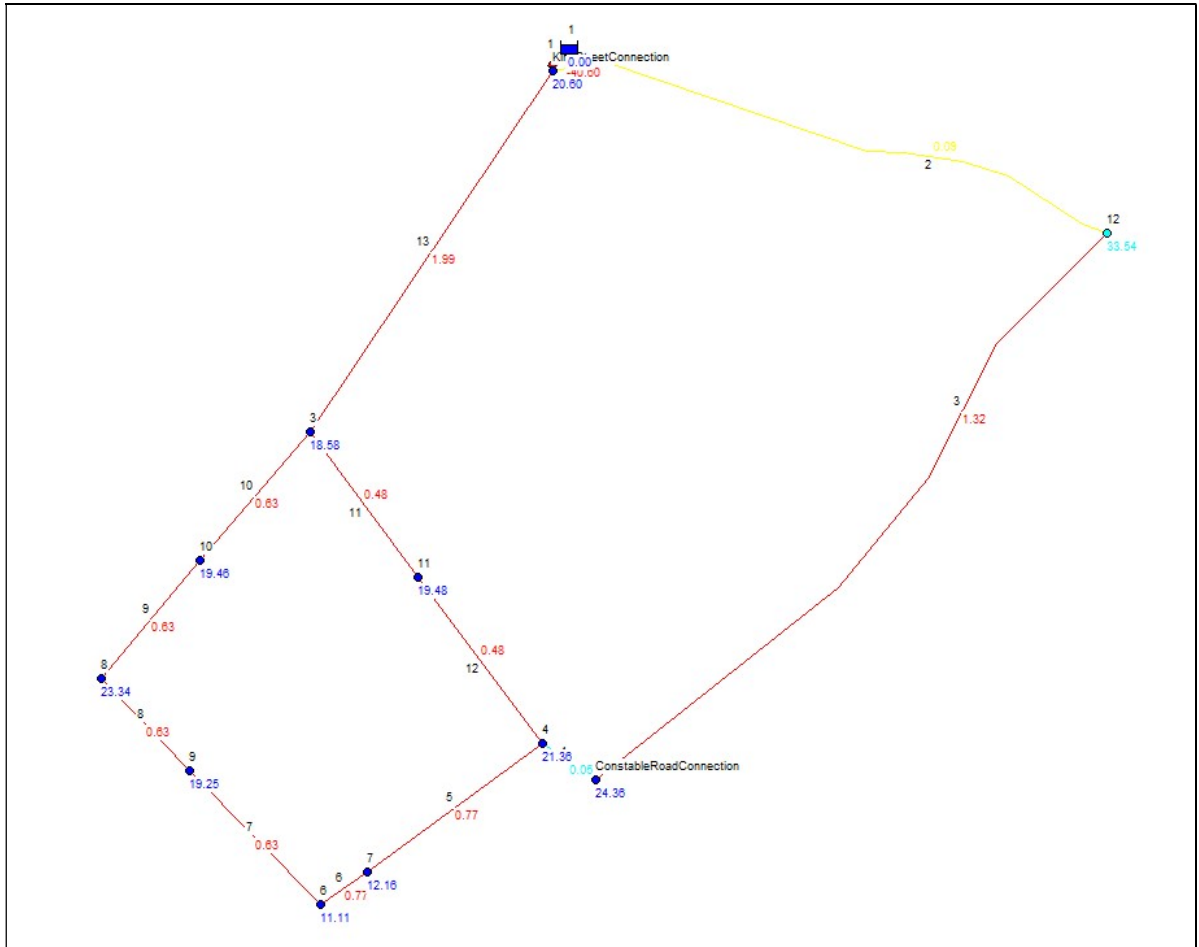


Figure 15: EPANET results – Scenario 2: NZS4509-2008 Design Flow (42.8l/s)

**6.3.3 Assessment Summary**

From our preliminary assessment above, it is concluded that the existing water supply reticulation network does have sufficient capacity to cater for the proposed plan change sites subject to booster pumps potentially being required to achieve the Watercare 250kPa minimum design pressure across the majority of the subject site within the proposed ring main loop. Subsequent detailed modelling drawing on information of the existing network can then refine the water reticulation network to confirm that minimum pressure requirements within the proposed plan change site are achieved. This would be done at the subdivision consent stage.

Watercare in their letter of 15 December 2021 have advised that based on a fire flow of FW2 (25L/s), and sufficient new pipe infrastructure from King St to supply the proposed development, no wider network pressure issues are expected.

**6.4 FUTURE POTENTIAL INTENSIFICATION UNDER RMA AMENDMENT BILL**

Future possible intensification of the O’Hara Plan Change area could occur under the RMA Amendment Bill, increasing the upper limit of the subdivision to 910 total lots. As a result of this increased number of total lots, the peak wastewater flow generated from the subdivision will increase as shown on Table 10.

**Table 10: Proposed water demand allowing for 910 total lots**

Scenario	Code of Practice	Design Flow (l/s)	Minimum Pressure (kPa)
1	Watercare - Water Supply	34.8	250
2	NZS4509-2008 (SNZ PAS)	48.2	100

EPANET modelling shows that minimum residual pressures of 100kPa will not be met under the firefighting + 2/3 peak water demand scenario for 910 lots. Hence a firefighting booster pump will be required on the subdivision vested to Watercare.

Funding for any new infrastructure can be supported through development contributions.

## 7.0 WASTEWATER RETICULATION

### 7.1 EXISTING INFRASTRUCTURE

Waiuku is serviced by a reticulated wastewater network that discharges to the Waiuku Wastewater Treatment Plant (WWTP) which is located adjacent to the Clarks Beach golf course. The nearest wastewater reticulation networks are located along King St to north of the site and Constable Road to the east of the site. Both wastewater networks drain to a pump station located on King Street (King St WWPS) where a rising main discharges to a trunk wastewater pipe that is located about the Racecourse Esplanade that discharges into a terminal pump station located at the north east extent of the Racecourse Esplanade, from where wastewater is pumped to the Waiuku WWTP.

### 7.2 PROPOSED DEVELOPMENT

#### 7.2.1 Wastewater Generation

Peak wastewater flows from the subject site have been calculated on the basis of the O'Hara Waiuku Plan Change development density for 45A, 92 and 130 Constable Road (May 2021). These flows are summarised in Table 11. They have been calculated in compliance with the Watercare Code of Practice. Refer to the attached calculations.

**Table 11: Proposed Wastewater Flows**

Catchment	Lots	Average Persons per Lot	Total Persons	Per capita flow (L/Day)	ADWF (L/s)	PWWF (L/s)
92+130 Constable Road	645	3	1935	180	4.0	27.0
45A Constable Road	55	3	165	180	0.3	2.3
Combined	700	3	2100	180	4.3	29.3

**Notes:**

1. The Crang Civil scheme plan for 45A Constable Rd shows 55 lots on it. Based on the upper expected limit of 700 lots new lots as part of the O’Hara Waiuku Plan Change, the balance of 645 lots have been adopted in our assessment for 92 and 130 Constable Road.
2. ADWF = average dry weather flow; PWWF = peak wet weather flow.

### **7.2.2 Wastewater Reticulation – Constable Road Option**

The 45A Constable Road site was originally proposed to be served by an approved extension of the existing wastewater public network located along Constable Road through the 45 Constable Road subdivision. This extension has been previously consented (Application #97281 dated 18/11/19) to the southern boundary abutting 45 Constable Road labelled as SSMH A.7 on the Crang Civil Approved Engineering Plan (ENG60342237 dated 16/01/2020). However, following recent topographical survey of the downstream wastewater system finding this system is under capacity, two options have been assessed and designed for wastewater reticulation, as explained earlier in section 3.2 of this report – namely Options A (refer section 6.2.3 and B).

Option B will service the 45/45A/92/130 development. It involves a new wastewater line from MH2.12 to MH2 along Constable Road, as shown on Crang Civil drawings C556 (plan) and long section (C561). Design calculations and further information is found in the separate Crang Civil infrastructure report. The Option B pipe reticulation system has been sized for design wastewater flows from this entire area.

For this option, wastewater from the majority of the 92/130 Constable Rd development area can be conveyed by gravity to the new Constable Road line. Up to approximately 3.4ha of the development area may still need to be serviced by a relatively small wastewater pump station, located by the proposed wetland. It may be possible to reduce the size of the pump station catchment as part of further design work as there is potential to lower the upper portion of the new Constable Rd line by around 1.7m.

The Option B layout is shown on Fraser Thomas drawing 32897/303.

### **7.2.3 Wastewater Reticulation – Pump Station, Rising Main and King St Connection Option**

A second wastewater collection and reticulation option has also been developed. This involves the following:

- 45/45A - Option A: New wastewater line from MH12 to MH2 along Constable Road as shown on Crang Civil drawings C555 (plan) and long-section (C560). This upgrade is also part of Option B, being required due to existing wastewater pipe system capacity issues, as explained in section 6.2.3.
- 92/130: Option C - Gravity wastewater collection system to new pump station on-site and a new rising main to connection into existing wastewater system along King St, with the King St system to be upgraded.

For this alternative option, 92 & 130 Constable Road would be serviced by a new wastewater pump station located in the north western corner of the site. Therefore, all properties within 92 & 130 Constable Road are to drain via gravity to the new wastewater pump station, which will be

provided with emergency storage in accordance with WSL's requirements. For the properties along Constable Road, a deep gravity line or a local pump station that discharges to a gravity line at the ridge of the site will be required to service these lots.

The Option A + C layout is shown on FTL drawing 32897/302.

The proposed development will comply with Watercare Services requirements that each of the new lots be served with individual connection points a minimum of 1.2m below finished floor level. Details of the proposed gravity network within the site draining to the new wastewater pump station will be confirmed at the subdivision consent stage.

The feasibility of servicing part of the 92 and 130 Constable Rd catchment via a gravity line extended from WWMH422826 (outside of #32 King St) was also investigated. Based on a proposed 150mm diameter public wastewater line at 0.75% minimum grade (assuming between 20-200 lots to be connected), there is insufficient cover to achieve the 1.2m clearance above the soffit of the pipe as per Watercare requirements (assuming at grade dwellings). Therefore, it is not feasible to service any part of the site via a gravity line to WWMH422826 outside of #32 King Street.

### **7.3 PRELIMINARY CONSULTATION WITH WATERCARE**

A pre-application meeting was held online with Watercare staff, Shahram Morteza (Development Engineer – Southern, Developer Services) and Ilze Gotelli (Head of Major Developments), on 11 March 2021. At this meeting, Watercare staff referred to additional information relevant to this area being available on their website, and advised that they would require a static wastewater network assessment down to the 550mm diameter public wastewater line located just before the King Street WWPS as part of the Plan Change process.

Subsequent communications have occurred including a constructive Zoom meeting with key Council and Watercare staff on February 23<sup>rd</sup> and provision of a letter from Watercare dated December 2021 providing some of the additional information sought. The landowners and their advisers welcome on-going engagement with Watercare and the Council on infrastructure servicing matters.

### **7.4 WASTEWATER STATIC NETWORK ASSESSMENT**

This section presents the results of the static wastewater network assessment requested by Watercare, based on the following options:

- Connecting into the existing wastewater network along Constable Road.
- Connecting into the existing wastewater network along King Street.

Our assessment of the existing public wastewater network is based on GIS information and additional topographical survey for the Constable Road route. No survey has been undertaken of the King St system as the GIS data indicates most of this system will need to be upgraded in any case. Where invert levels were not available from survey of GIS, we have inferred the invert level based on AC GIS contours and depth to invert information. Where neither invert levels nor depth to

invert level information was available, we have not assessed the associated pipe section(s). Despite this limitation, this assessment is considered adequate for this Plan Change application.

#### 7.4.1 Connection onto Constable Road Network

Crang Civil have undertaken this assessment, as reported on separately in their Infrastructure report. Their assessment, reviewed by ourselves, has shown that it is not viable to connect the 45A development alone into the Constable Road system without its capacity being exceeded.

Under Option A, a new wastewater line comprising 200mm diameter pipes of length 412m running from King St to just south of Leonard St is required to upgrade the existing system so that it has sufficient capacity to take the 45/45A development. For this option, the final 47m section of pipe (MH B to MH C) also needs to be upgraded to 300mm diameter to accommodate increased flows from the wastewater line along King St (taking 92/130 development wastewater) joining into it.

Under Option B, a new wastewater line comprising 225mm diameter pipes of length 938m running from King St to adjacent to 47 Constable Road is required to have sufficient capacity to take wastewater from the 45/45A and 92/130 development. For this option, the final 47m section of pipe (MH B to C) also needs to be upgraded to 300mm diameter to accommodate increased flows from 92/130, but coming down the new Constable Road line for this option.

The Crang Civil calculations and drawings show both of these options are viable.

#### 7.4.2 Connection onto King St Network

The option of servicing the Plan Change sites at 92 & 130 Constable Road by connecting onto the existing public wastewater network along King Street via a new connection into WWMH422826 (outside of #32 King St) was also assessed (Option C). The indicative alignment of the rising main and wastewater pump station is shown on FTL Drawing 32897/302. This rising main will run through the following properties:

- Constable Road (no street number); Lot 1, DP 93210 – 6.93ha (NA49D/500) - Auckland Council
- 34 King St; Pt Lot 2 DP93210; Pt Lot 7 DP 24487 (NA823/92) - Waiuku District Rugby Football Club Incorporated

These properties are all zoned “open space – sport and active recreation”.

Note that for this option as 45A Constable Road is to be serviced by Option A as described above, their contributing wastewater flows have not been included in our capacity assessment of the existing public wastewater network along King Street. Refer to the Crang Civil infrastructure report for further details.

A capacity assessment of the existing public wastewater network from the proposed connection point located at WWMH422826 (outside of #32 King St) until WWMH420713 (last WWMH before the 550mm wastewater pipe and King Street Pump Station) was undertaken. Our catchment delineation to each assessed WWMH is shown on FTL Drawing 32897/301.

Contributing wastewater flows were assessed as set out below:



- For areas zoned as “Residential”, the number of existing dwellings was counted based on the latest available aerial on AC GIS (2017). To determine design flows, a design occupancy of 3 persons per house and daily wastewater flow allowance of 180L/day were adopted.
- For areas zoned as “Business”, the building footprint area within the catchment was used along with an adopted design wastewater flow allowance of 4.5L/m<sup>2</sup>/day for light water users (up to 2 storeys) as the existing buildings within the “Business” zone of Waiuku are generally 2 storeys or less.
- For Waiuku College, wastewater flows were estimated based on 950 students (from school website information) and an assumed 50 staff members.
- For the Waiuku Rugby Club, the club website indicates that there is a large club room which has full bar facilities and a fully functional kitchen. As such, we have adopted a design wastewater flow allowance of 15L/m<sup>2</sup>/day for wet retail facilities. We have assumed the net floor area to be 1170m<sup>2</sup> based on the gross building area (1470m<sup>2</sup> as measured from AC GIS aerial) x 0.8 (as per the Code of Practice).
- For remaining areas zoned as “Open Space”, we have assumed no contributing wastewater flows. We do note that some areas within the “Open Space” zone contain buildings such as a Museum and Fire station. However, as no information was able to be obtained relating to the occupancy, we have ignored the contributing flows from these.

Refer to the attached calculations showing the catchment breakdown.

#### **7.4.3 Existing Scenario**

For the existing scenario, of the assessed wastewater piped network, there is sufficient capacity from the proposed connection point until WWMH420712. From this WWMH, the next section of 200mm diameter wastewater pipe is under capacity. Refer to the attached calculations and FTL Drawing 32897/304 showing the wastewater network that is under capacity for the existing scenario.

#### **7.4.4 Proposed Scenario**

For the proposed scenario, of the assessed wastewater piped network, there is sufficient capacity between WWMH421494 and WWMH421495 and WWMH422858 and WWMH420712 only. The remainder of the assessed piped network is under capacity. Refer to the attached calculations and FTL Drawing 32897/305 showing the wastewater network that is under capacity for the proposed scenario.

### **7.5 WASTEWATER NETWORK UPGRADE**

A preliminary assessment has been undertaken to determine the required pipe sizes to upgrade the King St wastewater reticulation network so that it can cater for the Plan Change area, assuming the same grades as existing. This assessment is summarised below:

- From the connection point at WWMH422826 until WWMH422858, the pipe sizing will need to increase from 150mm diameter to 200mm diameter – approximate length = 436m.

- From WWMH420712 to WWMH420713, the pipe sizing will need to increase from 200mm diameter to 300mm diameter – approximate length = 47m.
- The proposed wastewater network may consist of either upgrading the existing wastewater line or installing a new separate duplicate line or a falling main that may connect into WWMH420713 (upstream of the 550mm diameter AC pipe that connects into the King Street WWPS).

Refer to FTL Drawing 32897/308 showing the pipe sections that require upsizing for the upgrading existing line option.

Given that the static analysis has determined that the existing reticulation is currently under capacity, there appears to be little benefit in assessing staging of the proposed development.

To illustrate existing services and constraints on the proposed wastewater network upgrade, existing services information sourced from AC GIS and B4UDIG has been added onto a GIS based plan. It is noted that there is medium voltage electricity and a 125mm gas main pipeline among various other services within the road corridor of King Street which will need to be addressed as a part of further design associated with the proposed wastewater network upgrade.

Refer to the attached calculations and FTL Drawings 32897/306-307 showing the existing services along the assessed wastewater network route for Option C.

## 7.6 FUTURE POTENTIAL INTENSIFICATION (O’HARA PLAN CHANGE)

Future possible intensification of the O’Hara Plan Change area could occur under the Enabling Housing Act/MDRS, increasing the upper limit of the subdivision to 910 total lots. As a result of this increased number of total lots, the peak wastewater flow generated from the subdivision will increase as shown on Table 12.

**Table 12: Proposed wastewater flow allowing for 910 total lots**

Catchment	Lots	Average Persons per Lot	Total Persons	Per capita flow (L/Day)	ADWF (L/s)	PWWF (L/s)
92+130 Constable Road	855	3	2565	180	5.3	35.8
45A Constable Road	55	3	165	180	0.3	2.3
Combined	910	3	2730	180	5.6	38.1

To cater for the increased wastewater generation as part of this future option, the existing wastewater pipe network as discussed on section 6.5 will require future upsizing as follows:

- From the connection point at WWMH422826 until WWMH420669, the pipe sizing will need to increase from 150mm diameter to 200mm diameter – approximate length = 375m.
- From WWMH420669 to WWMH420712, the pipe sizing will need to increase from 150-200mm to 225mm diameter – approximate length = 130m.
- From WWMH420712 to WWMH420713, the pipe sizing will need to increase from 200mm diameter to 300mm diameter – approximate length = 47m.

Refer to the attached calculations and FTL Drawings 32897/312 showing the existing services along the assessed wastewater network route for Option C.

## 7.7 KING ST AND KOHWAI PLACE WASTEWATER PUMP STATIONS

The King St wastewater pumpstation (WWPS) will be the receiving pump station to wastewater conveyed from the proposed plan change site. AC GIS indicates that the King St WWPS conveys wastewater via a 200 AC rising main to a 375 to 600 AC trunk gravity pipeline to the terminal Kowhai Place WWPS which then pumps wastewater to the Waiuku WWTP.

The Waiuku Integrated Catchment Management Plan (WICMP) prepared by FTL dated August 2010 states that King Street WWPS and Kowhai Place WWPS are the two large-capacity pump stations in the Waiuku wastewater network. The WICMP also references information provided by Franklin District Council (FDC) at that time which states that:

- King Street WWPS has a total storage volume of 109m<sup>3</sup> (consisting of 51m<sup>3</sup> wet well volume and 58m<sup>3</sup> emergency storage volume) and Kowhai Place WWPS has a total storage volume of 195m<sup>3</sup> (consisting of 61m<sup>3</sup> wet well volume and 134m<sup>3</sup> emergency storage volume).
- The minimum storage requirement for a WWPS is 4 hours of dry weather flow. This equates to 99m<sup>3</sup> and 141m<sup>3</sup> for the King Street and Kowhai Place WWPS's respectively.

Based on the current WSL standards for network wastewater pumping stations and pressure rising mains, the required storage volume equates to 8 hours of average dry weather flow (ADWF) from the ultimate catchment.

The required storage volumes for the existing and proposed (Plan Change) scenarios for the King Street WWPS have been assessed based on current WSL standards. These results are summarised in Table 13.

**Table 13: King Street WWPS Storage Requirements**

Existing catchment storage requirements – WSL 8hr ADWF (m <sup>3</sup> )	Proposed catchment (including Plan Change Area) storage requirements – WSL 8hr ADWF (m <sup>3</sup> )	Increase (%)
377.3	504	33.6

From the information provided by FDC (dated 2007), it was stated that planned upgrades were to occur to the King Street WWPS within the next five years (i.e. by 2012). This means that these upgrade works should have been carried out by now. Watercare has advised in recent correspondence that these upgrades were not carried out. Hence, the above information is still correct.

No more recent information has been made available as to the capacity of the King St WWPS and Kowhai Place WWPS. Given King St WWPS and Kowhai Place WWPS are key bulk wastewater infrastructure assets, accepted practice is that hydraulic modelling of such key assets would have been undertaken, particularly given the South West Project, and be available from

Council/Watercare and that analysis of the impact of the plan change contribution would be a task anticipated by these authorities.

## **7.8 WASTEWATER TREATMENT**

## **8.0 UTILITIES**

Crang Civil have advised that Counties Power Ltd and Chorus Ltd have been engaged to provide power and telecommunication services for 45 Constable Road and that there is no reason why their services can not be extended for a development of 45A Constable Road.

Counties Power have confirmed in writing that network connection points can be made available within the road reserve to service future residential development of No 92 and 132, but that upgrades of existing network infrastructure will be necessary to accommodate this development.

Chorus have advised by telephone communication that the existing fibre network in the road berm can be extended to service No 92 and 130 and that they would confirm any upgrades required to support the proposed development once a new connection request is lodged.

Power and telecommunication services will be reticulated underground from the existing networks present in the service berm along Constable Road through the proposed development area.

## **9.0 CONCLUSIONS**

This engineering report has shown that the proposed change of zoning for No 45A, 92 and 130 Constable Road is appropriate in terms of geotechnical constraints, contaminated land, earthworks, and the provision of stormwater management. While further information, and engagement with Watercare, will help to clarify the final water and wastewater infrastructure requirements for the proposed Plan Change, it is considered that the development is technically capable of being serviced in the future. Therefore it can meet the requirements of the Resource Management Act, AUP:OP, NPS-UD, and the Auckland Regional Stormwater NDC.

## **10.0 DISCLAIMER**

The professional opinion expressed herein has been prepared solely for, and is furnished to our client, Gardon Trust and for the information of Council, on the express condition that it will only be used for the purpose for which it is intended.

No liability is accepted by this firm or by any Principal, or Director, or any servant or agent of this firm, in respect of its use by any other person, and any other person who relies upon any matter contained in this report does so entirely at its own risk. This disclaimer shall apply notwithstanding that this report may be made available to any person by any person in connection with any application for permission or approval, or pursuant to any requirement of law.

We do not assume any liability for misrepresentation or items not visible, accessible or present at the subject site during the time of the site inspection; or for the validity or accuracy of any

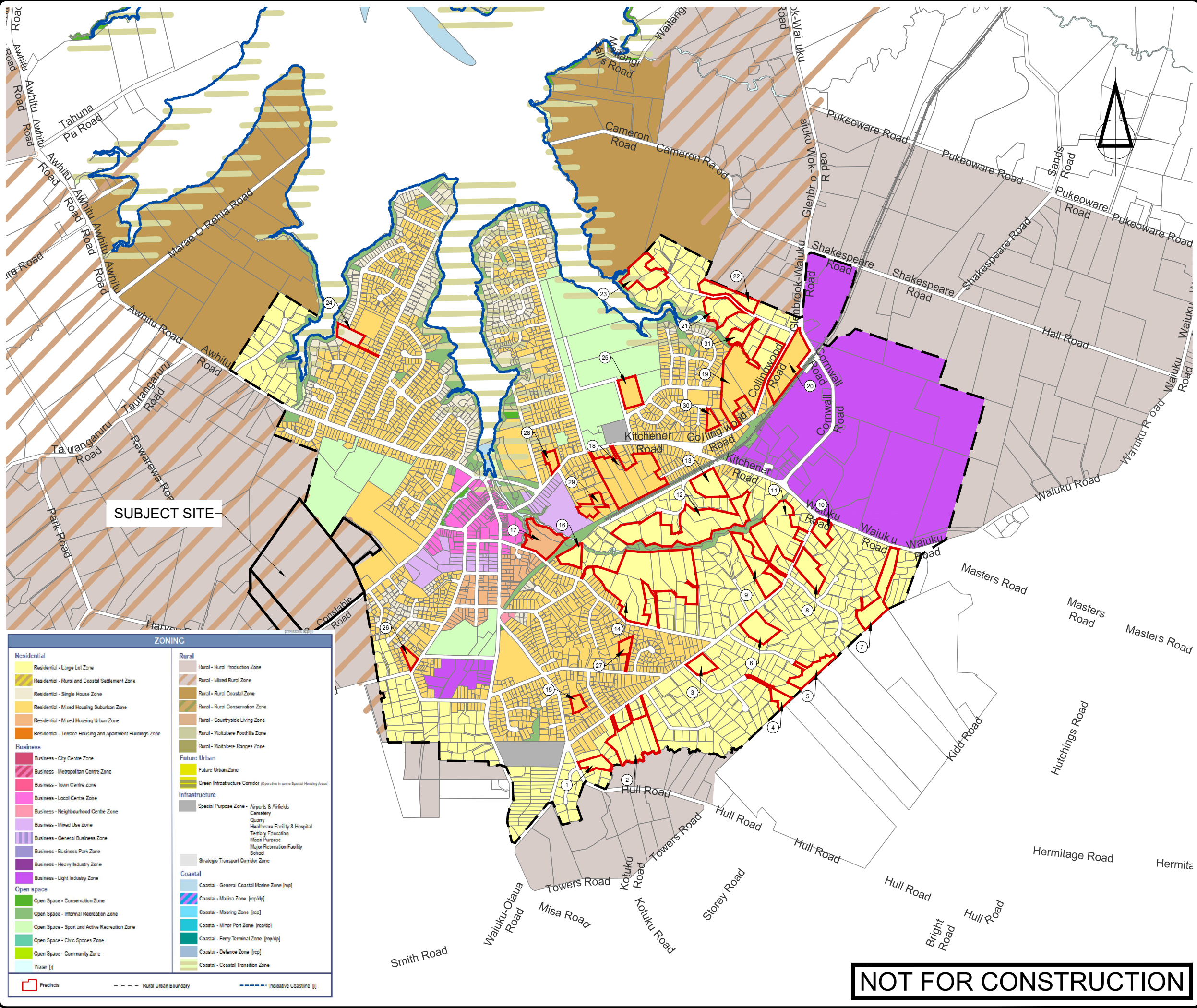
information provided by our client or third parties that have been utilised in the preparation of this report.

The conclusions and recommendations expressed herein should be read in conjunction with the remainder of this report and should not be referred to out of context with the remainder of this report.

J:\32 series\32897 Gardon Trust Waiuku PPC\Report\32897 Eng Report 220308 - draft v5.doc

## ***Figures and Drawings***

P:\32 series\32897 Brookdale Waiuku PPC03 Drawings\32897-22.dwg, A, 10/03/2022 1:50:36 pm



SURVEYED		APPROVED	DATE
DESIGNED		SF	04/03/2022
DRAWN	DK	04/03/2022	
CHECKED	SF	04/03/2022	
REVISION	CHANGES		CHECKED DATE
A	For Information		SF 04/03/2022

**Legend:**

Potential parcels that can be subdivided

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE  
**POTENTIAL SUBDIVISION  
PARCELS (AUP AND NO AERIAL  
OVERLAY)**

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
HAWKE'S BAY ..... 06 211 2766  
CHRISTCHURCH ..... 03 358 5936  
BLENHEIM ..... 03 428 3293

www.fraserthomas.co.nz

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

STATUS  
**PLAN CHANGE**

Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

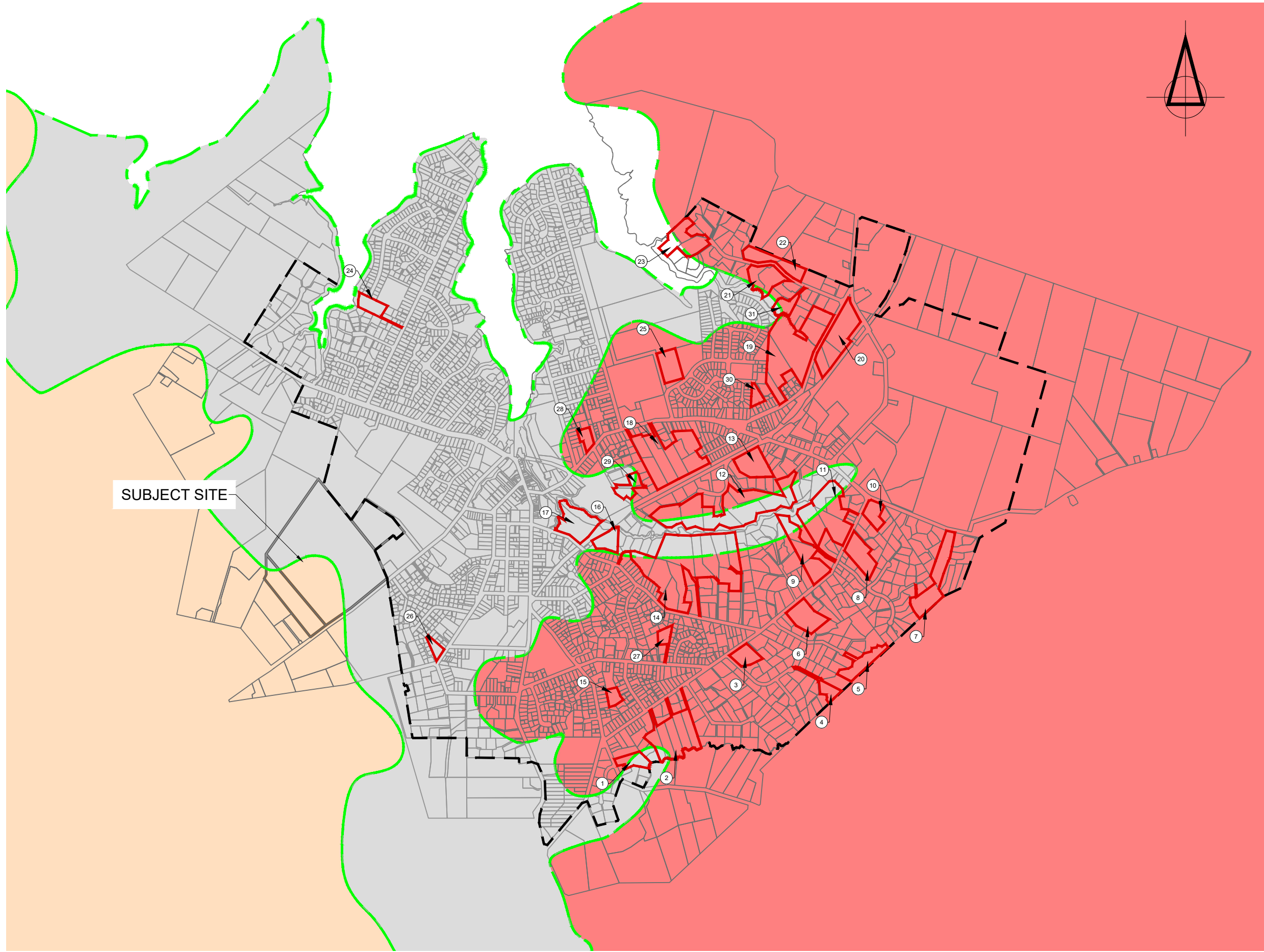
SCALE 1:20000 (A3)

DRAWING No. **32897/22** REVISION **A**

**NOT FOR CONSTRUCTION**





ZONING	
<b>Residential</b>	<b>Rural</b>
Residential - Large Lot Zone	Rural - Rural Production Zone
Residential - Rural and Coastal Settlement Zone	Rural - Mixed Rural Zone
Residential - Single House Zone	Rural - Rural Coastal Zone
Residential - Mixed Housing Suburban Zone	Rural - Rural Conservation Zone
Residential - Mixed Housing Urban Zone	Rural - Countryside Living Zone
Residential - Terrace Housing and Apartment Buildings Zone	Rural - Waitakere Foothills Zone
<b>Business</b>	Rural - Waitakere Ranges Zone
Business - City Centre Zone	<b>Future Urban</b>
Business - Metropolitan Centre Zone	Future Urban Zone
Business - Town Centre Zone	Green Infrastructure Corridor (Operates in some Special Housing Areas)
Business - Local Centre Zone	<b>Infrastructure</b>
Business - Neighbourhood Centre Zone	Special Purpose Zone - Airports & Airfields
Business - Mixed Use Zone	Cemetery
Business - General Business Zone	Quarry
Business - Business Park Zone	Healthcare Facility & Hospital
Business - Heavy Industry Zone	Tertiary Education
Business - Light Industry Zone	Minor Purpose
<b>Open Space</b>	Major Recreation Facility
Open Space - Conservation Zone	School
Open Space - Informal Recreation Zone	Strategic Transport Corridor Zone
Open Space - Sport and Active Recreation Zone	<b>Coastal</b>
Open Space - Civic Spaces Zone	Coastal - General Coastal Marine Zone [top]
Open Space - Community Zone	Coastal - Marina Zone [top]
Water [0]	Coastal - Mooring Zone [top]
	Coastal - Minor Port Zone [top]
	Coastal - Ferry Terminal Zone [top]
	Coastal - Defence Zone [top]
	Coastal - Coastal Transition Zone
<span style="border: 1px solid red; display: inline-block; width: 10px; height: 10px;"></span> Precincts	- - - Rural Urban Boundary
	- - - Indicative Coastline [0]

P:\32 series\32897 Brookdale Waiuku PPC\03 Drawings\32897-23.dwg, A, 10/03/2022 1:50:26 pm



SURVEYED		APPROVED	SF	DATE	
DESIGNED					
DRAWN	DK	04/03/2022			
CHECKED	SF	04/03/2022			
REVISION	CHANGES		CHECKED	DATE	
A	For Information		SF	04/03/2022	


**Legend:**

-  Potential parcels that can be subdivided
-  Undifferentiated Kerikeri Volcanic Group basalt lava of South Auckland Volcanic Field
-  Moderately to poorly consolidated, cross-bedded, plane-parallel and ripple-laminated sandstone, with paleosols, lignite and carb
-  Pumiceous mud, sand and gravel with muddy peat and lignite: rhyolite pumice, including non-welded ignimbrite, tephra and alluvia

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE  
**POTENTIAL SUBDIVISION  
PARCELS (GEOLOGY OVERLAY)**



**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
HAWKE'S BAY ..... 06 211 2766  
CHRISTCHURCH ..... 03 358 5936  
BLLENHEIM ..... 03 428 3293

[www.fraserthomas.co.nz](http://www.fraserthomas.co.nz)

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

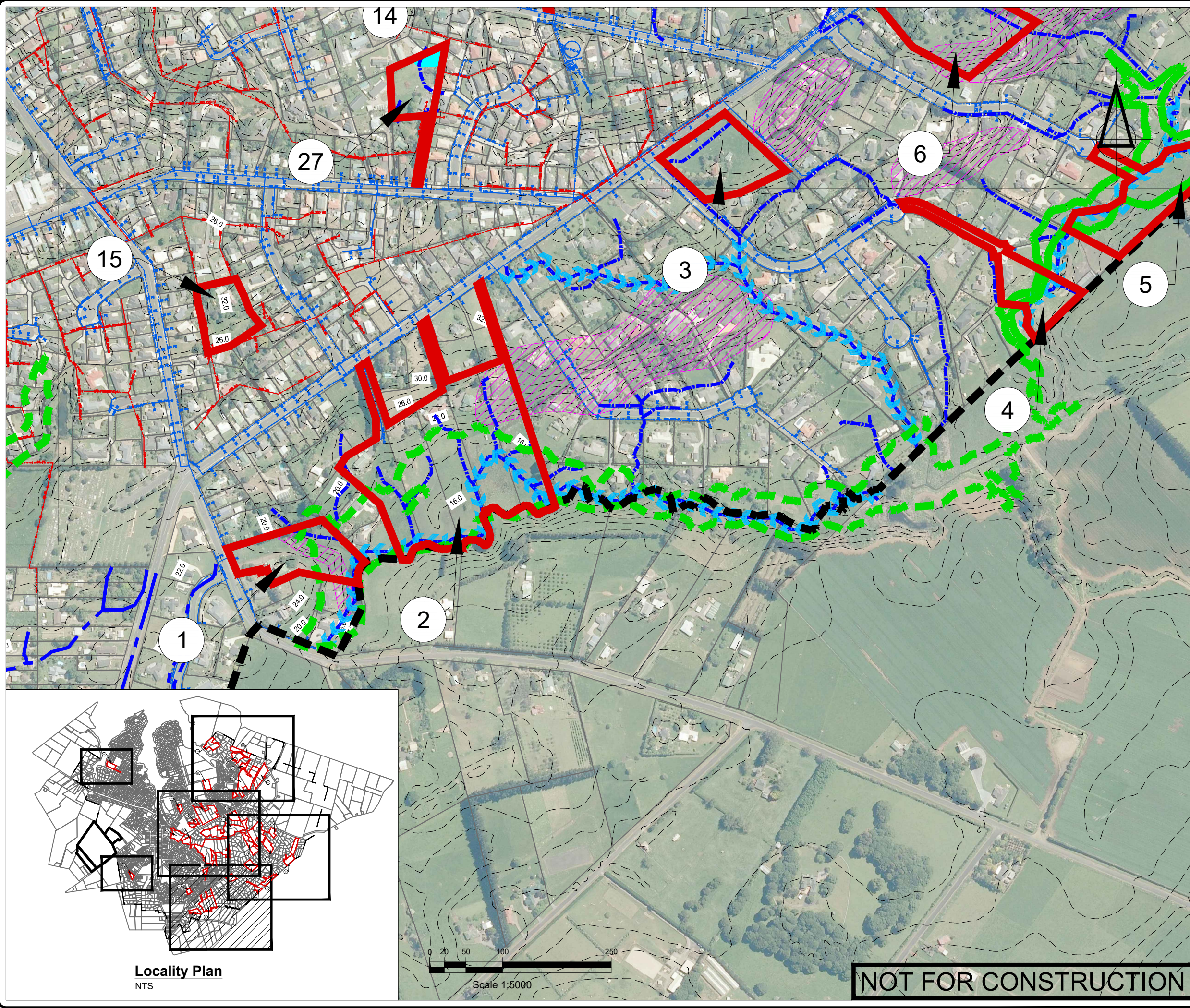
STATUS  
**PLAN CHANGE**  
Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE 1:20000 (A3)  
DRAWING No. 32897/23 REVISION A

**NOT FOR CONSTRUCTION**



P:\32 series\32897 Brookdale Waiuku PPC\03 Drawings\32897-24.dwg, A, 10/03/2022 1:46:24 pm



**Locality Plan**  
NTS

SURVEYED		APPROVED	SF	DATE	04/03/2022
DESIGNED					
DRAWN	DK				
CHECKED	SF				
REVISION	CHANGES	CHECKED	DATE		
A	For Information	SF	04/03/2022		

NOTES

**Legend:**

- Potential parcels that can be subdivided
- Geotechnical risk zone
- OLFP from Geomaps within the potential parcels
- Flood plain traced from Geomaps within the potential parcels
- River/stream from Geomaps within the potential parcels
- Existing water
- Existing wastewater
- Floodplain from FTL Waiuku ICMP model (Allows for climate change to 2051)

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE  
**EXISTING HAZARD MAP WITHIN  
POTENTIAL PARCELS (SHEET 1  
OF 5)**

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
HAWKE'S BAY ..... 06 211 2766  
CHRISTCHURCH ..... 03 358 5936  
BLLENHEIM ..... 03 428 3293

www.fraserthomas.co.nz

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

STATUS  
**PLAN CHANGE**

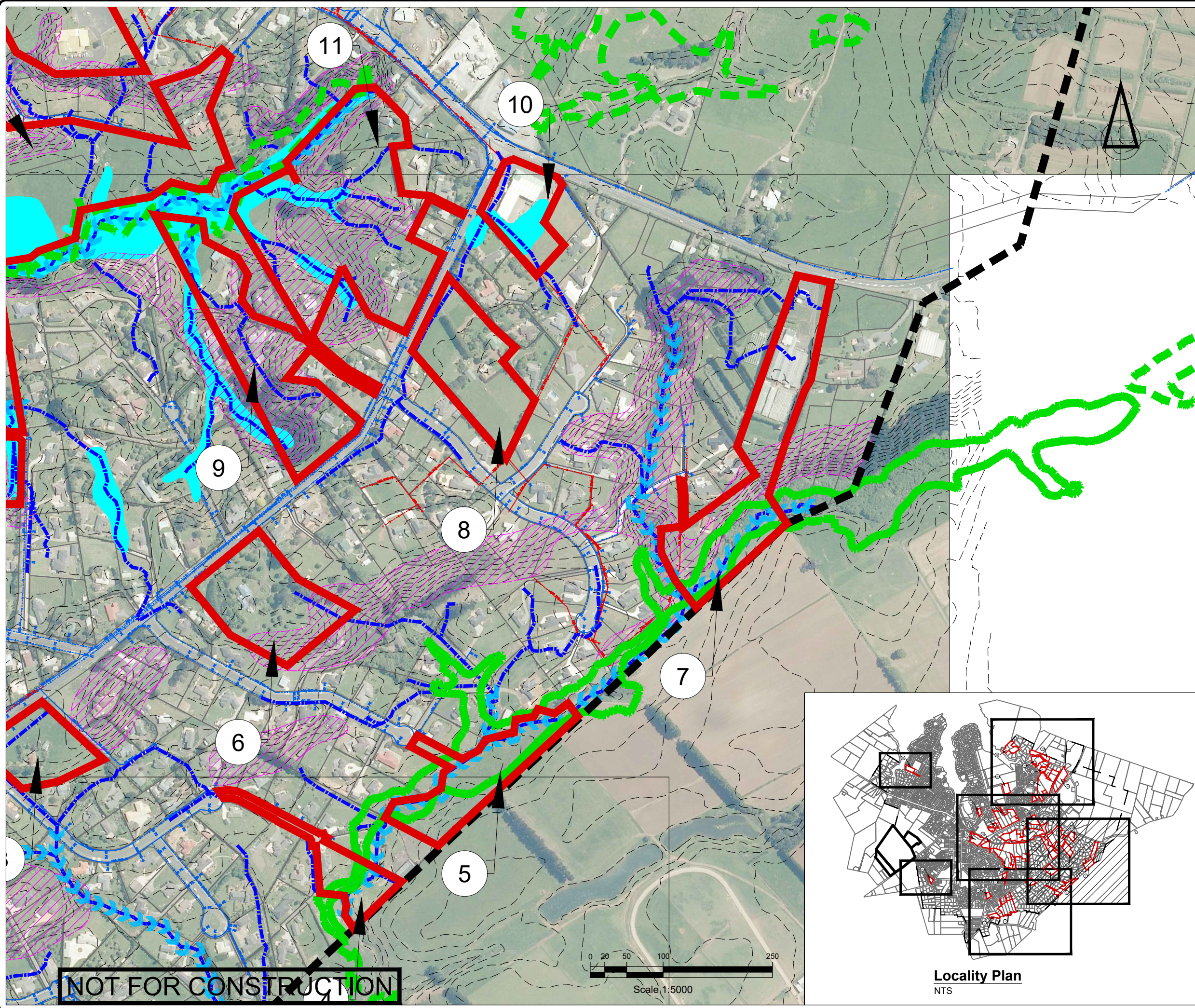
Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE 1:5000 (A3)

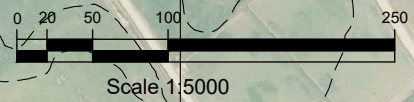
DRAWING No. 32897/24 REVISION A

**NOT FOR CONSTRUCTION**

P:\32 series\32897 Brookdale Waiuku PPC\03 Drawings\32897-25.dwg, A, 10/03/2022 1:46:53 pm



**NOT FOR CONSTRUCTION**



**Locality Plan**  
NTS

SURVEYED		APPROVED	SF	DATE	04/03/2022
DESIGNED					
DRAWN	DK	04/03/2022			
CHECKED	SF	04/03/2022			
REVISION	CHANGES		CHECKED	DATE	
A	For Information		SF	04/03/2022	

NOTES

**Legend:**

- Potential parcels that can be subdivided
- Geotechnical risk zone
- OLFP from Geomaps within the potential parcels
- Flood plain traced from Geomaps within the potential parcels
- River/stream from Geomaps within the potential parcels
- Existing water
- Existing wastewater
- Floodplain from FTL Waiuku ICMP model (Allows for climate change to 2051)

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE  
**EXISTING HAZARD MAP WITHIN  
POTENTIAL PARCELS (SHEET 2  
OF 5)**

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
HAWKE'S BAY ..... 06 211 2766  
CHRISTCHURCH ..... 03 358 5936  
BLLENHEIM ..... 03 428 3293

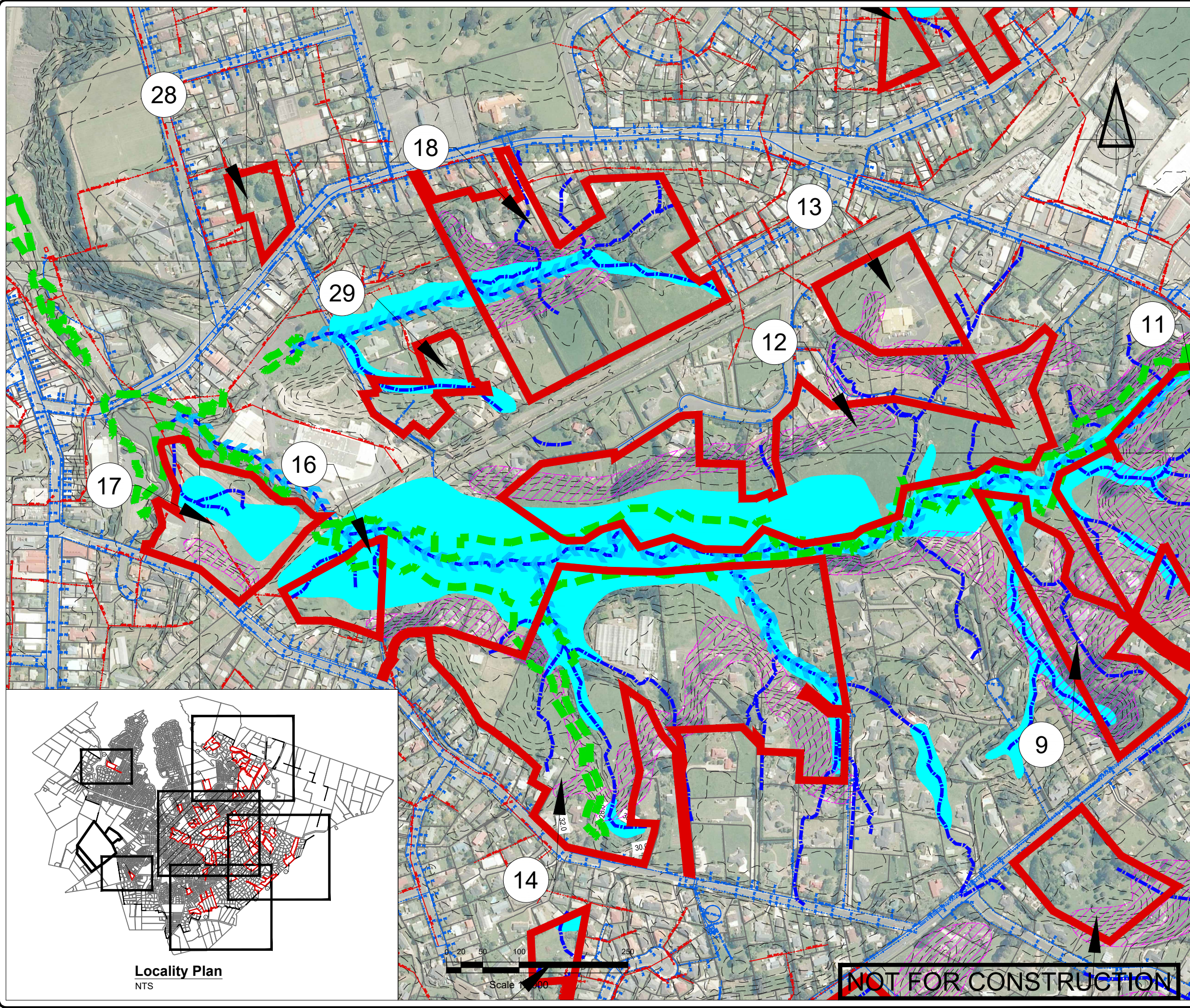
[www.fraserthomas.co.nz](http://www.fraserthomas.co.nz)

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

STATUS  
**PLAN CHANGE**  
Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE 1:5000 (A3)  
DRAWING No. **32897/25** REVISION **A**

P:\32 series\32897 Brookdale Waiuku PPC\03 Drawings\32897-26.dwg, A, 10/03/2022 1:47:22 pm



**Locality Plan**  
NTS



**NOT FOR CONSTRUCTION**

SURVEYED		APPROVED	SF	DATE	
DESIGNED				04/03/2022	
DRAWN	DK			04/03/2022	
CHECKED	SF			04/03/2022	
REVISION		CHANGES	CHECKED	DATE	
A		For Information	SF	04/03/2022	

NOTES

**Legend:**

- Potential parcels that can be subdivided
- Geotechnical risk zone
- OLFP from Geomaps within the potential parcels
- Flood plain traced from Geomaps within the potential parcels
- River/stream from Geomaps within the potential parcels
- Existing water
- Existing wastewater
- Floodplain from FTL Waiuku ICMP model (Allows for climate change to 2051)

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE  
**EXISTING HAZARD MAP WITHIN  
POTENTIAL PARCELS (SHEET 3  
OF 5)**

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
HAWKE'S BAY ..... 06 211 2766  
CHRISTCHURCH ..... 03 358 5936  
BLenheim ..... 03 428 3293

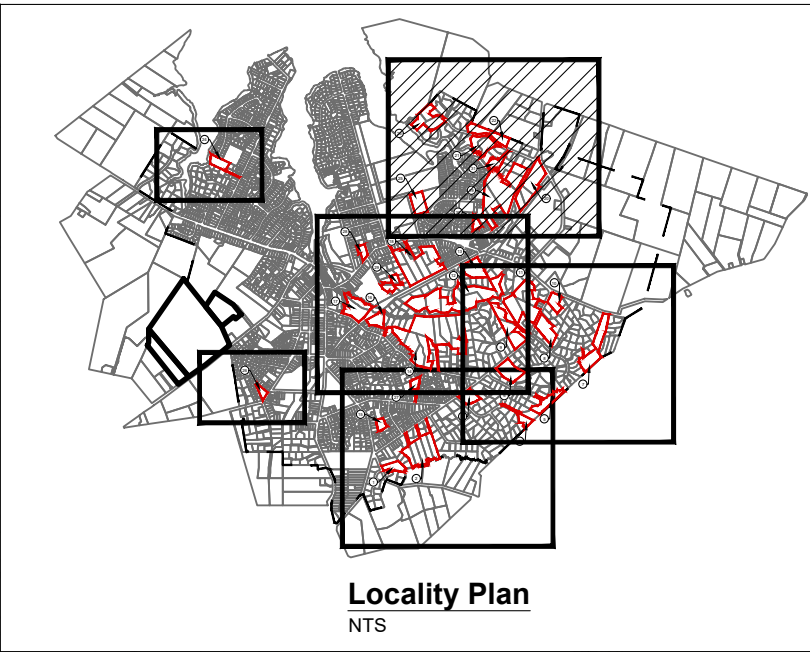
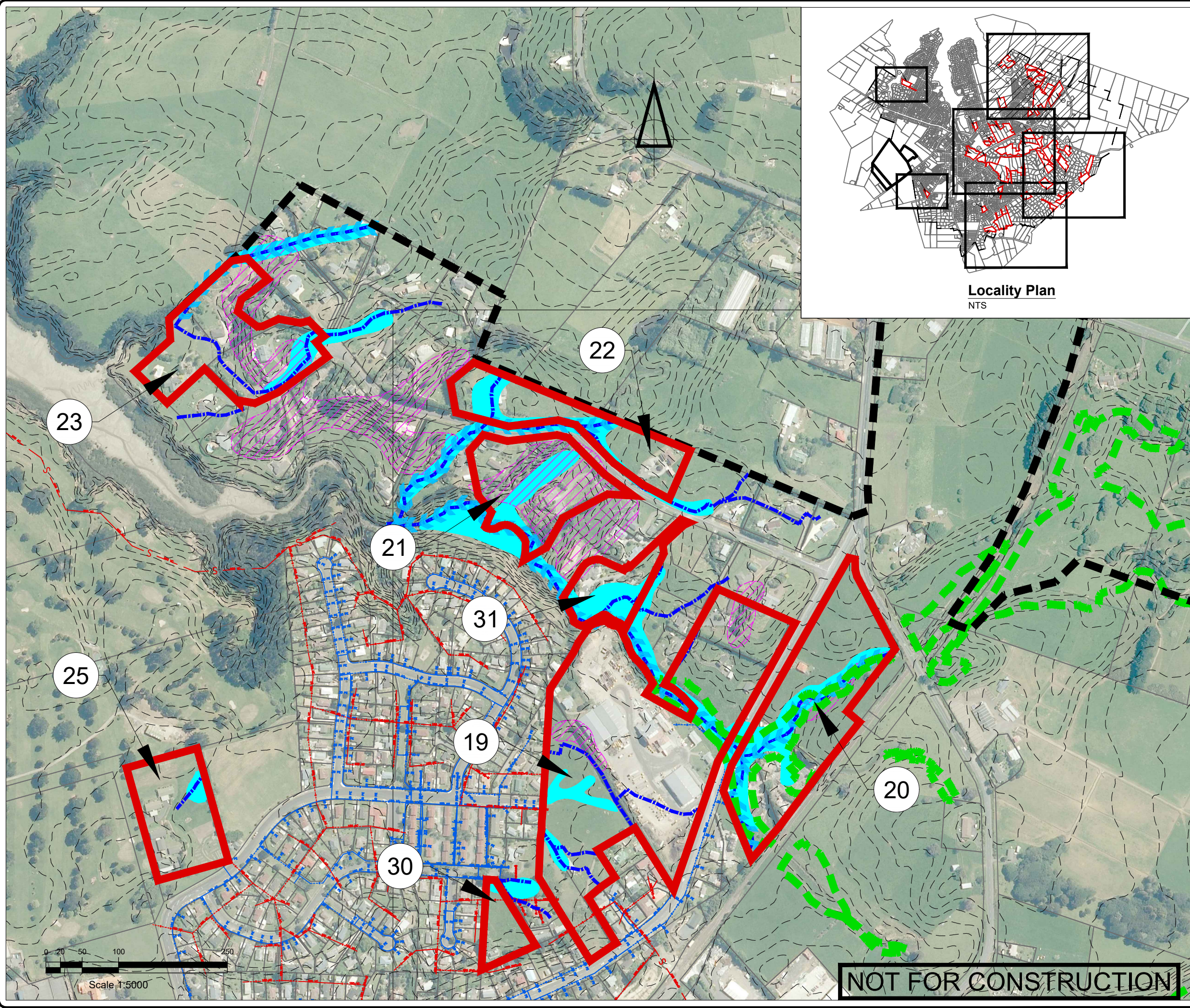
www.fraserthomas.co.nz

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

STATUS  
**PLAN CHANGE**  
Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE 1:5000 (A3)  
DRAWING No. 32897/26 REVISION A

P:\32 series\32897 Brookdale Waiuku PPC\03 Drawings\32897-27.dwg, A, 10/03/2022 1:47:50 pm



SURVEYED		APPROVED	SF	DATE	04/03/2022
DESIGNED					
DRAWN	DK	04/03/2022			
CHECKED	SF	04/03/2022			
REVISION	CHANGES		CHECKED	DATE	
A	For Information		SF	04/03/2022	

NOTES

**Legend:**

- Potential parcels that can be subdivided
- Geotechnical risk zone
- OLFP from Geomaps within the potential parcels
- Flood plain traced from Geomaps within the potential parcels
- River/stream from Geomaps within the potential parcels
- Existing water
- Existing wastewater
- Floodplain from FTL Waiuku ICMP model (Allows for climate change to 2051)

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE  
**EXISTING HAZARD MAP WITHIN  
POTENTIAL PARCELS (SHEET 4  
OF 5)**

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
HAWKE'S BAY ..... 06 211 2766  
CHRISTCHURCH ..... 03 358 5936  
BLENHEIM ..... 03 428 3293

[www.fraserthomas.co.nz](http://www.fraserthomas.co.nz)

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

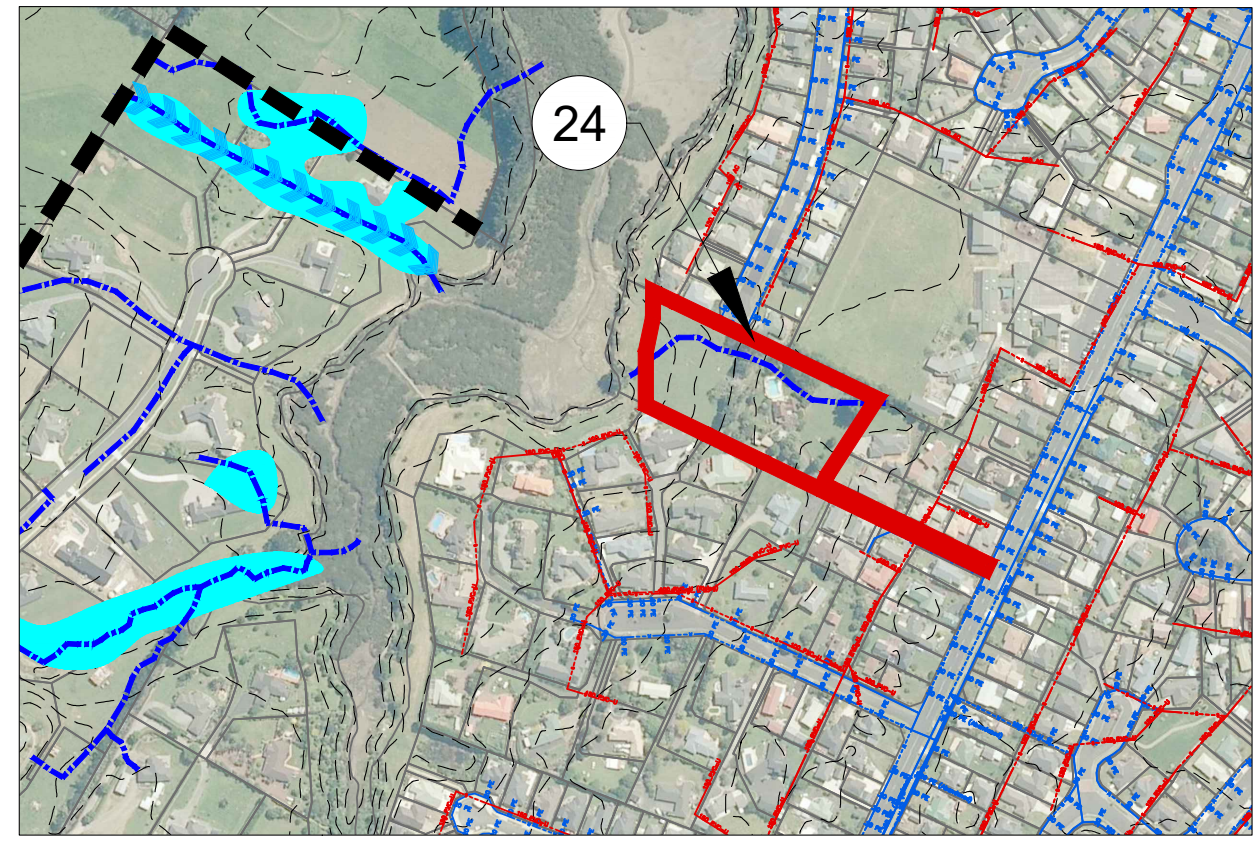
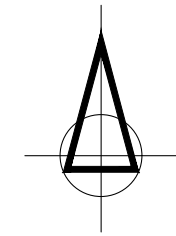
STATUS  
**PLAN CHANGE**

Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE	1:5000	(A3)
DRAWING No	32897/27	REVISION
		A

**NOT FOR CONSTRUCTION**

SURVEYED		APPROVED	SF	DATE	
DESIGNED					
DRAWN	DK	04/03/2022			
CHECKED	SF	04/03/2022			
REVISION	CHANGES	CHECKED	DATE		
A	For Information	SF	04/03/2022		



NOTES

**Legend:**

- Potential parcels that can be subdivided
- Geotechnical risk zone
- OLFP from Geomaps within the potential parcels
- Flood plain traced from Geomaps within the potential parcels
- River/stream from Geomaps within the potential parcels
- Existing water
- Existing wastewater
- Floodplain from FTL Waiuku ICMP model (Allows for climate change to 2051)

CLIENT

**GARDON TRUST**

PROJECT

**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE

**EXISTING HAZARD MAP WITHIN  
POTENTIAL PARCELS (SHEET 5  
OF 5)**



**Fraser  
Thomas**

ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
 HAWKE'S BAY ..... 06 211 2766  
 CHRISTCHURCH ..... 03 358 5936  
 BLENHEIM ..... 03 428 3293

[www.fraserthomas.co.nz](http://www.fraserthomas.co.nz)

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

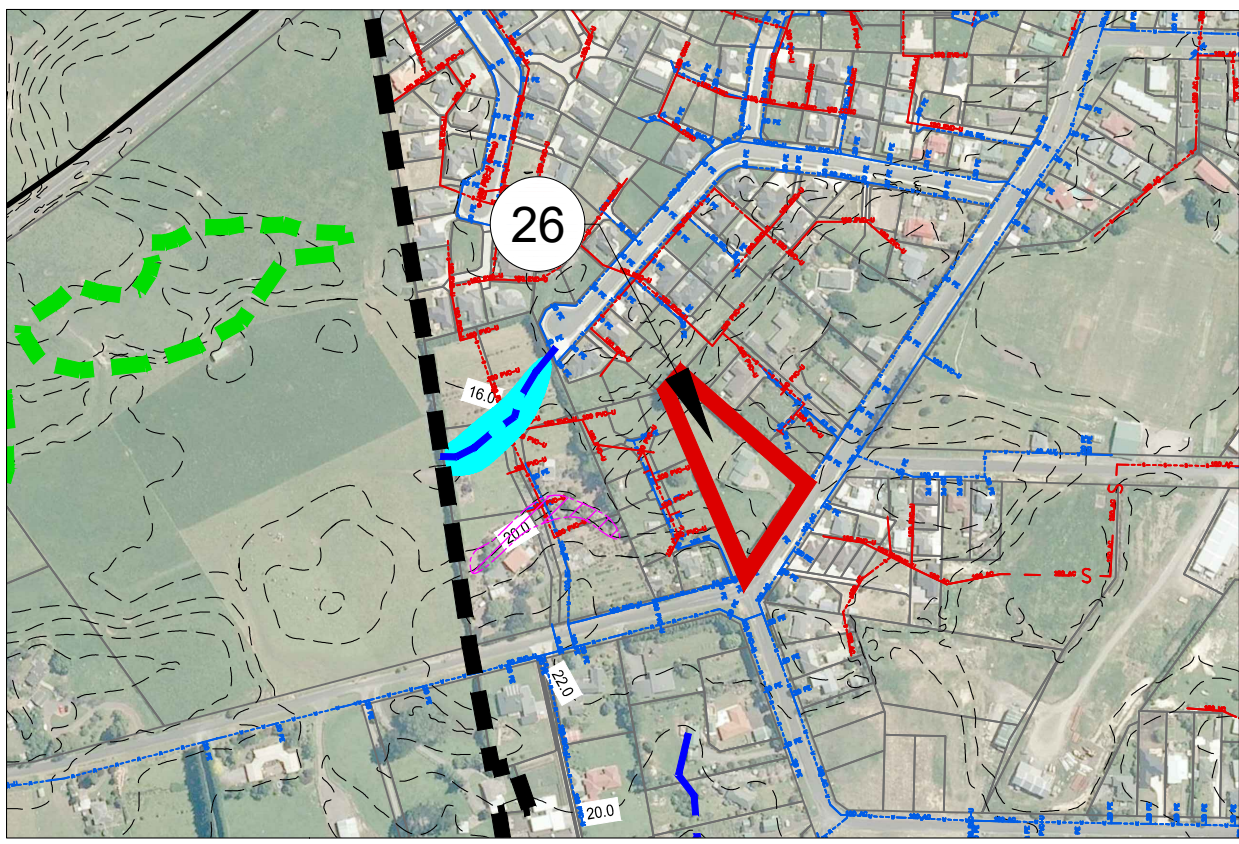
STATUS

**PLAN CHANGE**

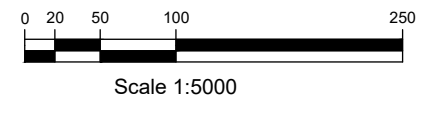
Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE **1:5000** (A3)

DRAWING No. **32897/28** REVISION **A**



**NOT FOR CONSTRUCTION**



**Locality Plan**  
NTS

**Legend**

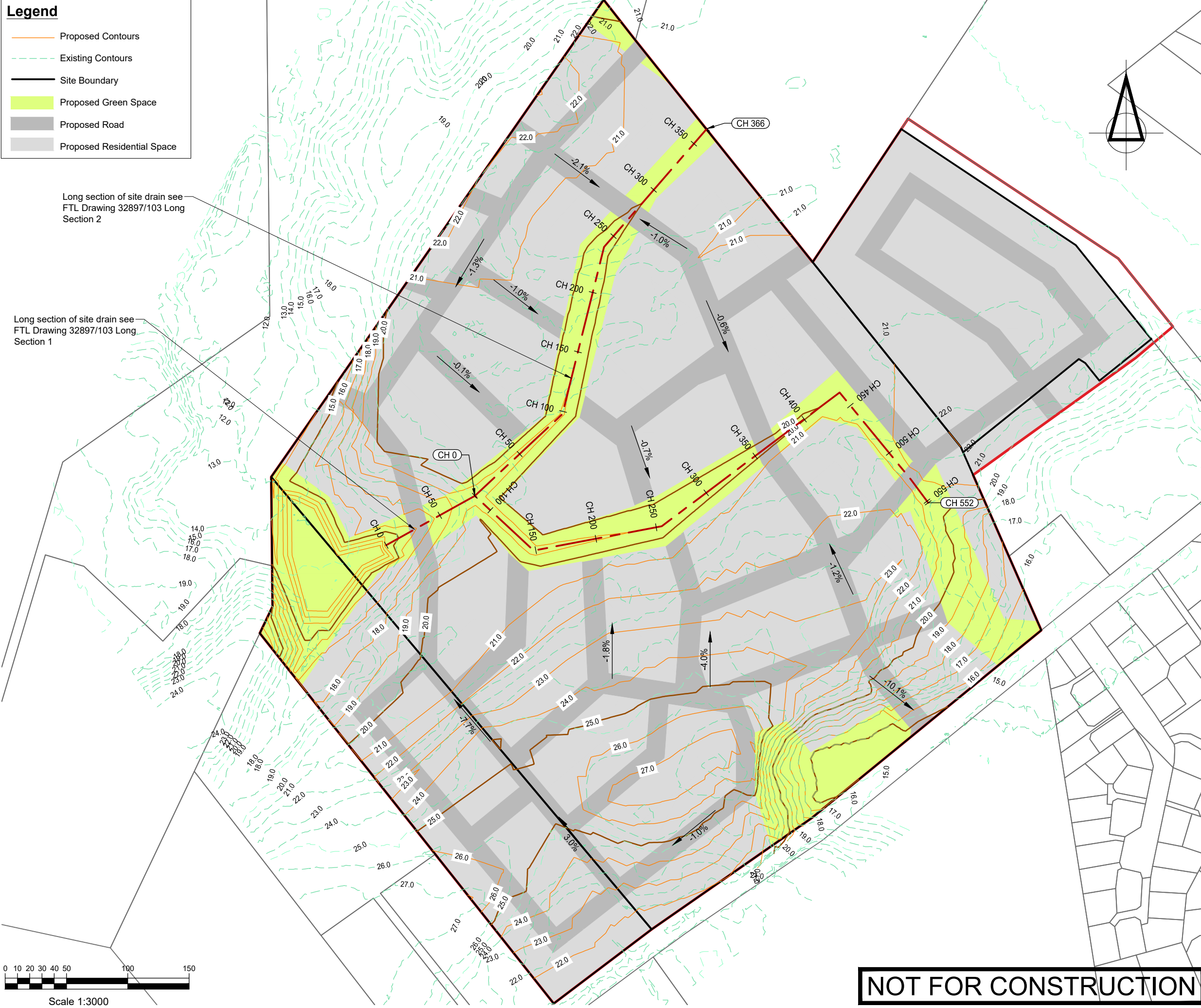
- Proposed Contours
- Existing Contours
- Site Boundary
- Proposed Green Space
- Proposed Road
- Proposed Residential Space

SURVEYED		APPROVED	DATE
DESIGNED	TB	17/02/21	SF
DRAWN	TB	17/02/21	18/02/21
CHECKED	SF	18/02/21	
REVISION	CHANGES		CHECKED DATE
A	MINOR CHANGES		SF 15/06/21



Long section of site drain see FTL Drawing 32897/103 Long Section 2

Long section of site drain see FTL Drawing 32897/103 Long Section 1



NOTES

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE  
**PROPOSED DEVELOPMENT  
PLAN**

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
 NAPIER ..... 06 211 2766  
 CHRISTCHURCH ..... 03 358 5936  
 BLENHEIM ..... 03 428 3293

www.fraserthomas.co.nz

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

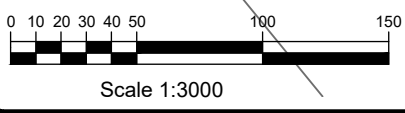
STATUS  
**PLAN CHANGE**

Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE 1:3000 (A3)

DRAWING No. 32897/101 REVISION A

**NOT FOR CONSTRUCTION**



**Legend**

Proposed Cut

Proposed Fill

**Notes:**

Total Cut: 100,000m<sup>3</sup>  
 Total Fill: 100,000m<sup>3</sup> (based on 1.15 compaction factor)  
 Net: 0m<sup>3</sup>

Total topsoil strip: 86,400 m<sup>3</sup> (based on 0.3m average depth)

Total cut area: 133,964m<sup>2</sup>  
 Total fill area: 154,030m<sup>2</sup>  
 Total earthworks area: 287,994m<sup>2</sup>



SURVEYED		APPROVED	DATE
DESIGNED	TB	17/02/21	SF
DRAWN	TB	17/02/21	18/02/21
CHECKED	SF	18/02/21	
REVISION	CHANGES	CHECKED	DATE
A	EARTHWORKS AMMENDED	SF	15/06/21

**NOTES**

1. Earthworks for 45A are covered under existing consents LUC60111076-A and LUC60271724-A and are not shown in this plan.

CLIENT

GARDON TRUST

PROJECT

O'HARA WAIUKU PLAN CHANGE  
 45A, 92 & 130 CONSTABLE ROAD  
 WAIUKU

TITLE

PROPOSED EARTHWORKS  
 CUT AND FILL PLAN

**Fraser Thomas**

ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
 NAPIER ..... 06 211 2766  
 CHRISTCHURCH ..... 03 358 5936  
 BLLENHEIM ..... 03 428 3293

www.fraserthomas.co.nz

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

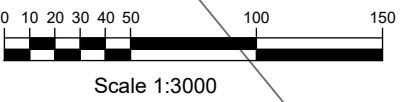
STATUS

**PLAN CHANGE**

Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

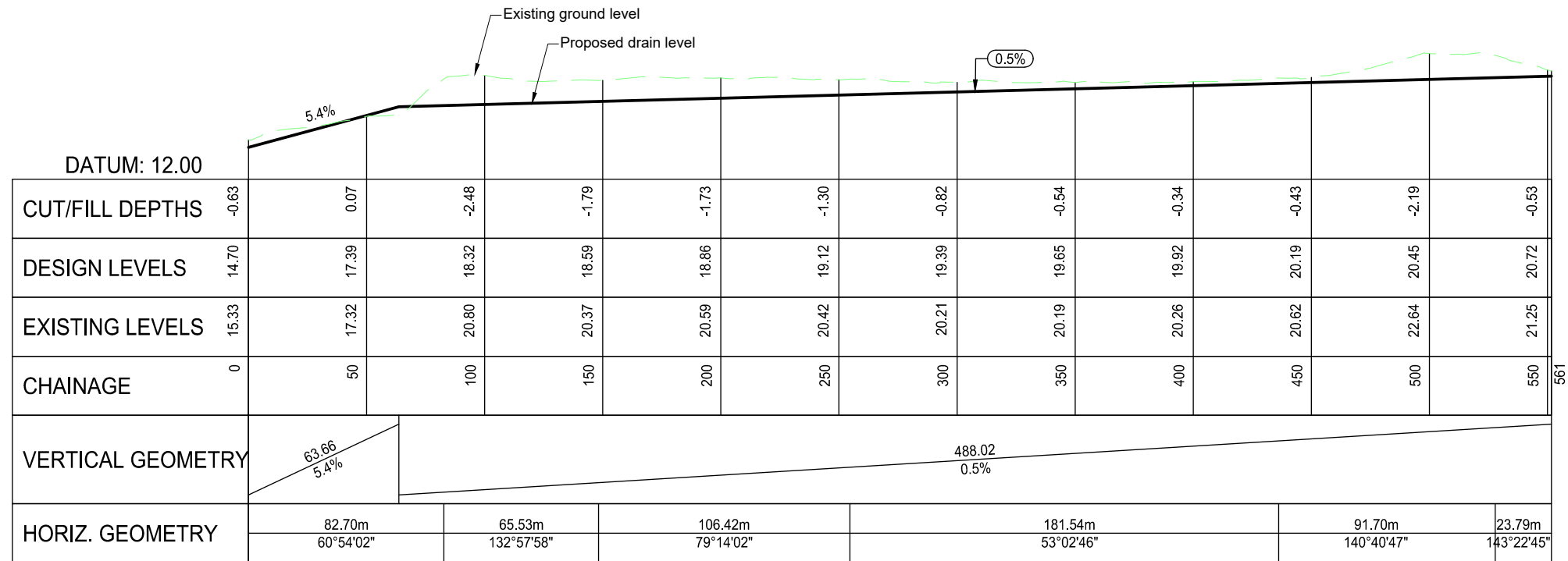
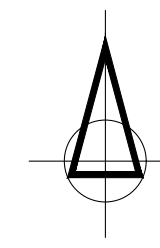
SCALE 1:3000 (A3)

DRAWING No. 32897/102 REVISION A

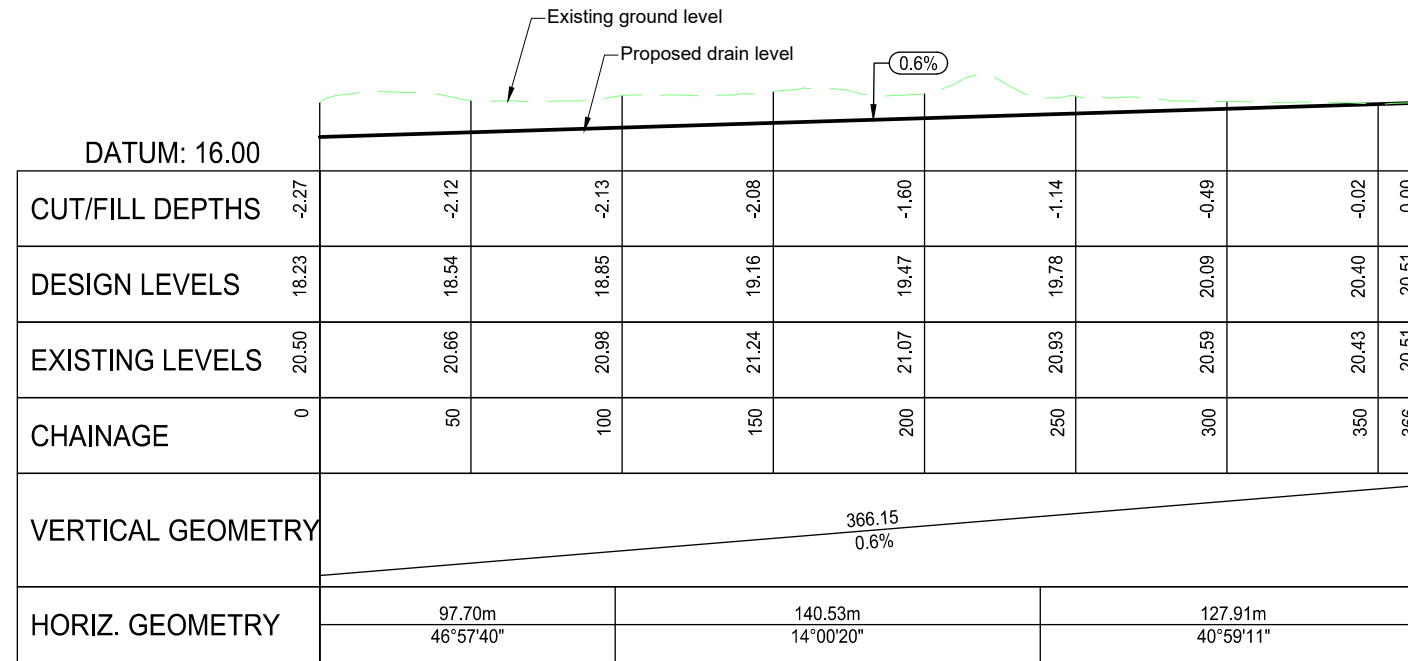


**NOT FOR CONSTRUCTION**

SURVEYED		APPROVED	DATE
DESIGNED	TB	17/02/21	SF
DRAWN	TB	17/02/21	18/02/21
CHECKED	SF	18/02/21	
REVISION	CHANGES	CHECKED	DATE
A	EARTHWORKS AMMENDED	SF	15/06/21



**Drain Long Section 1**  
Scale 1:2500 Horiz, 1:500 Vert



**Drain Long Section 2**  
Scale 1:2500 Horiz, 1:500 Vert

NOTES

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE  
**PROPOSED SITE DRAINAGE  
LONG SECTIONS**

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
 NAPIER ..... 06 211 2766  
 CHRISTCHURCH ..... 03 358 5936  
 BLENHEIM ..... 03 428 3293

www.fraserthomas.co.nz

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

STATUS  
**PLAN CHANGE**

Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

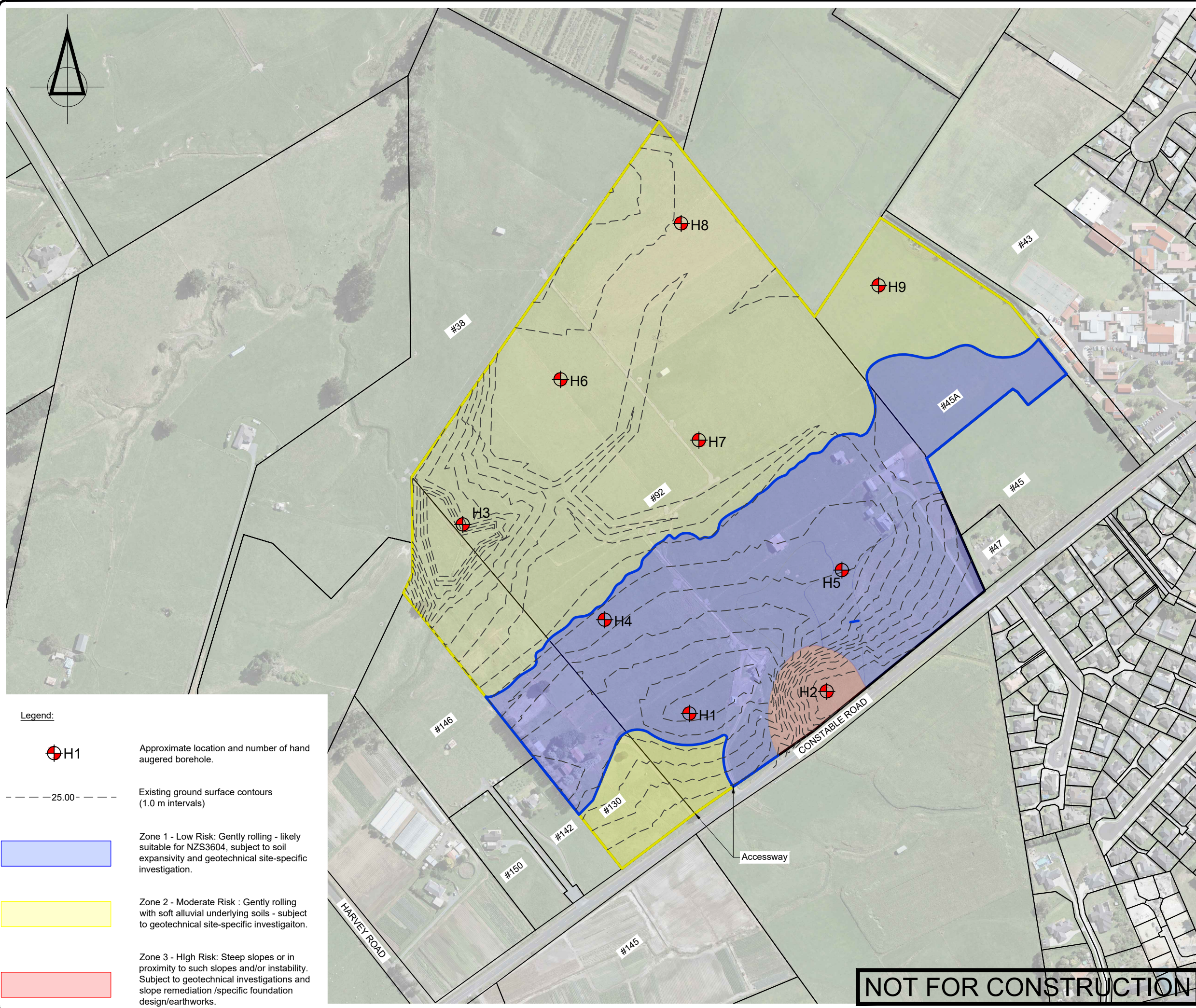
SCALE AS SHOWN (A3)

DRAWING No. 32897/103 REVISION A



**NOT FOR CONSTRUCTION**

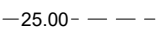




Legend:



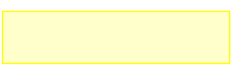
Approximate location and number of hand augered borehole.



Existing ground surface contours (1.0 m intervals)



Zone 1 - Low Risk: Gently rolling - likely suitable for NZS3604, subject to soil expansivity and geotechnical site-specific investigation.



Zone 2 - Moderate Risk : Gently rolling with soft alluvial underlying soils - subject to geotechnical site-specific investigation.



Zone 3 - High Risk: Steep slopes or in proximity to such slopes and/or instability. Subject to geotechnical investigations and slope remediation /specific foundation design/earthworks.

SURVEYED		APPROVED	SF	DATE	18/02/21
DESIGNED	TB	17/02/21			
DRAWN	TB	17/02/21			
CHECKED	SF	18/02/21			
REVISION	CHANGES		CHECKED	DATE	
A	RISK ZONES AMMENDED		SF	15/06/21	

- NOTES
1. The land contours shown on this plan are based on 2017 LiDAR data.
  2. Refer to Fraser Thomas Ltd. Report No. 64932, dated March 2021 for full description of Risk Zones.
  3. Risk zones based on Fraser Thomas Ltd. finished ground contours. Zones for the existing ground contours can be found in the Fraser Thomas Ltd. Report No. 64932, dated March 2021. If finished ground contours are significantly different from those shown on this drawing then risk zones may change.

CLIENT  
GARDON TRUST

PROJECT  
O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU

TITLE  
GEOTECHNICAL RISK ZONES  
FOR PROPOSED GROUND  
LEVELS

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
NAPIER ..... 06 211 2766  
CHRISTCHURCH ..... 03 358 5936  
CROMWELL ..... 03 428 3293

www.fraserthomas.co.nz

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

STATUS	PLAN CHANGE	
Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.		
SCALE	1:4000	(A3)
DRAWING No	32897/104	REVISION
		A

**NOT FOR CONSTRUCTION**

**Legend**

- Stage Boundary
- Streams/drains
- Site Boundary
- Stormwater Network
- Greenways/Wetland
- 1** Stage Areas

SURVEYED		APPROVED	DATE
DESIGNED			
DRAWN	MD	3/11/21	
CHECKED			
REVISION	CHANGES	CHECKED	DATE

NOTES

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE  
**PRELIMINARY STAGING PLAN**

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
 HAWKE'S BAY ..... 06 211 2766  
 CHRISTCHURCH ..... 03 358 5936  
 BLENHEIM ..... 03 428 3293

[www.fraserthomas.co.nz](http://www.fraserthomas.co.nz)

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

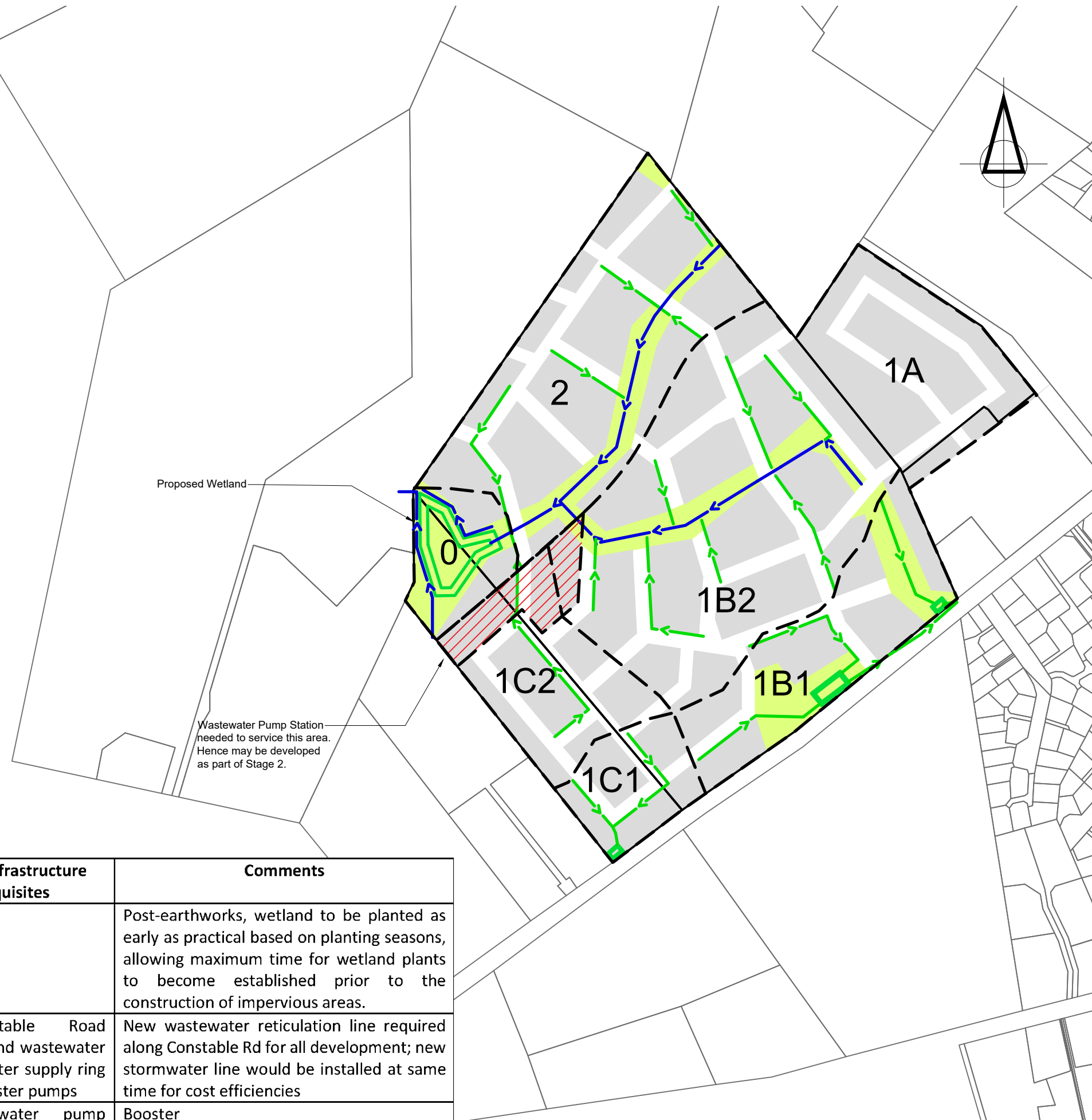
STATUS  
**PLAN CHANGE**

Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE **1:5000** (A3)

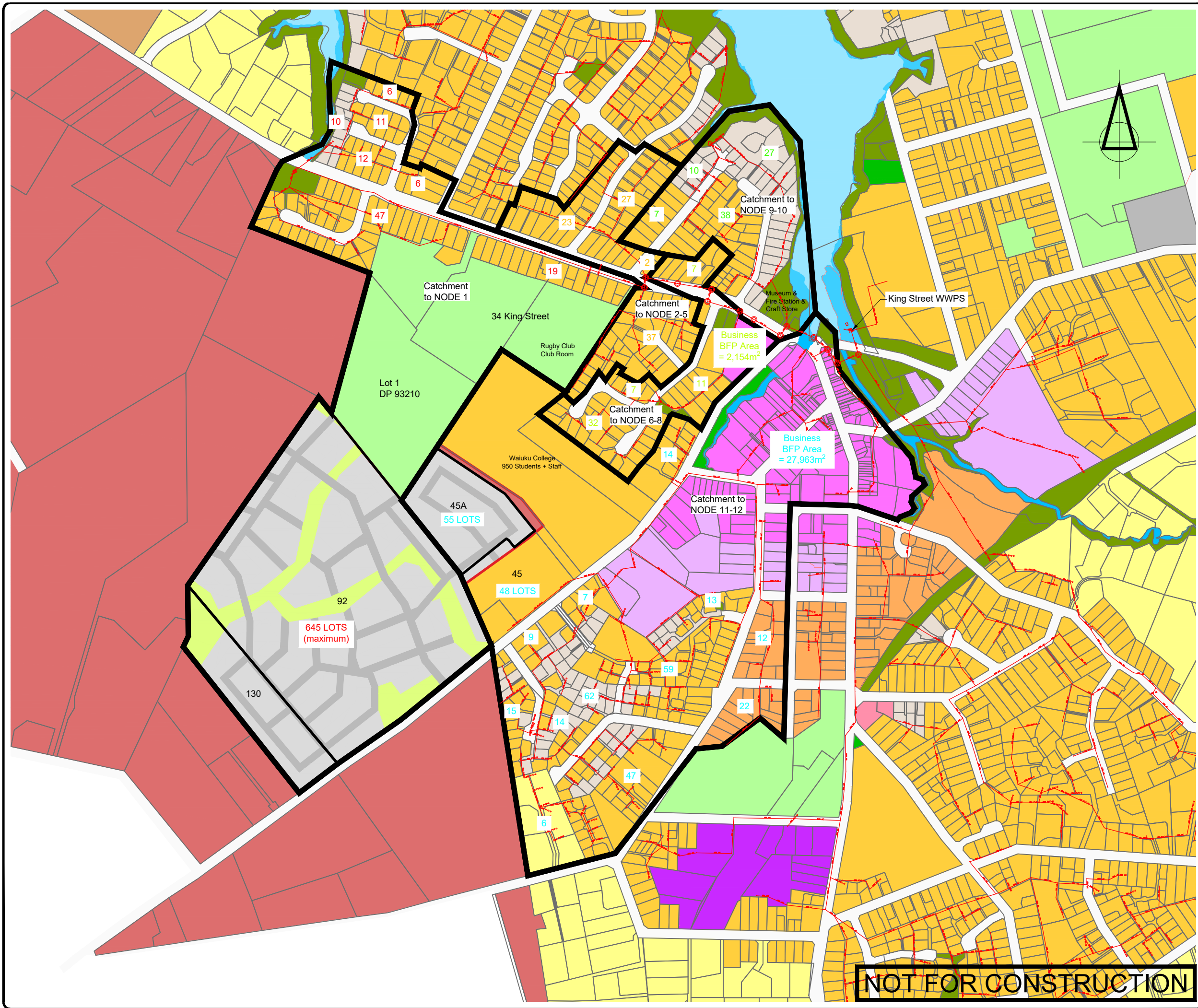
DRAWING No **32897/105** REVISION

Stage	Percentage of Stage Area over Total Site
0	<b>4.9%</b>
1A	12.1%
1B1	12.2%
1B2	32.6%
1C1	5.2%
1C2	9.9%
<b>Stage 1</b>	<b>72.0%</b>
<b>Stage 2</b>	<b>23.2%</b>
Total Site	100.00%



Phase	Stages served	Essential Infrastructure Prerequisites	Comments
0	1B2, 1C2, 2 (stormwater only)	Wetland	Post-earthworks, wetland to be planted as early as practical based on planting seasons, allowing maximum time for wetland plants to become established prior to the construction of impervious areas.
1	1A, 1B1, 1C1	New Constable Road stormwater and wastewater lines; new water supply ring main and booster pumps	New wastewater reticulation line required along Constable Rd for all development; new stormwater line would be installed at same time for cost efficiencies
2	Part 1B2, 1C2 and 2	New wastewater pump station and associated rising main	Booster

**NOT FOR CONSTRUCTION**



SURVEYED		APPROVED	DATE
DESIGNED		GM	12/04/2021
DRAWN	AC	24/03/2021	
CHECKED	GM	12/04/2021	
REVISION	CHANGES	CHECKED	DATE
A	REVISED LOT YIELD	SF	31/05/21
B	REVISED INDUSTRIAL CATCHMENT	SF	25/06/21
C	REMOVED WWPS AND RISING MAIN	SF	06/07/21

**NOTES**

**LEGEND**

- Residential - Mixed Housing Urban
- Residential - Mixed Housing Suburban
- Residential - Single House Zone
- Residential - Large Lot Zone
- Business - Local Centre Zone
- Business - Mixed Use Zone
- Business - Light Industry Zone
- Rural - Mixed Rural Zone
- Open Space - Informal Recreation Zone
- Open Space - Sport and Active Recreation Zone

*Note - AUP Zoning colours shown do not match the colours shown on AUP Plan maps.*

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE  
**PUBLIC WASTEWATER  
CATCHMENT PLAN**

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
NAPIER ..... 06 211 2766  
CHRISTCHURCH ..... 03 358 5936  
BLENHEIM ..... 03 428 3293

[www.fraserthomas.co.nz](http://www.fraserthomas.co.nz)

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

STATUS  
**PLAN CHANGE**

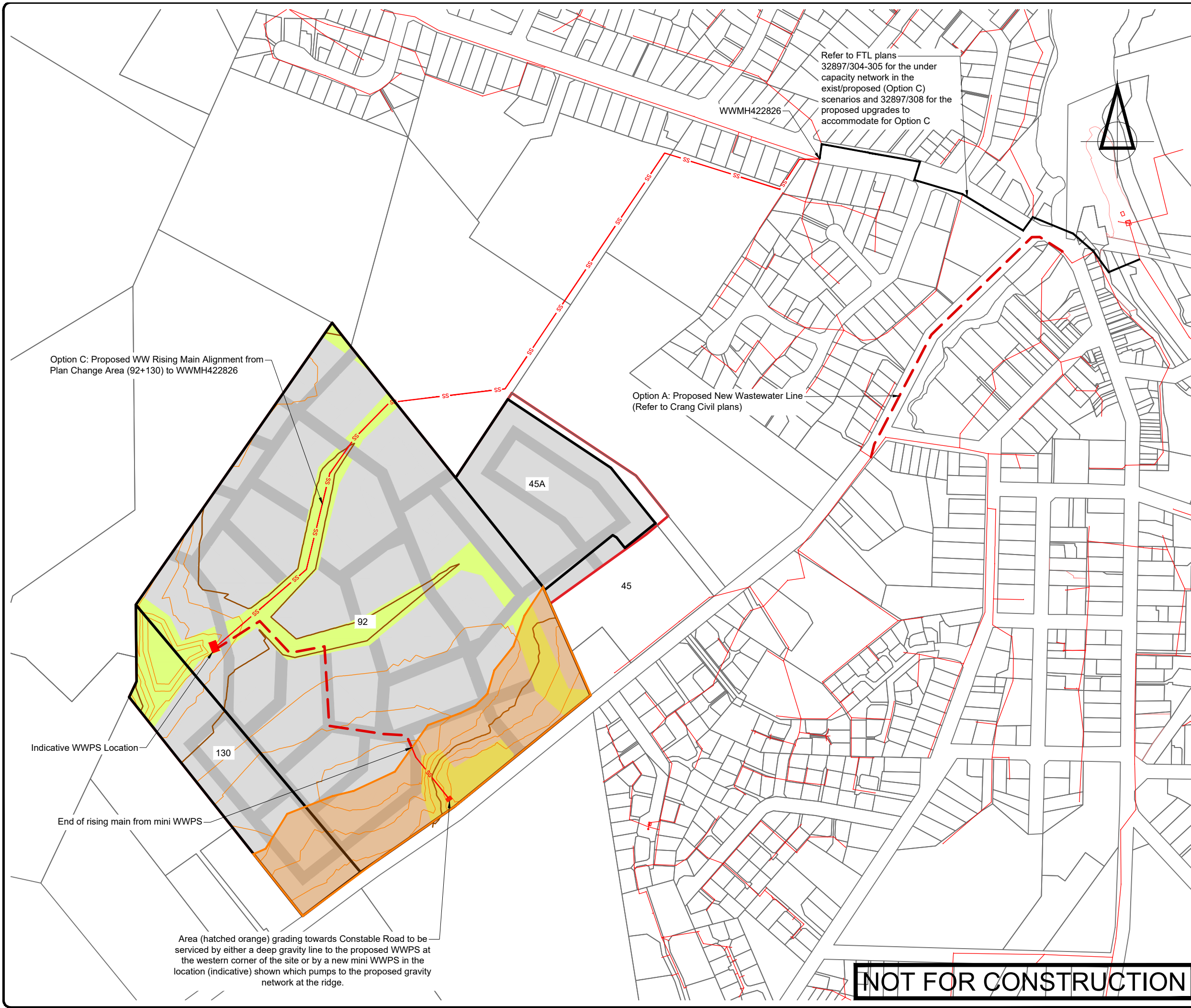
Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE 1:7500 (A3)

DRAWING No. **32897/301** REVISION **C**

**NOT FOR CONSTRUCTION**

P:\32 series\32897 Brookdale Waiuku PPC\03 Drawings\32897-302.dwg, 302, 6/07/2021 11:14:15 am



Refer to FTL plans 32897/304-305 for the under capacity network in the exist/proposed (Option C) scenarios and 32897/308 for the proposed upgrades to accommodate for Option C

SURVEYED		APPROVED	SF	DATE	05/07/2021
DESIGNED	AC				
DRAWN	AC				
CHECKED	SF				
REVISION	CHANGES	CHECKED	DATE		

- NOTES
- LEGEND**
- Existing Public Wastewater Network
  - Proposed Rising Main
  - Proposed Gravity Line
- Contours shown within 92 & 130 Constable Road are the proposed finished ground levels as of June 2021 at 2.0m intervals.
  - Refer to Crang Civil plans C555 & C560 for Option A details.
  - Refer to FTL plans 32897/304-305 & 308 for Option C details.

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE 45A, 92 & 130 CONSTABLE ROAD WAIUKU**

TITLE  
**PROPOSED WASTEWATER RETICULATION - OPTIONS A & C**

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
 NAPIER ..... 06 211 2766  
 CHRISTCHURCH ..... 03 358 5936  
 BLLENHEIM ..... 03 428 3293

www.fraserthomas.co.nz

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

STATUS  
**PLAN CHANGE**

Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE 1:5000 (A3)

DRAWING No. **32897/302** REVISION -

**NOT FOR CONSTRUCTION**

SURVEYED		APPROVED	SF	DATE	
DESIGNED					
DRAWN	AC	05/07/2021			
CHECKED	SF	05/07/2021			
REVISION		CHANGES	CHECKED	DATE	

- NOTES
- LEGEND**
- Existing Public Wastewater Network
  - - - Proposed Gravity Line
  - Gravity Catchment to MH2.12
  - Pumped Catchment to MH2.12
- Contours shown within 92 & 130 Constable Road are the proposed finished ground levels as of June 2021 at 2.0m intervals.
  - Proposed wastewater gravity network layout and gravity main alignment not shown - to be designed at subdivision consent stage.
  - Refer to Crang Civil plans C556 & C561 for Option B details.

CLIENT

**GARDON TRUST**

PROJECT

**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE

**PROPOSED WASTEWATER  
RETICULATION - OPTION B**



**Fraser  
Thomas**

ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
 NAPIER ..... 06 211 2766  
 CHRISTCHURCH ..... 03 358 5936  
 BLLENHEIM ..... 03 428 3293

[www.fraserthomas.co.nz](http://www.fraserthomas.co.nz)

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

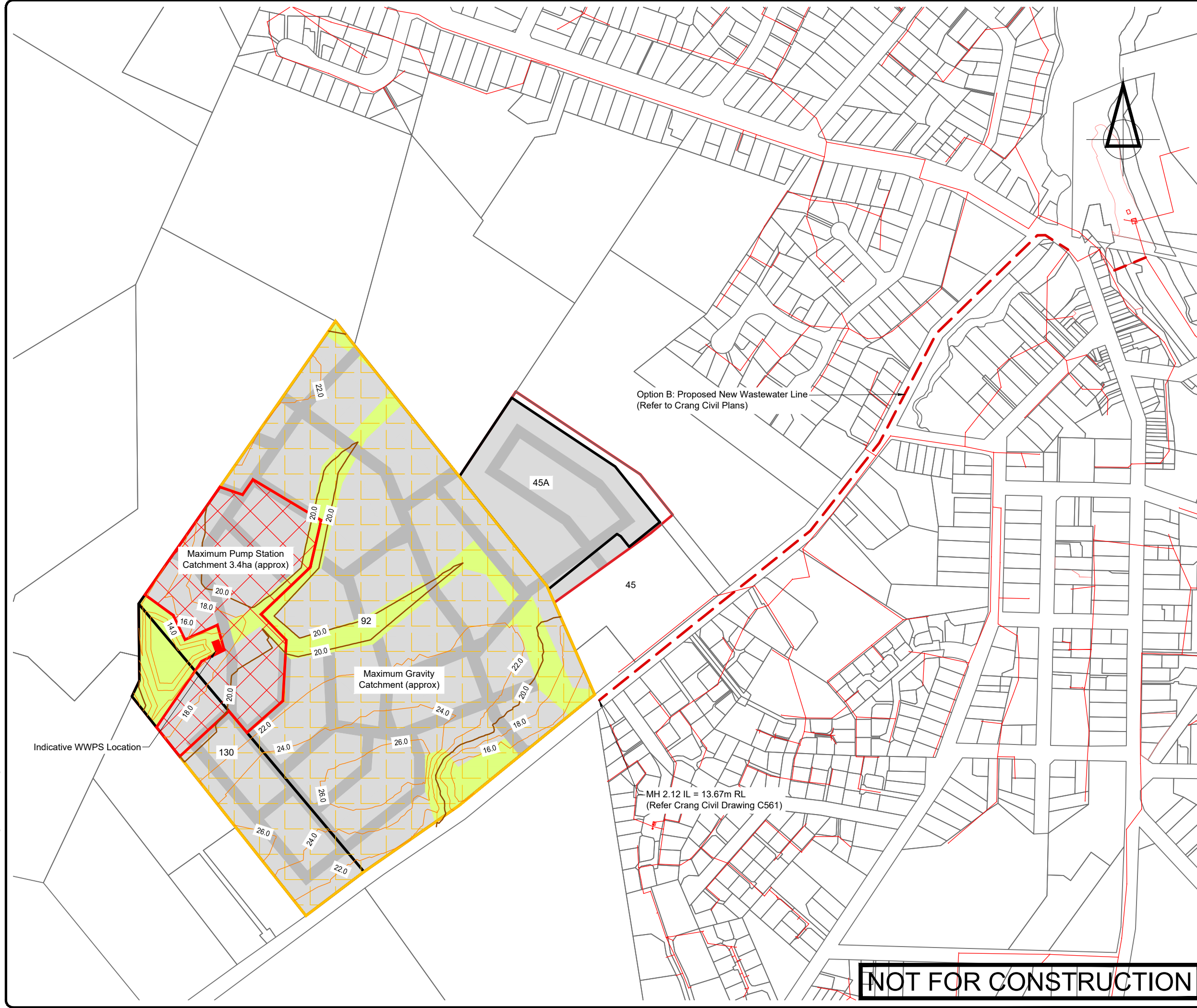
STATUS

**PLAN CHANGE**

Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE **1:5000** (A3)

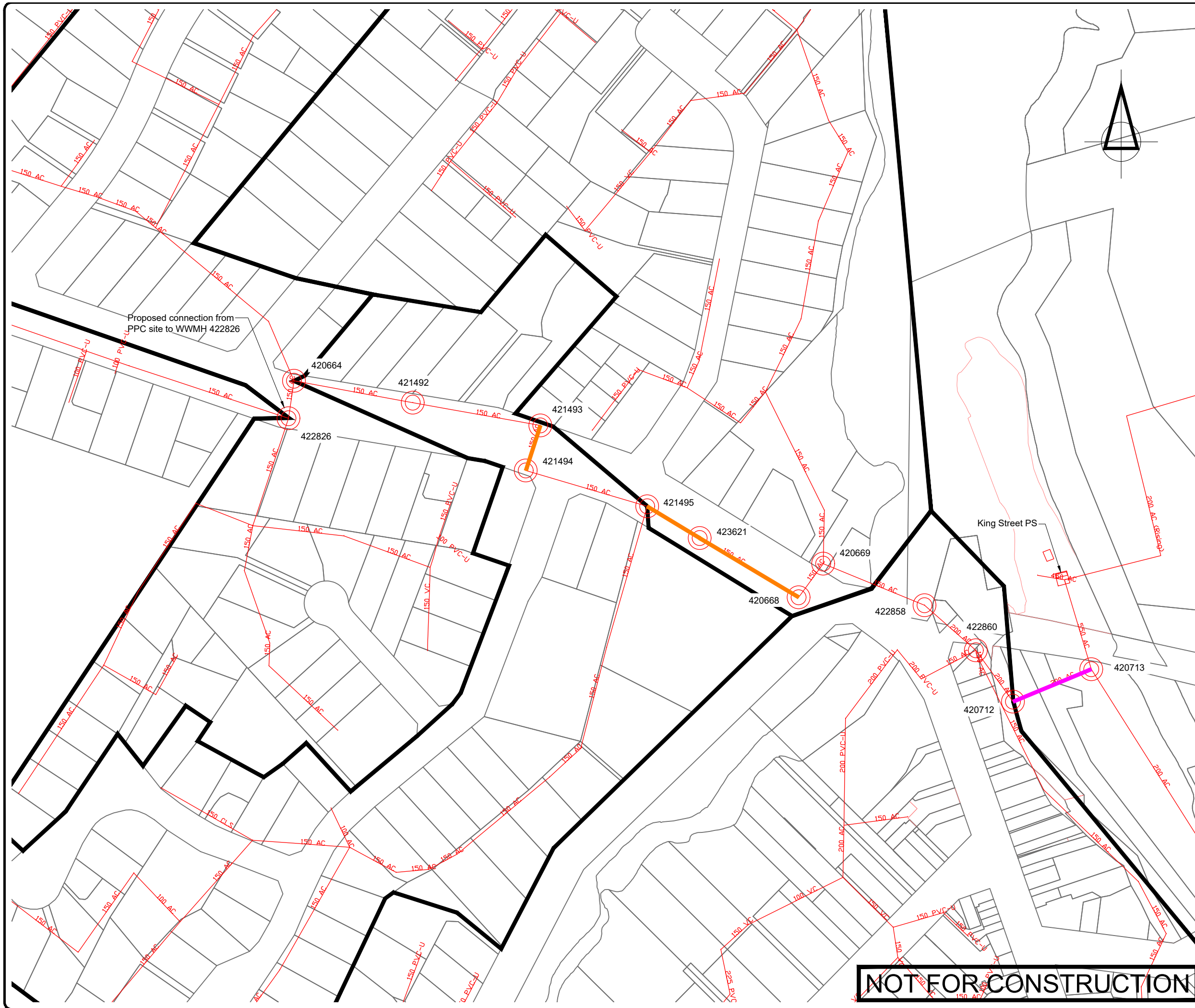
DRAWING No. **32897/303** REVISION **-**



**NOT FOR CONSTRUCTION**

P:\32 series\32897 Brookdale Waiuku PPC\03 Drawings\32897-303.dwg, 303, 6/07/2021 11:12:49 am

P:\32 series\32897 Brookdale Waiuku PPC\03 Drawings\32897-301\_304-305.dwg, 304\_6/07/2021 11:31:42 am



**NOT FOR CONSTRUCTION**

SURVEYED		APPROVED	DATE
DESIGNED		GM	12/04/2021
DRAWN	AC	24/03/2021	
CHECKED	GM	12/04/2021	
REVISION	CHANGES		CHECKED DATE
A	MINOR CHANGES		SF 25/06/21

**LEGEND**

- Under Capacity Pipe Network (Existing)
- Pipe network unable to be assessed

**NOTE:**  
Some sections of pipe were unable to be assessed for capacity due to missing or incorrect (negative pipe grade) GIS data.

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE  
**SCENARIO C: UNDER CAPACITY  
NETWORK - EXISTING**

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
NAPIER ..... 06 211 2766  
CHRISTCHURCH ..... 03 358 5936  
BLLENHEIM ..... 03 428 3293

www.fraserthomas.co.nz

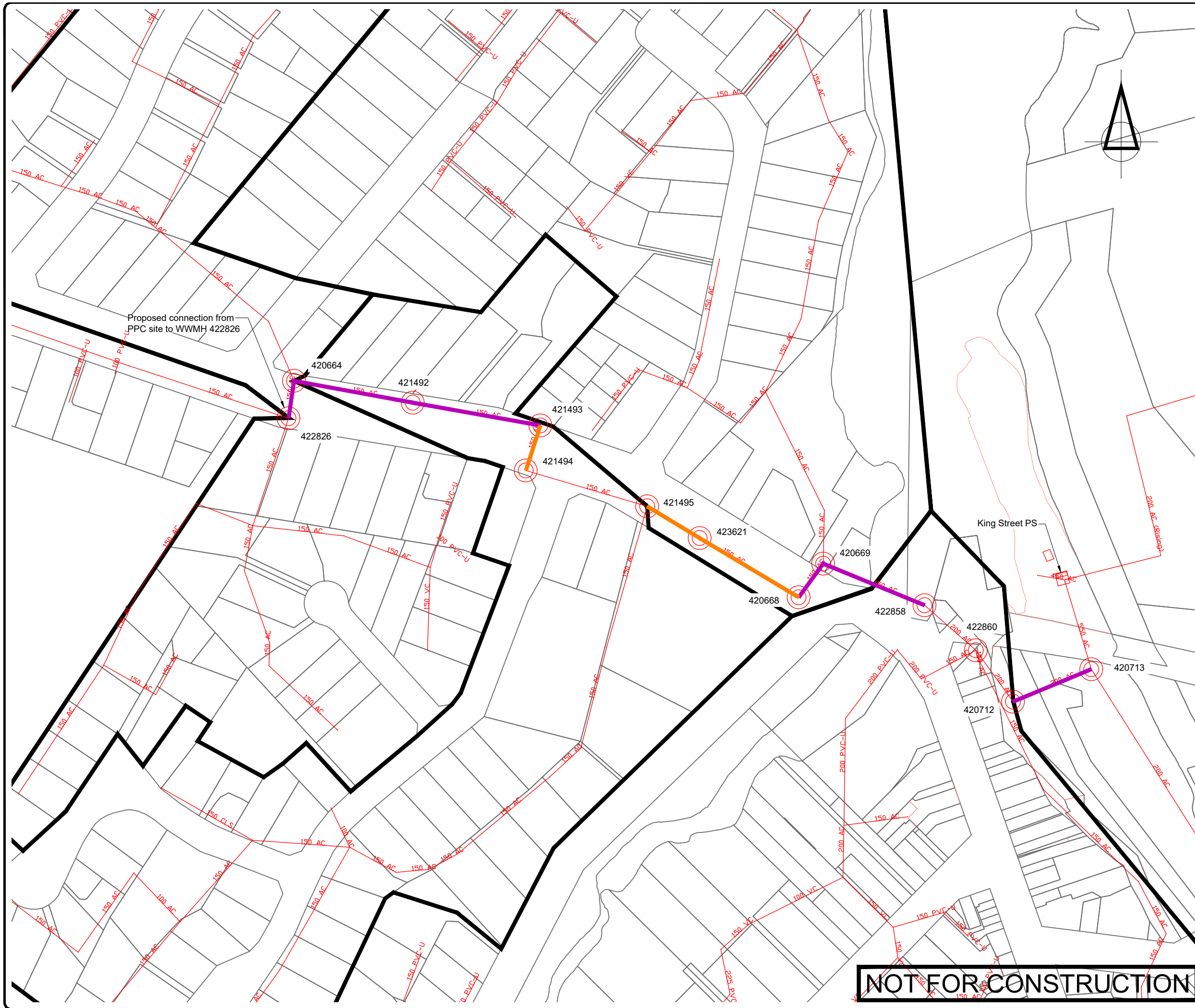
The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

STATUS  
**PLAN CHANGE**  
Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE 1:2000 (A3)

DRAWING No. 32897/304 REVISION A

P:\32 series\32897 Brookdale Waiuku PPC\03 Drawings\32897-301\_304-305.dwg, 305, 6/07/2021 11:32:00 am



SURVEYED		APPROVED	DATE
DESIGNED		GM	12/04/2021
DRAWN	AC	24/03/2021	
CHECKED	GM	12/04/2021	
REVISION	CHANGES		CHECKED DATE
A	MINOR CHANGES		SF 25/06/21

**LEGEND**

- Under Capacity Pipe Network (Proposed)
- Pipe network unable to be assessed

**NOTE:**  
Some sections of pipe were unable to be assessed for capacity due to missing or incorrect (negative pipe grade) GIS data.

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE  
**SCENARIO C: UNDER CAPACITY  
NETWORK - PROPOSED**

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
NAPIER ..... 06 211 2766  
CHRISTCHURCH ..... 03 358 5936  
BLLENHEIM ..... 03 428 3293

www.fraserthomas.co.nz

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

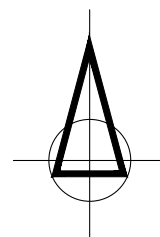
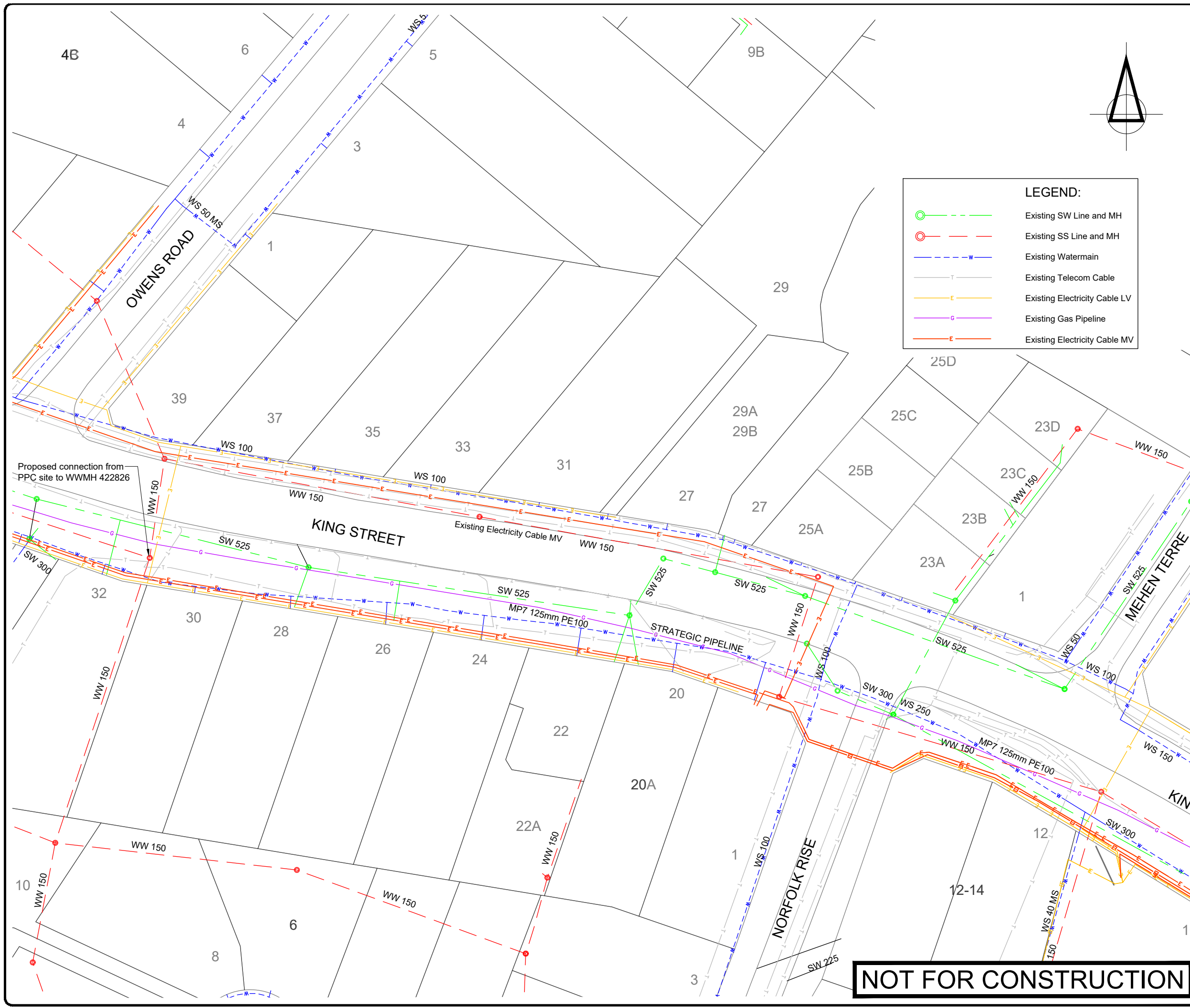
STATUS  
**PLAN CHANGE**

Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE 1:2000 (A3)

DRAWING No. 32897/305 REVISION A

**NOT FOR CONSTRUCTION**



**LEGEND:**

- Existing SW Line and MH
- Existing SS Line and MH
- Existing Watermain
- Existing Telecom Cable
- Existing Electricity Cable LV
- Existing Gas Pipeline
- Existing Electricity Cable MV

Proposed connection from  
PPC site to WWMH 422826

Existing Electricity Cable MV

STRATEGIC PIPELINE

**NOT FOR CONSTRUCTION**


SURVEYED		APPROVED	GM	DATE	
DESIGNED					
DRAWN	HN	25/03/2021		12/04/2021	
CHECKED	GM				
REVISION		CHANGES		CHECKED	DATE

NOTES

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE  
**SCENARIO C: EXISTING  
SERVICES PLAN SHEET 1 OF 2**



**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
 NAPIER ..... 06 211 2766  
 CHRISTCHURCH ..... 03 358 5936  
 BLENHEIM ..... 03 428 3293

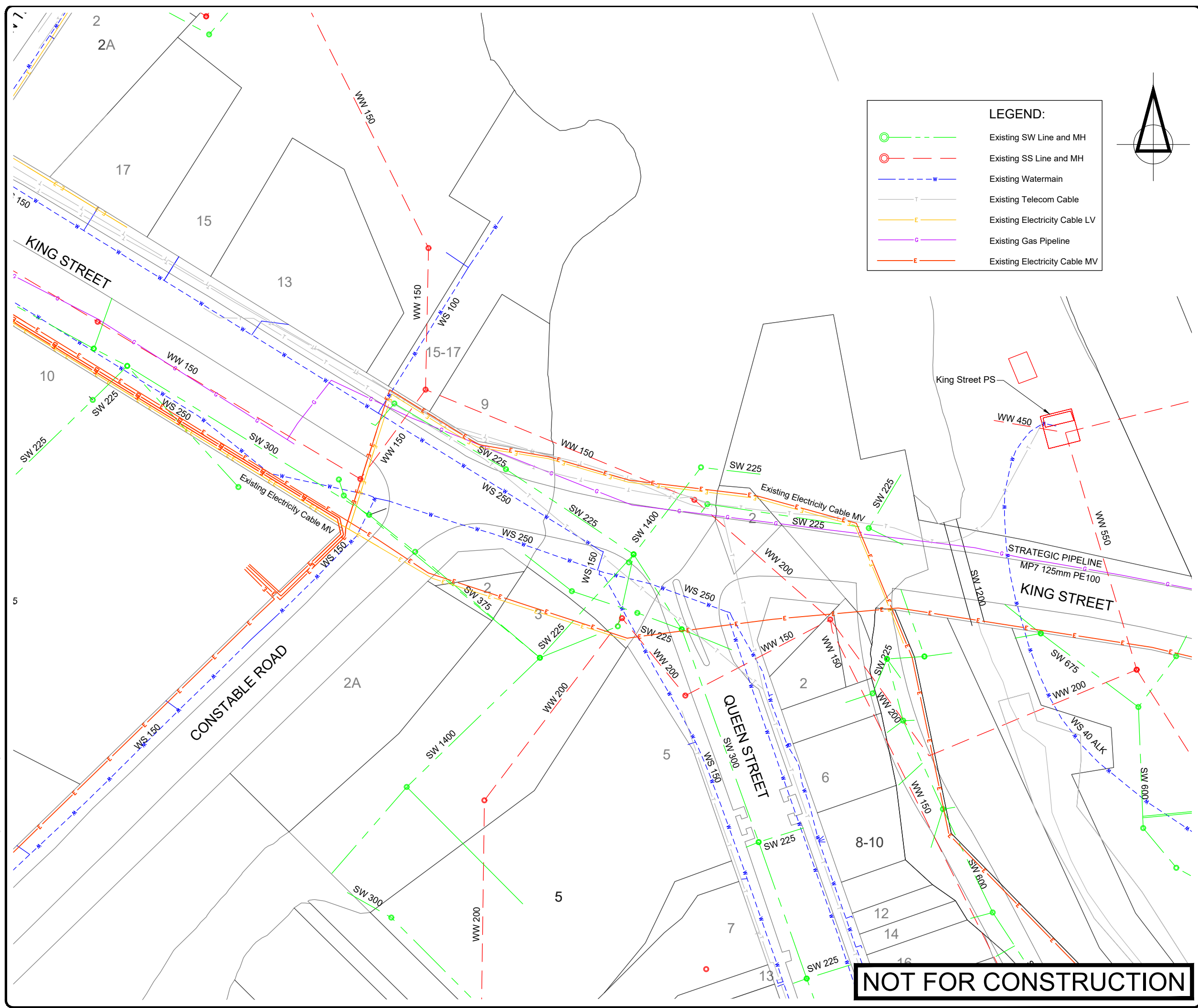
[www.fraserthomas.co.nz](http://www.fraserthomas.co.nz)

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

STATUS	<b>PLAN CHANGE</b>
Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.	
SCALE	1:750 (A3)
DRAWING No	32897/306
REVISION	-

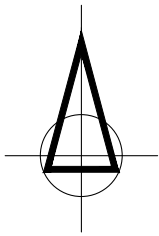
P:\132 series\32897 Brookdale Waiuku PPC\03 Drawings\32897-306-307.dwg, 306, 6/07/2021 11:33:06 am





**LEGEND:**

	Existing SW Line and MH
	Existing SS Line and MH
	Existing Watermain
	Existing Telecom Cable
	Existing Electricity Cable LV
	Existing Gas Pipeline
	Existing Electricity Cable MV



SURVEYED		APPROVED	DATE
DESIGNED		GM	12/04/2021
DRAWN	HN	25/03/2021	
CHECKED	GM	12/04/2021	
REVISION	CHANGES	CHECKED	DATE

NOTES

CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU**

TITLE  
**SCENARIO C: EXISTING  
SERVICES PLAN SHEET 2 OF 2**

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
 NAPIER ..... 06 211 2766  
 CHRISTCHURCH ..... 03 358 5936  
 BLLENHEIM ..... 03 428 3293

www.fraserthomas.co.nz

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

STATUS  
**PLAN CHANGE**

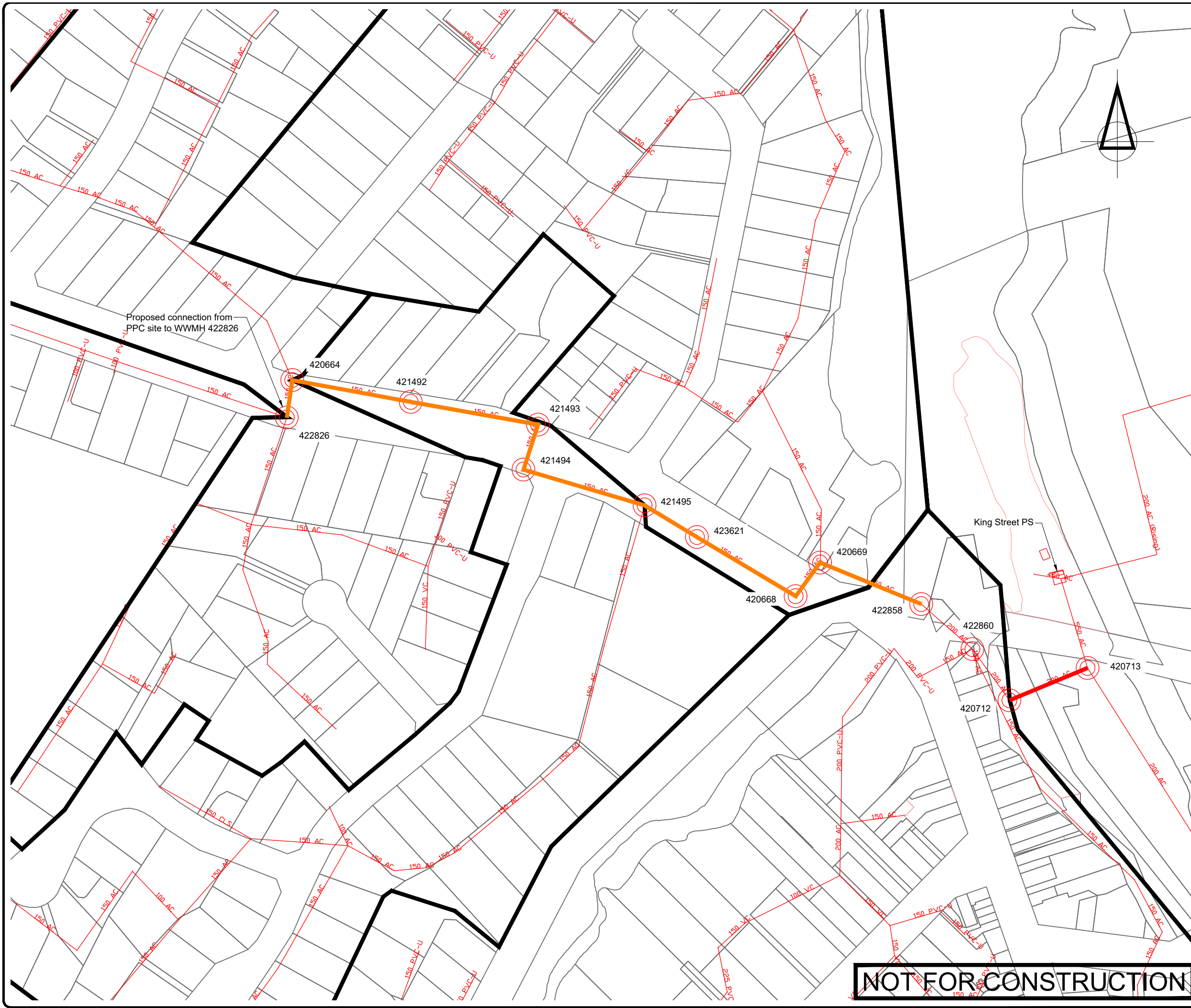
Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE	1:750	(A3)
DRAWING No	32897/307	REVISION
		-

**NOT FOR CONSTRUCTION**

P:\32 series\32897 Brookdale Waiuku PPC\03 Drawings\32897-306-307.dwg, 307, 6/07/2021 11:33:38 am

P:\32 series\32897 Brookdale Waiuku PPC\03 Drawings\32897-308.dwg, 308, 6/07/2021 11:36:10 am



SURVEYED		APPROVED	DATE
DESIGNED	AC	GM	12/04/2021
DRAWN	AC	04/05/2021	
CHECKED	GM	12/04/2021	
REVISION	CHANGES	CHECKED	DATE
A	REVISED PIPE DIAMETER	SF	31/05/21
B	REVISED PIPE DIAMETER	SF	25/06/21

**NOTES**  
**LEGEND**  
 Upgrade to 200mm diameter pipe  
 Upgrade to 300mm diameter pipe  
**NOTE:**  
 Proposed upgrades of existing wastewater network is only one possible option to convey the wastewater flows from the Private Plan Chang site. Alternative options of a duplicate line or falling main are not shown.

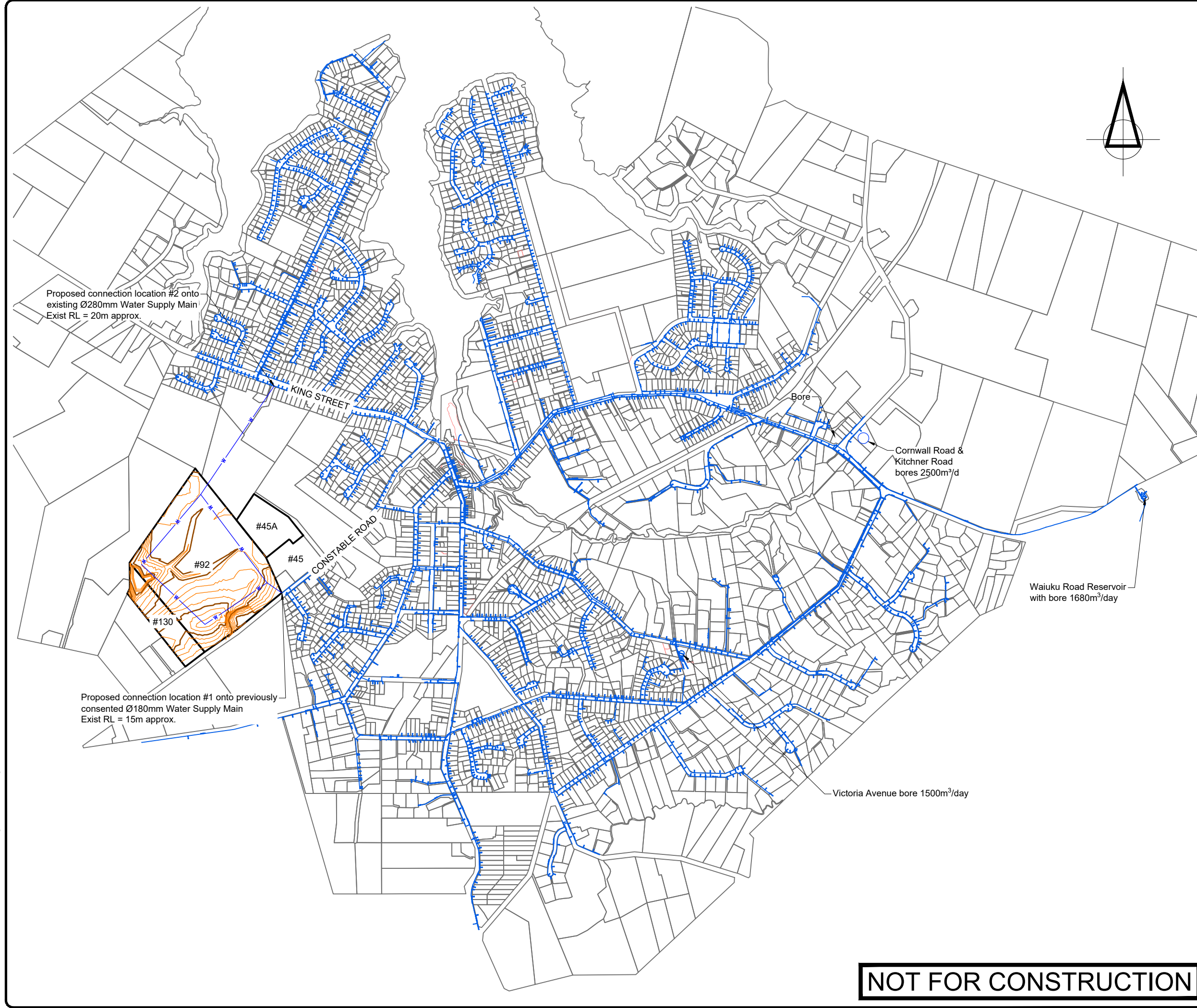
CLIENT  
**GARDON TRUST**

PROJECT  
**O'HARA WAIUKU PLAN CHANGE  
 45A, 92 & 130 CONSTABLE ROAD  
 WAIUKU**

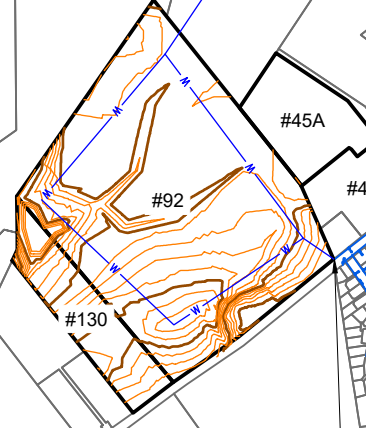
TITLE  
**SCENARIO C: WASTEWATER  
 NETWORK UPGRADE PLAN  
 (INDICATIVE)**

**Fraser Thomas**  
 ENGINEERS • RESOURCE MANAGERS • SURVEYORS  
 AUCKLAND ..... 09 278 7078  
 NAPIER ..... 06 211 2766  
 CHRISTCHURCH ..... 03 358 5936  
 BLENHEIM ..... 03 428 3293  
 www.fraserthomas.co.nz  
 The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

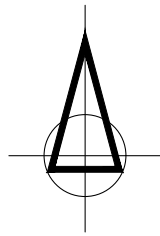
STATUS  
**PLAN CHANGE**  
 Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.  
 SCALE 1:2000 (A3)  
 DRAWING No 32897/308 REVISION B



Proposed connection location #2 onto existing Ø280mm Water Supply Main  
Exist RL = 20m approx.



Proposed connection location #1 onto previously consented Ø180mm Water Supply Main  
Exist RL = 15m approx.



SURVEYED		APPROVED	GM	DATE	12/04/2021
DESIGNED					
DRAWN	AC				
CHECKED	GM				
REVISION		CHANGES	CHECKED	DATE	
A		REVISED EARTHWORKS	SF	25/06/21	

NOTES  
1. Contours shown within 92 & 130 Constable Road are the proposed finished ground levels as of June 2021 at 1.0m intervals.

LEGEND  
— Proposed Watermain Extension

CLIENT  
GARDON TRUST

PROJECT  
O'HARA WAIUKU PLAN CHANGE  
45A, 92 & 130 CONSTABLE ROAD  
WAIUKU

TITLE  
WATER SUPPLY ASSESSMENT  
PLAN

**Fraser Thomas**  
ENGINEERS • RESOURCE MANAGERS • SURVEYORS

AUCKLAND ..... 09 278 7078  
NAPIER ..... 06 211 2766  
CHRISTCHURCH ..... 03 358 5936  
BLLENHEIM ..... 03 428 3293

www.fraserthomas.co.nz

The copyright of this design and drawing is vested in Fraser Thomas Ltd, unless otherwise indicated.

STATUS  
**PLAN CHANGE**  
Construction works shall commence only on receipt of and in accordance with the Council or Council organisation stamped approved drawings, unless otherwise indicated.

SCALE 1:15000 (A3)  
DRAWING No. 32897/401 REVISION A

**NOT FOR CONSTRUCTION**

***Appendix A***

***Water Supply Calculations***

Gardon Trust  
45A, 92 & 130 Constable Road, Waiuku  
Development Water Supply Demand

Job No. 32897  
 Site Address 45a, 92 and 130 Constable Road, Waiuku  
 Description Water supply demand from proposed plan change residential lots  
 Computed By AC Date 31/05/2021  
 Check By GM Date 31/05/2021

Catchment Site	Total Dwellings	Average Persons per Lot	Total Persons	Daily Consumption per person (L/person/Day)	Average Daily Residential demand (L/Day)	Peak Day Demand (Factor *2) L/d	Peak Hourly Demand (Factor *2.5) L/h	Peak Hourly Demand (Factor *2.5) L/s
45a Constable Road	55	3	165	220	36300	72600	7563	2.1
92 + 130 Constable Road	645	3	1935	220	425700	851400	88688	24.6

**Peak Day Demand (over a 12-month period) = Average Day Demand x PF**

Unless specified otherwise by Watercare:

(a) PF = 1.5 for populations over 10,000;

(b) PF = 2 for populations below 2,000.

(c) Interpolated between 1.5 and 2 for populations between 10,000 and 2,000

**Peak Hourly Demand = Average Hourly Demand (on peak day) x PF (over a 24-hour period)**

Unless specified otherwise by Watercare, the peaking factor shall be 2.5

**WSL 5.3.5.1 Residential Occupancy Rates**

Number of people per dwelling = 3.0

**WSL 6.3.5.6 Minimum Water Demand**

(a) Daily consumption of 220 L/p/day;

(b) Peaking factor of up to 5;

(c) Firefighting demands as specified in SNZ PAS 4509;

(d) The network shall be designed to maintain appropriate nominated pressures for both peak demand (average daily demand in L/s x peaking factor) and firefighting demand scenarios

**(Design pressure 250kPa to 800kPa)**

From hydrant test results undertaken along constable road in 2018, extrapolate flows to encompass our required FW2 + 2/3 peak combination

Nova Flowtec Services FW2 hydrant flow test at 45 Constable Road on Monday 13th August at 9.32am.

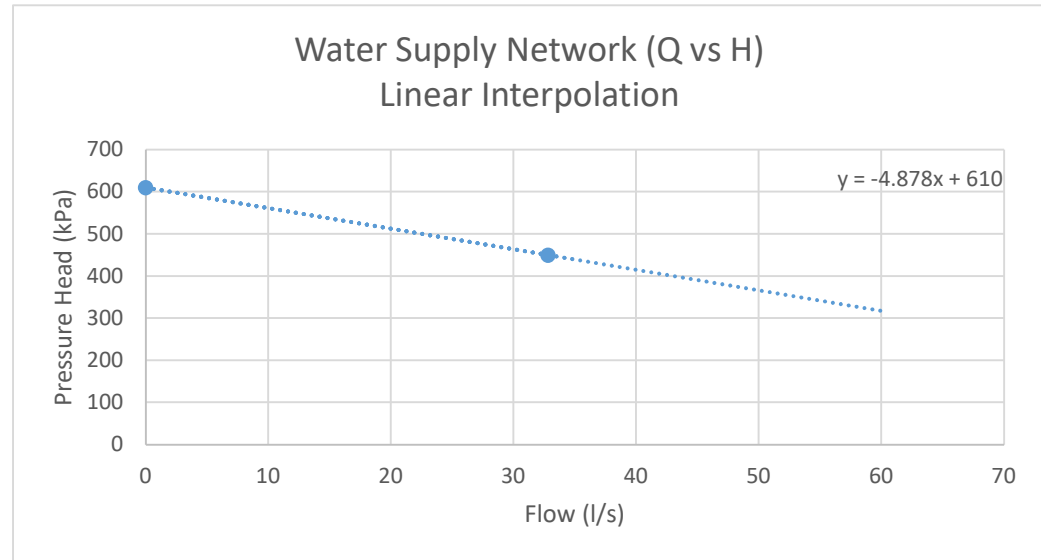
**Measured**

Q (l/s)	H (kPa)
0	610
32.8	450

FW2 + 2/3 peak combination = 41.5L/s

**Extrapolated**

Q (l/s)	H (kPa)
0	610
10	561
20	512
30	464
40	415
50	366
60	317



Gardon Trust  
45A, 92 & 130 Constable Road, Waiuku  
Development Water Supply Demand

Job No. 32897  
 Site Address 45a, 92 and 130 Constable Road, Waiuku  
 Description Water supply demand from proposed plan change residential lots (910 Total Lots)  
 Computed By AC Date 31/05/2021  
 Check By GM Date 31/05/2021

Catchment Site	Total Dwellings	Average Persons per Lot	Total Persons	Daily Consumption per person (L/person/Day)	Average Daily Residential demand (L/Day)	Peak Day Demand (Factor *2) L/d	Peak Hourly Demand (Factor *2.5) L/h	Peak Hourly Demand (Factor *2.5) L/s
45a Constable Road	55	3	165	220	36300	72600	7563	2.1
92 + 130 Constable Road	855	3	2565	220	564300	1128600	117563	32.7

**Peak Day Demand (over a 12-month period) = Average Day Demand x PF**

Unless specified otherwise by Watercare:

- (a) PF = 1.5 for populations over 10,000;
- (b) PF = 2 for populations below 2,000.
- (c) Interpolated between 1.5 and 2 for populations between 10,000 and 2,000

**Peak Hourly Demand = Average Hourly Demand (on peak day) x PF (over a 24-hour period)**

Unless specified otherwise by Watercare, the peaking factor shall be 2.5

**WSL 5.3.5.1 Residential Occupancy Rates**

Number of people per dwelling = 3.0

**WSL 6.3.5.6 Minimum Water Demand**

- (a) Daily consumption of 220 L/p/day;
- (b) Peaking factor of up to 5;
- (c) Firefighting demands as specified in SNZ PAS 4509;
- (d) The network shall be designed to maintain appropriate nominated pressures for both peak demand (average daily demand in L/s x peaking factor) and firefighting demand scenarios

**(Design pressure 250kPa to 800kPa)**

***Appendix B***

***Wastewater Calculations***



Gardon Trust  
45A, 92 & 130 Constable Road, Waiuku  
Development Wastewater Flow

Job No. 32897  
 Site Address 45a, 92 and 130 Constable Road, Waiuku  
 Description Wastewater flows from proposed plan change residential lots  
 Computed By AC Date 31/05/2021  
 Check By GM Date 31/05/2021

Catchment Site	Total Dwellings	Average Persons per Lot	Total Persons	Per capita flow (L/d)	ADWF (L/s)	Self-Cleansing Design Flow (L/s)	PWWF (L/s)
45a Constable Road	55	3	165	180	0.3	1.03	2.3
92 + 130 Constable Road	645	3	1935	180	4.0	12.09	27.0

**WSL Code of Practice, 5.3.5 Residential flows**

Average dry weather flow of 180 litres per day per person

Number of people per dwelling: 3.0

Peak Factor,; Self Cleansing Design Flow = 3.0

Peak Wet Weather Flow PF = 6.7

Self Cleansing Design Flow = (Design Average Dry Weather Flow) X (Self Cleansing Peaking Factor, as outlined in the applicable design-flow tables in section 5.3.5.1.1)

## Wastewater Catchment Breakdown - Existing Scenario (Option C)

Draining to node 1 (connection point)

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
111	3	180	0.7

Peak Wet Weather Flow 6.0 L/s

Draining to node 2

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
200	3	180	1.3

Peak Wet Weather Flow 9.7 L/s

Nodes 3 - 5 adopt node 2 flow

Peak Wet Weather Flow 9.7 L/s

Draining to node 6

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
257	3	180	1.6

Peak Wet Weather Flow 12.9 L/s

Nodes 7 - 8 adopt node 6 flow

Peak Wet Weather Flow 12.9 L/s

Draining to node 9

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
339	3	180	2.1

Peak Wet Weather Flow 16.3 L/s

Node 10 adopt node 9 flow

Peak Wet Weather Flow 16.3 L/s

Draining to node 11

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
667	3	180	4.2

Peak Wet Weather Flow 41.4 L/s

Node 12 adopt node 11 flow

Peak Wet Weather Flow 41.4 L/s

Catchment to Node 12 used in static assessment

Draining to node 13

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
1498	3	180	9.4

Average Dry Weather Flow 13.1 L/s

Peak Wet Weather Flow 87.7 L/s

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
0	4.5	0

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
0	4.5	0

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
2154	4.5	0.1

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
2154	4.5	0.1

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
30117	4.5	1.6

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
54058	4.5	2.8

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
Open Space	Rugby Club	1170m <sup>2</sup> net area	17550	0.2

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
		NONE		

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
		NONE		

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
Open Space	Museum	???	?	IGNORE
Open Space	Fire Station	???	?	IGNORE
Open Space	Craft Store	???	?	IGNORE

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
Waiuku College (secondary school)	Students	950	20	0.2
	Staff	50	45	0.0
	TOTAL Q			0.2

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
Mixed Housing Urban	COSMPOLITAN CLUB - wet retail	4000m <sup>2</sup>	15	0.7
Mixed Housing Urban	Waiuku Motel	32	180	0.1
Open Space	Public Pool	???	?	IGNORE
Open Space	Public Toilets	???	?	IGNORE
Waiuku Primary School	Students	420	15	0.1
	Staff	30	45	0.0
George St Kindergarden (day care)	Students	49	42	0.0
	Staff	5	45	0.0
Waiuku Kindergarden (day care)	Students	62	42	0.0
	Staff	6	45	0.0
	TOTAL Q			0.9

Catchment to Node 13 used in determining King Street WWPS emergency storage volume

## Wastewater Catchment Breakdown - Proposed Scenario (Option C)

Draining to node 1 (connection point)

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
756	3	180	4.7

Peak Wet Weather Flow 33.0 L/s

Draining to node 2

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
845	3	180	5.3

Peak Wet Weather Flow 36.7 L/s

Nodes 3 - 5 adopt node 2 flow

Peak Wet Weather Flow 36.7 L/s

Draining to node 6

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
902	3	180	5.6

Peak Wet Weather Flow 39.9 L/s

Nodes 7 - 8 adopt node 6 flow

Peak Wet Weather Flow 39.9 L/s

Draining to node 9

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
984	3	180	6.2

Peak Wet Weather Flow 43.3 L/s

Node 10 adopt node 9 flow

Peak Wet Weather Flow 43.3 L/s

Draining to node 11

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
1367	3	180	8.5

Peak Wet Weather Flow 70.8 L/s

Node 12 adopt node 11 flow

Peak Wet Weather Flow 70.8 L/s

Catchment to Node 12 used in static assessment

Draining to node 13

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
2198	3	180	13.7

Average Dry Weather Flow 17.5 L/s

Peak Wet Weather Flow 117.0 L/s

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
0	4.5	0

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
0	4.5	0

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
2154	4.5	0.1

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
2154	4.5	0.1

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
30117	4.5	1.6

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
54058	4.5	2.8

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
Open Space	Rugby Club	1170m <sup>2</sup> net area	17550	0.2

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
NONE				

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
NONE				

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
Open Space	Museum	???	?	IGNORE
Open Space	Fire Station	???	?	IGNORE
Open Space	Craft Store	???	?	IGNORE

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
Waiuku College (secondary school)	Students	950	20	0.2
	Staff	50	45	0.0
TOTAL Q				0.2

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
Mixed Housing Urban	COSMOPOLITAN CLUB - wet retail	4000m <sup>2</sup>	15	0.7
Mixed Housing Urban	Waiuku Motel	32	180	0.1
Open Space	Public Pool	???	?	IGNORE
Open Space	Public Toilets	???	?	IGNORE
Waiuku Primary School	Students	420	15	0.1
	Staff	30	45	0.0
George St Kindergarden (day care)	Students	49	42	0.0
	Staff	5	45	0.0
Waiuku Kindergarden (day care)	Students	62	42	0.0
	Staff	6	45	0.0
TOTAL Q				0.9

Catchment to Node 13 used in determining King Street WWPS emergency storage volume

**EXISTING WASTEWATER NETWORK CAPACITY ASSESSMENT (Option C)**

TITLE: 92-130 CONSTABLE ROAD, WAIUKU  
 CLIENT: GARDON TRUST  
 EXTENT: EXIST WW CAPACITY CHECK - King St Connection Pt. (exist scenario)

**Data notes**

IL inferred from GIS contours and DTI  
 No info

Job no. 32897  
 Calcs by: AC  
 Date: 23/03/2021  
 Checked by: GDM  
 Page 1 / 1

U/S Node	D/S Node	Node (catchment #)	Remark	Assessed	FROM GIS				GRADE (%)	Full Flow Velocity - Vf (m/s)	Full Flow Capacity - Qf (l/s)	Capacity comments	% Utilisation
				PWWF (L/s)	Pipe diameter (mm)	IL U/S	IL D/S	Length (m)					
422826	420664	1	Connection Point outside of #32 King Street	6.0	158	13.7	13.33	20.84	1.78%	1.21	23.82	Comply	25%
420664	421492	2		9.7	158	13.33	12.15	66.58	1.77%	1.21	23.79	Comply	41%
421492	421493	3		9.7	158	12.15	9.85	71.43	3.22%	1.64	32.08	Comply	30%
421493	421494	4		9.7	158	9.85	10.3	26.17	-1.72%	#NUM!	#NUM!	#NUM!	#NUM!
421494	421495	5		9.7	158	10.3	6.3	69.78	5.73%	2.18	42.80	Comply	23%
421495	423621	6		12.9	158	6.3	?	33.79	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
423621	420668	7		12.9	158	?	5.5	63.61	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
420668	420669	8		12.9	158	5.5	4.5	22.98	4.35%	1.90	37.29	Comply	35%
420669	422858	9		16.3	158	4.5	3.25	60.39	2.07%	1.31	25.72	Comply	63%
422858	422860	10		16.3	203	3.25	1.85	37.63	3.72%	2.08	67.23	Comply	24%
422860	420712	11		41.4	203	1.85	0.4	34.95	4.15%	2.19	70.99	Comply	58%
420712	420713	12	Last run until 550 AC	41.4	203	0.4	-0.2	46.69	1.29%	1.22	39.50	Surcharge	105%
420713	King St WWPS	13			550	-0.2			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

**NOTE:**

Based on WSL COP 01/11/2019  
 Assessment of the existing wastewater network without incorporating proposed flows from 92 and 130 Constable Road. Existing catchment assessed with no allowance for MPD.

**EXISTING WASTEWATER NETWORK CAPACITY ASSESSMENT (Option C)**

TITLE: 92-130 CONSTABLE ROAD, WAIUKU  
 CLIENT: GARDON TRUST  
 EXTENT: EXIST WW CAPACITY CHECK - King St Connection Pt. (proposed scenario)

**Data notes**  
 IL inferred from GIS contours and DTI  
 No info




Job no. 32897  
 Calcs by: AC  
 Date: 31/05/2021  
 Checked by: GDM  
 Page 1 / 1

U/S Node	D/S Node	Node (catchment #)	Remark	Assessed	FROM GIS				GRADE (%)	Full Flow Velocity - Vf (m/s)	Full Flow Capacity - Qf (l/s)	Capacity comments	% Utilisation
				PWWF (L/s)	Pipe diameter (mm)	IL U/S	IL D/S	Length (m)					
422826	420664	1	Connection Point outside of #32 King Street	33.0	158	13.7	13.33	20.84	1.78%	1.21	23.82	Surcharge	139%
420664	421492	2		36.7	158	13.33	12.15	66.58	1.77%	1.21	23.79	Surcharge	154%
421492	421493	3		36.7	158	12.15	9.85	71.43	3.22%	1.64	32.08	Surcharge	115%
421493	421494	4		36.7	158	9.85	10.3	26.17	-1.72%	#NUM!	#NUM!	#NUM!	#NUM!
421494	421495	5		36.7	158	10.3	6.3	69.78	5.73%	2.18	42.80	Comply	86%
421495	423621	6		39.9	158	6.3	?	33.79	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
423621	420668	7		39.9	158	?	5.5	63.61	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
420668	420669	8		39.9	158	5.5	4.5	22.98	4.35%	1.90	37.29	Surcharge	107%
420669	422858	9		43.3	158	4.5	3.25	60.39	2.07%	1.31	25.72	Surcharge	168%
422858	422860	10		43.3	203	3.25	1.85	37.63	3.72%	2.08	67.23	Comply	64%
422860	420712	11		70.8	203	1.85	0.4	34.95	4.15%	2.19	70.99	Comply	100%
420712	420713	12	Last run until 550 AC	70.8	203	0.4	-0.2	46.69	1.29%	1.22	39.50	Surcharge	179%
420713	King St WWPS	13			550	-0.2			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

**NOTE:**  
 Based on WSL COP 01/11/2019  
 Assessment of the existing wastewater network incorporating proposed flows from 92 and 130 Constable Road. Existing catchment assessed with no allowance for MPD.

**EXISTING WASTEWATER NETWORK CAPACITY ASSESSMENT (Option C)**

TITLE: 92-130 CONSTABLE ROAD, WAIUKU  
 CLIENT: GARDON TRUST  
 EXTENT: PROPOSED WW CAPACITY CHECK - King St Connection Pt. (proposed scenario)

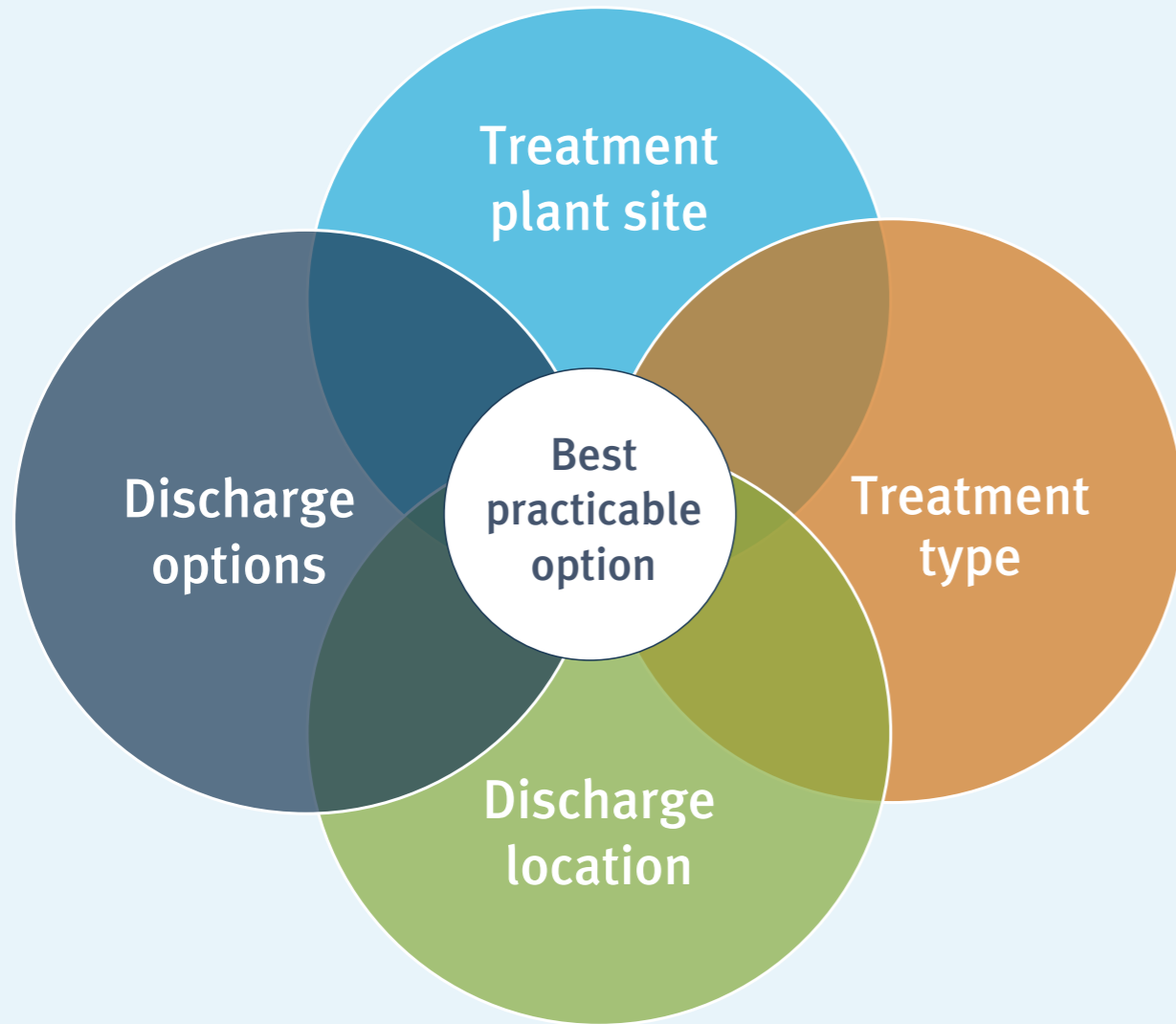
**Data notes**  
 IL inferred from GIS contours and DTI  
 No info  
 pipe upsize

Job no. 32897  
 Calcs by: AC  
 Date: 31/05/2021  
 Checked by: GDM  
 Page 1 / 1

U/S Node	D/S Node	Node (catchment #)	Remark	Assessed	FROM GIS					GRADE (%)	Full Flow Velocity - Vf (m/s)	Full Flow Capacity - Qf (l/s)	Capacity comments	% Utilisation
				PWWF (L/s)	Pipe diameter (mm)	IL U/S	IL D/S	Length (m)						
422826	420664	1	Connection Point outside of #32 King Street	33.0	203	13.7	13.33	20.84	1.78%	1.43	46.44	Comply	71%	
420664	421492	2		36.7	203	13.33	12.15	66.58	1.77%	1.43	46.40	Comply	79%	
421492	421493	3		36.7	203	12.15	9.85	71.43	3.22%	1.93	62.54	Comply	59%	
421493	421494	4		36.7	203	9.85	10.3	26.17	-1.72%	#NUM!	#NUM!	#NUM!	#NUM!	
421494	421495	5		36.7	203	10.3	6.3	69.78	5.73%	2.58	83.45	Comply	44%	
421495	423621	6		39.9	203	6.3	?	33.79	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	
423621	420668	7		39.9	203	?	5.5	63.61	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!	
420668	420669	8		39.9	203	5.5	4.5	22.98	4.35%	2.25	72.71	Comply	55%	
420669	422858	9		43.3	203	4.5	3.25	60.39	2.07%	1.55	50.14	Comply	86%	
422858	422860	10		43.3	203	3.25	1.85	37.63	3.72%	2.08	67.23	Comply	64%	
422860	420712	11		70.8	203	1.85	0.4	34.95	4.15%	2.19	70.99	Comply	100%	
420712	420713	12	Last run until 550 AC	70.8	304	0.4	-0.2	46.69	1.29%	1.59	115.47	Comply	61%	
420713	King St WWPS	13			550	-0.2			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	

**NOTE:**  
 Based on WSL COP 01/11/2019  
 Assessment of the existing wastewater network incorporating proposed flows from 92 and 130 Constable Road. Existing catchment assessed with no allowance for MPD.

A combination of the following options have been considered...



### What next?

We have requested Auckland Council to publicly notify the application. Council will now be reviewing the information prior to making their notification decision .

For information on the consents application and its associated processes, please visit the Auckland Council website [www.aucklandcouncil.govt.nz](http://www.aucklandcouncil.govt.nz).

### Contact us

For further information to be kept informed or queries regarding the project please contact us on:

Email: [southwest@water.co.nz](mailto:southwest@water.co.nz) Phone: 09 442 2222

Or visit [www.watercare.co.nz](http://www.watercare.co.nz) –'work in your area'.



# An update on the...

# South-West Wastewater Servicing Project

## Overview

The South-West Wastewater Servicing Project has been looking at the best way to supply Kingseat, Clarks Beach, Glenbrook Beach and Waiuku communities with reliable wastewater services that cater for population growth. Work has now concluded to identify the best practicable option that balances a number of objectives including environment, community, cultural and economic values. A discharge only resource consent application was lodged with Auckland Council on the 30th of June 2016.

## Best practicable option

**The preferred scheme is for a higher technology treatment plant at the existing Waiuku Wastewater Treatment Plant location which will service the West Franklin townships. The treated wastewater will be conveyed to the existing Clarks Beach site and discharged off the Clarks Beach Golf Course 12th green, mid channel into the Waiuku Estuary.**

### The preferred scheme will:

- Provide higher treatment technology of wastewater through comprehensive clarifying and additional filtration process.
- By reducing three discharge points down to one, there will be immediate improvements to the surrounding marine environment.
- Improvements to the ecology of the Waiuku estuary (proposed discharge location) due to higher treatment technology.
- Able to immediately service approved areas of development.
- Provide greater flexibility in responding to alternative types of reuse in the medium to long-term.
- Provide a long term and sustainable solution to cater for planned growth.
- Provide sustainable overall costs of services.

## BEST PRACTICABLE OPTION...WHAT DOES THAT MEAN?

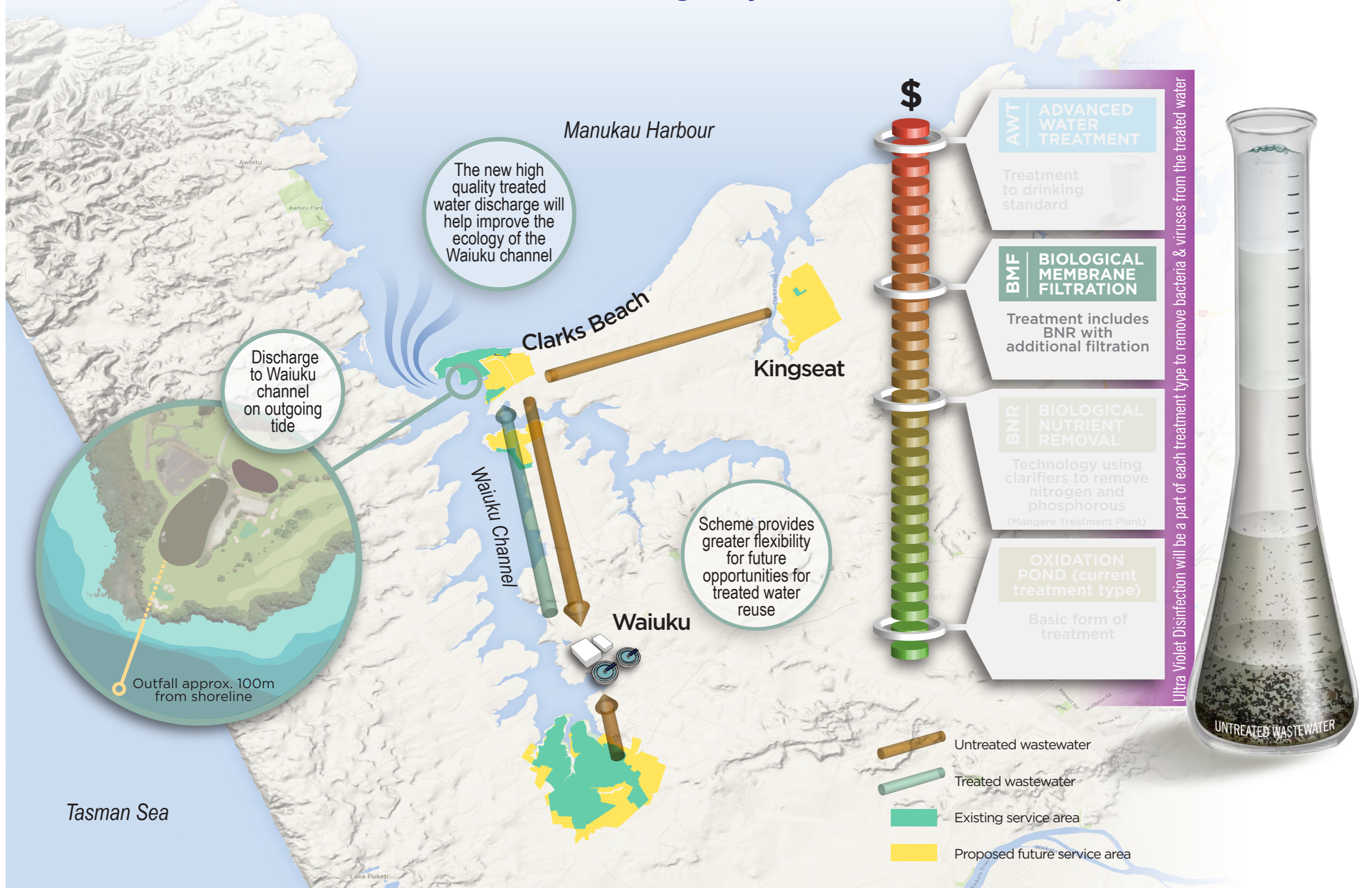
In simple terms, the best practicable option for the South-West Wastewater Servicing Project means the 'best option'



This would be the wastewater treatment and disposal method that balances a number of objectives, is affordable and protects our communities while also preventing harm to the environment and cultural values.



# South-West Wastewater Servicing Project - Best Practicable Option



The new high quality treated water discharge will help improve the ecology of the Waiuku channel

Discharge to Waiuku channel on outgoing tide

Outfall approx. 100m from shoreline

Scheme provides greater flexibility for future opportunities for treated water reuse

**\$**

- AWT | ADVANCED WATER TREATMENT**  
Treatment to drinking standard
- BMF | BIOLOGICAL MEMBRANE FILTRATION**  
Treatment includes BNR with additional filtration
- BNR | BIOLOGICAL NUTRIENT REMOVAL**  
Technology using clarifiers to remove nitrogen and phosphorous (Mangere Treatment Plant)
- OXIDATION POND (current treatment type)**  
Basic form of treatment

Ultra Violet Disinfection will be a part of each treatment type to remove bacteria & viruses from the treated water



- Untreated wastewater
- Treated wastewater
- Existing service area
- Proposed future service area

Tasman Sea

Manukau Harbour

Clarks Beach

Kingseat

Waiuku Channel

Waiuku

Awhitu

Awhitu Park

Lake Puketiti

Pahurehure Inlet

Attwell Rd, Middleton Rd, Burrow Rd, Lippell Rd, Ray Street

Waikato River



Gardon Trust  
45A, 92 & 130 Constable Road, Waiuku  
Development Wastewater Flow

Job No. 32897  
 Site Address 45a, 92 and 130 Constable Road, Waiuku  
 Description Wastewater flows from proposed plan change residential lots (910 Total Lots)  
 Computed By AC Date 31/05/2021  
 Check By GM Date 31/05/2021

Catchment Site	Total Dwellings	Average Persons per Lot	Total Persons	Per capita flow (L/d)	ADWF (L/s)	Self-Cleansing Design Flow (L/s)	PWWF (L/s)
45a Constable Road	55	3	165	180	0.3	1.03	2.3
92 + 130 Constable Road	855	3	2565	180	5.3	16.03	35.8

**WSL Code of Practice, 5.3.5 Residential flows**

Average dry weather flow of 180 litres per day per person

Number of people per dwelling: 3.0

Peak Factor,,: Self Cleansing Design Flow = 3.0

Peak Wet Weather Flow PF = 6.7

Self Cleansing Design Flow = (Design Average Dry Weather Flow) X (Self Cleansing Peaking Factor, as outlined in the applicable design-flow tables in section 5.3.5.1.1)

## Wastewater Catchment Breakdown - Proposed Scenario (Option C)

Draining to node 1 (connection point)

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
966	3	180	6.0

Peak Wet Weather Flow 41.8 L/s

Draining to node 2

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
1055	3	180	6.6

Peak Wet Weather Flow 45.5 L/s

Nodes 3 - 5 adopt node 2 flow

Peak Wet Weather Flow 45.5 L/s

Draining to node 6

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
1112	3	180	7.0

Peak Wet Weather Flow 48.7 L/s

Nodes 7 - 8 adopt node 6 flow

Peak Wet Weather Flow 48.7 L/s

Draining to node 9

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
1194	3	180	7.5

Peak Wet Weather Flow 52.1 L/s

Node 10 adopt node 9 flow

Peak Wet Weather Flow 52.1 L/s

Draining to node 11

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
1577	3	180	9.9

Peak Wet Weather Flow 79.6 L/s

Node 12 adopt node 11 flow

Peak Wet Weather Flow 79.6 L/s

Catchment to Node 12 used in static assessment

Draining to node 13

Residential			
Equivalent Dwelling Units	Design Occupancy	Design Flow Allowance (L/d/person)	Design Flow (L/s)
2408	3	180	15.1

Average Dry Weather Flow 18.8 L/s

Peak Wet Weather Flow 125.8 L/s

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
0	4.5	0

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
0	4.5	0

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
2154	4.5	0.1

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
2154	4.5	0.1

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
30117	4.5	1.6

Commercial/Industrial		
Area (m <sup>2</sup> )	Design Flow Allowance (L/m <sup>2</sup> /d)	Design Flow (L/s)
54058	4.5	2.8

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
Open Space	Rugby Club	1170m <sup>2</sup> net area	17550	0.2

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
NONE				

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
NONE				

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
Open Space	Museum	???	?	IGNORE
Open Space	Fire Station	???	?	IGNORE
Open Space	Craft Store	???	?	IGNORE

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
Waiuku College (secondary school)	Students	950	20	0.2
	Staff	50	45	0.0
TOTAL Q				0.2

Other				
Zone	Category	Number	Design Flow Allowance (L/d)	Design Flow (L/s)
Mixed Housing Urban	COSMOPOLITAN CLUB - wet retail	4000m2	15	0.7
Mixed Housing Urban	Waiuku Motel	32	180	0.1
Open Space	Public Pool	???	?	IGNORE
Open Space	Public Toilets	???	?	IGNORE
Waiuku Primary School	Students	420	15	0.1
	Staff	30	45	0.0
George St Kindergarden (day care)	Students	49	42	0.0
	Staff	5	45	0.0
Waiuku Kindergarden (day care)	Students	62	42	0.0
	Staff	6	45	0.0
TOTAL Q				0.9

Catchment to Node 13 used in determining King Street WWPS emergency storage volume

**EXISTING WASTEWATER NETWORK CAPACITY ASSESSMENT (Option C)**

TITLE: 92-130 CONSTABLE ROAD, WAIUKU  
 CLIENT: GARDON TRUST  
 EXTENT: EXISTING WW CAPACITY CHECK - King St Connection Pt. (proposed scenario)

**Data notes**

IL inferred from GIS contours and DTI  
 No info

Job no. 32897  
 Calcs by: AC  
 Date: 31/05/2021  
 Checked by: GDM  
 Page 1 / 1

U/S Node	D/S Node	Node (catchment #)	Remark	Assessed	FROM GIS					Full Flow Velocity - Vf (m/s)	Full Flow Capacity - Qf (l/s)	Capacity comments	% Utilisation
				PWWF (L/s)	Pipe diameter (mm)	IL U/S	IL D/S	Length (m)	GRADE (%)				
422826	420664	1	Connection Point outside of #32 King Street	41.8	158	13.7	13.33	20.84	1.78%	1.21	23.82	Surcharge	176%
420664	421492	2		45.5	158	13.33	12.15	66.58	1.77%	1.21	23.79	Surcharge	191%
421492	421493	3		45.5	158	12.15	9.85	71.43	3.22%	1.64	32.08	Surcharge	142%
421493	421494	4		45.5	158	9.85	10.3	26.17	-1.72%	#NUM!	#NUM!	#NUM!	#NUM!
421494	421495	5		45.5	158	10.3	6.3	69.78	5.73%	2.18	42.80	Surcharge	106%
421495	423621	6		48.7	158	6.3	?	33.79	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
423621	420668	7		48.7	158	?	5.5	63.61	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
420668	420669	8		48.7	158	5.5	4.5	22.98	4.35%	1.90	37.29	Surcharge	131%
420669	422858	9		52.1	158	4.5	3.25	60.39	2.07%	1.31	25.72	Surcharge	203%
422858	422860	10		52.1	203	3.25	1.85	37.63	3.72%	2.08	67.23	Comply	78%
422860	420712	11		79.6	203	1.85	0.4	34.95	4.15%	2.19	70.99	Surcharge	112%
420712	420713	12	Last run until 550 AC	79.6	203	0.4	-0.2	46.69	1.29%	1.22	39.50	Surcharge	201%
420713	King St WWPS	13			550	-0.2			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

**NOTE:**

Based on WSL COP 01/11/2019  
 Assessment of the existing wastewater network incorporating proposed flows from 92 and 130 Constable Road. Existing catchment assessed with no allowance for MPD.

**EXISTING WASTEWATER NETWORK CAPACITY ASSESSMENT (Option C)**

TITLE: 92-130 CONSTABLE ROAD, WAIUKU  
 CLIENT: GARDON TRUST  
 EXTENT: PROPOSED WW CAPACITY CHECK - King St Connection Pt. (proposed scenario)

**Data notes**

IL inferred from GIS contours and DTI  
 No info  
 pipe upsize

Job no. 32897  
 Calcs by: AC  
 Date: 31/05/2021  
 Checked by: GDM  
 Page 1 / 1

U/S Node	D/S Node	Node (catchment #)	Remark	Assessed	FROM GIS					Full Flow Velocity - Vf (m/s)	Full Flow Capacity - Qf (l/s)	Capacity comments	% Utilisation
				PWWF (L/s)	Pipe diameter (mm)	IL U/S	IL D/S	Length (m)	GRADE (%)				
422826	420664	1	Connection Point outside of #32 King Street	41.8	203	13.7	13.33	20.84	1.78%	1.43	46.44	Comply	90%
420664	421492	2		45.5	203	13.33	12.15	66.58	1.77%	1.43	46.40	Comply	98%
421492	421493	3		45.5	203	12.15	9.85	71.43	3.22%	1.93	62.54	Comply	73%
421493	421494	4		45.5	203	9.85	10.3	26.17	-1.72%	#NUM!	#NUM!	#NUM!	#NUM!
421494	421495	5		45.5	203	10.3	6.3	69.78	5.73%	2.58	83.45	Comply	55%
421495	423621	6		48.7	203	6.3	?	33.79	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
423621	420668	7		48.7	203	?	5.5	63.61	#VALUE!	#VALUE!	#VALUE!	#VALUE!	#VALUE!
420668	420669	8		48.7	203	5.5	4.5	22.98	4.35%	2.25	72.71	Comply	67%
420669	422858	9		52.1	225	4.5	3.25	60.39	2.07%	1.66	65.92	Comply	79%
422858	422860	10		52.1	225	3.25	1.85	37.63	3.72%	2.22	88.39	Comply	59%
422860	420712	11		79.6	225	1.85	0.4	34.95	4.15%	2.35	93.34	Comply	85%
420712	420713	12	Last run until 550 AC	79.6	304	0.4	-0.2	46.69	1.29%	1.59	115.47	Comply	69%
420713	King St WWPS	13			550	-0.2			#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

**NOTE:**

Based on WSL COP 01/11/2019

Assessment of the existing wastewater network incorporating proposed flows from 92 and 130 Constable Road. Existing catchment assessed with no allowance for MPD.

***Appendix C***

***Counties Power Correspondence***

5th February 2021

Fraser Thomas Limited  
P O Box 204006  
Highbrook  
Auckland 2161  
Attn: Johnbir Singh

Please quote reference  
number 20024

Dear Johnbir

**Re: Proposed new subdivision at 90-130 Constable Road, Waiuku – Pt Lot 4 Deeds Whau 29, connection to Counties Power Network**

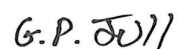
Thank you for your enquiry regarding the provision of network capacity for 532 lots for the new proposed development identified on Draft Plan, drawing number 32897/09.

We confirm that network connection points can be made available within the road reserve to serve these, however, upgrades to the existing network infrastructure will be necessary to accommodate this development.

Connection of these lots/units to the electricity network will be further subject to compliance with the terms and conditions of the Electricity Network Provision and payment of a capital contribution towards the provision of the network connection points and the extension to the electricity network will be required.

Please contact the writer, should you wish to discuss matters regarding power supply to the proposed subdivision.

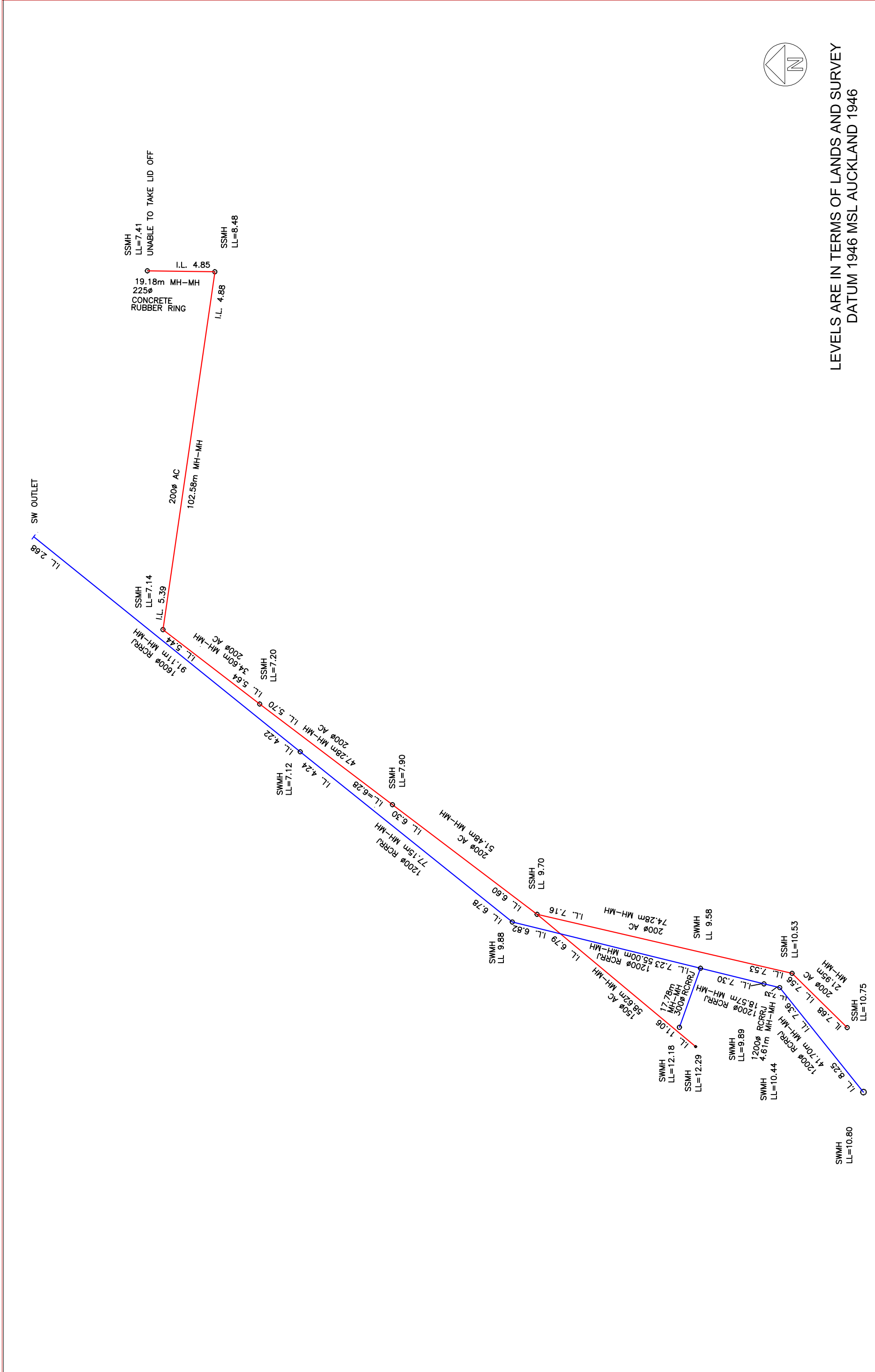
Yours sincerely



Greg Jull  
Design Engineer  
Mob: (027) 4769990  
Email: greg.jull@countiespower.com

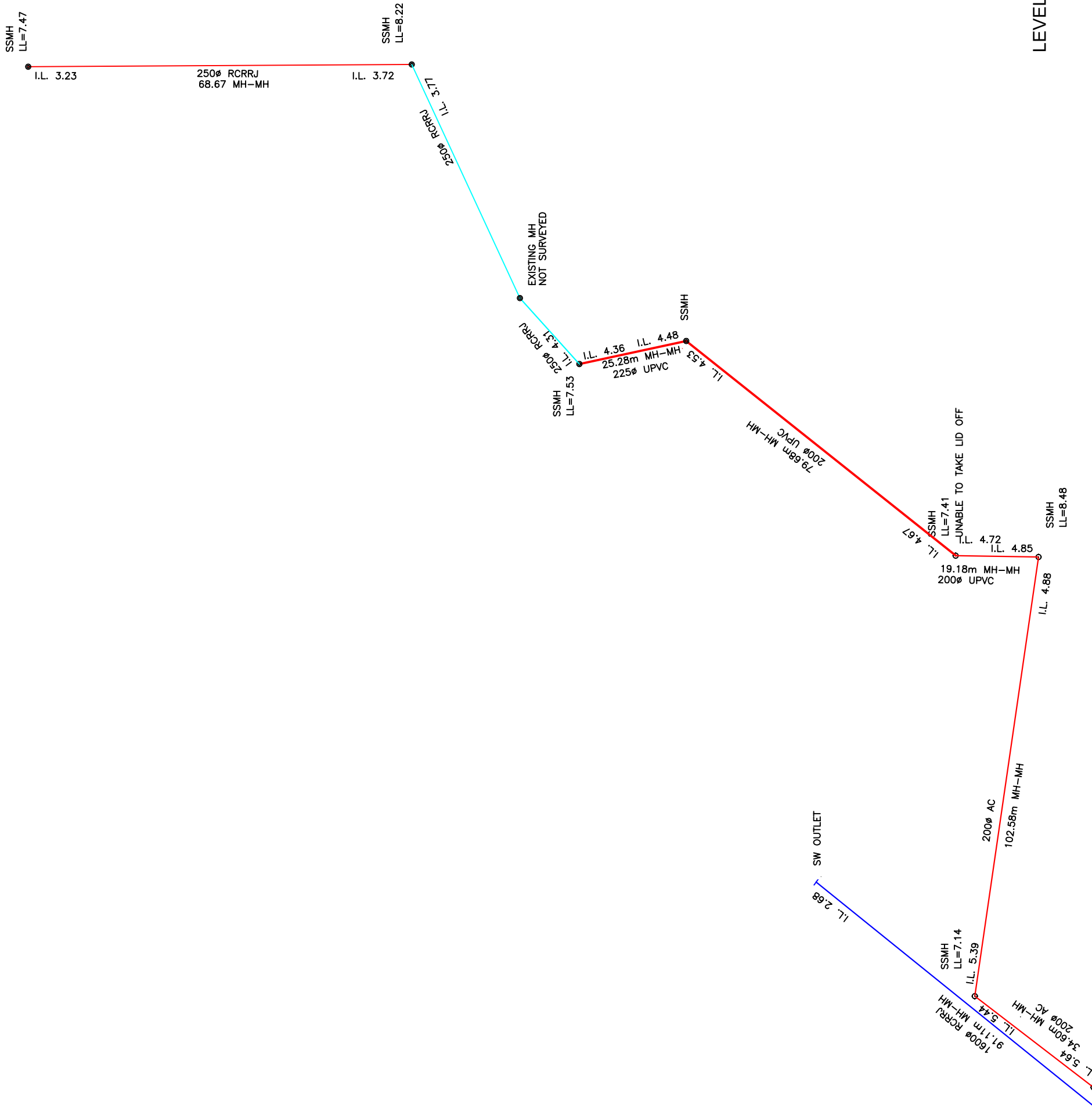
***Appendix D***

***Topographical Survey Data***



PREPARED BY: <b>P HARRISON</b> NZCLS PHONE: 0221081559	PROJECT NAME & ENGINEERING APPROVAL:  PROJECT NO.:	PROJECT NO.:	DRAWN: PH CHECKED: PH APPROVED: DATE: JUNE 2021 DWG NO: SHEET NO: 1 PS:1000	REVISION HISTORY: 18/06/21 - AT ISSUE	SHEET NO.:
				PREPARED FOR: SANITARY SEWER / STORMWATER ASBUILT CONSTABLE ROAD WAIKUKU	SCALE: N.T.S SHEET SIZE: A3





LEVELS ARE IN TERMS OF LANDS AND SURVEY  
DATUM 1946 MSL AUCKLAND 1946

PREPARED BY:  <b>P HARRISON</b> <b>NZCLS</b> <b>PHONE: 0221081559</b>	PROJECT NAME & ENGINEERING APPROVAL:  SANITARY SEWER /STORMWATER/ASBUILT CONSTABLE ROAD WAIUKU	PROJECT NO.:	SHEET NO.:
		PREPARED FOR:	REVISION HISTORY: 18/06/21 - AT ISSUE
PROJECT NO.:	DWG NO:	SHEET NO:	OF
PROJECT NO.:	DATE: JUNE 2021	SCALE: N.T.S	SHEET SIZE: A3

***Appendix E***

***Potential Subdivision Areas  
High Level Constraints Mapping***

Analysis

Sites in "Residential - Large Lot" (RLL) Zoning

Area	Zoning	Address	Minimum Lot Size (m2)	Gross Land Area (m2)	Potential Maximum Yield	Development viable	Comments	Revised Yield	No of new lots
1	RLL	12 Hull Road	4000	10060	2	No	New lot would be almost entirely within floodplain area	1	0
2	RLL	29 Colombo Road	4000	8774	2	No	New lot would be almost entirely within floodplain area	1	0
2	RLL	31 Colombo Road	4000	9870	2	No	New lot would be almost entirely within floodplain area	1	0
2	RLL	35 Colombo Road	4000	10335	2	No	New lot would be almost entirely within floodplain area	1	0
2	RLL	41 Colombo Road	4000	10020	2	No	New lot would be almost entirely within floodplain area	1	0
2	RLL	47 Colombo Road	4000	10060	2	No	New lot would be almost entirely within floodplain area	1	0
3	RLL	73 Colombo Road	4000	11054	2	Yes	Developable	2	1
4	RLL	26 Jenny Lane	4000	8639	2	No	Site has long narrow driveway and Awaroa Stream splits site in two; making subdivision into 2nd 4,000m2 lot difficult	1	0
5	RLL	24 Springvale Road	4000	16681	4	No	Flooding affects majority of site (no existing house)	1	0
6	RLL	111 Colombo Road	4000	20234	5	Yes	Subdividable except possibly southern end	4	3
7	RLL	27 Kendallvale Drive	4000	15687	3	No	Majority of site within floodplain or on land steeper >1V:4H	1	0
7	RLL	1537 Waiuku Road	4000	16270	4	Yes	Except possibly southern end; already developed as horticultural operation so assumed only vacant land developed for residential	3	2
8	RLL	155 Colombo Road	4000	19300	4	Yes	Developable	4	3
9	RLL	134 Colombo Road	4000	11230	2	No	Due to OLFPs/steep land	1	0
9	RLL	138 Colombo Road	4000	9260	2	No	Due to OLFPs/steep land	1	0
9	RLL	140A Colombo Road	4000	9307	2	No	Due to OLFPs and flooding	1	0
10	RLL	173 Colombo Road	4000	10628	2	Yes	Site is relatively flat and already used for commercial operation (Farm Source supplies) - development assumes localised flooding can be resolved	2	1
11	RLL	142 Colombo Road	4000	17740	4	No	Due to steep ground, OLFPs and/or flooding	1	0
11	RLL	160 Colombo Road	4000	13026	3	No	Due to steep ground, OLFPs and/or flooding (no existing house)	1	0
11	RLL	168 Colombo Road	4000	9160	2	No	Due to steep ground, OLFPs and/or flooding	1	0
11	RLL	269 Kitchener Road	4000	12286	3	No	Due to steep ground, OLFPs and/or flooding	1	0
12	RLL	8 Country Club Lane	4000	13550	3	No	Due to steep ground, OLFPs and/or flooding	1	0
12	RLL	7 Country Club Lane	4000	17285	4	No	Due to steep ground, OLFPs and/or flooding	1	0
12	RLL	5A Country Club Lane	4000	19914	4	No	Due to steep ground, OLFPs and/or flooding	1	0
12	RLL	4 Country Club Lane	4000	19920	4	Yes	Only portion of site outside of OLFPs/flooding	2	1
12	RLL	3 Country Club Lane	4000	19980	4	Yes	Only possibly portion of site outside of OLFPs/flooding	2	1
12	RLL	177 Kitchener Road	4000	9100	2	No	Due to site shape, location of existing house and steep slopes	1	0
13	RLL	3 James Bright Lane	4000	20000	5	No	Site is occupied by church - assumed unlikely to be developed for residential use	1	0

Analysis

14	RLL	46A Victoria Avenue	4000	9769	2	Yes	In area to east of existing house	2	1
14	RLL	70 Victoria Avenue	4000	14063	3	Yes	Likely just one additional house due to OLFPs and steep slopes	2	1
14	RLL	74 Victoria Avenue	4000	10927	2	No	Due to OLFP and steep slopes	1	0
14	RLL	76 Victoria Avenue	4000	13593	3	Yes	One house at northern end of site	2	1
14	RLL	82A Victoria Avenue	4000	28510	7	Yes	Already developed as horticultural operation - possibly 2 houses if hort operation replaced (may or may not occur)	2	1
14	RLL	92 Victoria Avenue	4000	12303	3	Yes	On flat land adjacent to hort operation on neighbouring site	2	1
14	RLL	94 Victoria Avenue	4000	14190	3	No	Due to steep slopes and floodplain	1	0
14	RLL	106 Victoria Avenue	4000	11360	2	No	Due to steep slopes, OLFP and floodplain	1	0
14	RLL	108 Victoria Avenue	4000	10401	2	Yes	Possibly at northern end of site	1	0
14	RLL	104 Victoria Avenue	4000	10712	2	No	Due to steep slopes	1	0
16	RLL	36 Victoria Avenue	4000	11184	2	No	Majority of site subject to flooding	1	0
19	RLL	11B Hyland Place	4000	11152	2	Yes	One new lot on western side adjacent to floodplain	2	1
19	RLL	11A Hyland Place	4000	8113	2	Yes	one new lot on eastern side of site	2	1
21	RLL	21 Hyland Place	4000	8930	2	No	Already fully developed	2	1
21	RLL	29 Hyland Place	4000	12150	3	No	Residual vacant land either steep or in floodplain	1	0
21	RLL	49A Hyland Place	4000	8337	2	No	Residual vacant land either steep or in floodplain	1	0
22	RLL	46 Hyland Place	4000	9842	2	Yes	Eastern end of site outside of floodplain	2	1
22	RLL	30 Hyland Place	4000	8384	2	Yes	Western end of site outside of floodplain	2	1
23	RLL	79C Hyland Place	4000	8157	2	Yes	Eastern end of site	2	1
23	RLL	82A Hyland Place	4000	8753	2	Yes	Eastern end of site	2	1
23	RLL	81 Hyland Place	4000	9779	2	No	Residual vacant land is steep or within floodplain	1	0
		<b>No of lots</b>	<b>49</b>		<b>134</b>			<b>73</b>	<b>24</b>

Sites >4,000m2 in other residential zoned areas within area investigated by FTL

Area	Zoning	Address	Minimum Lot Size (m2)	Gross Land Area (m2)	Potential Maximum Yield	Development viable	Comments	Revised Yield	No of new lots
15	MHS	11A Campbell Street	400	5766	14	Yes	Estimated 6 sites based on existing site layout and allowing for access	7	6
17	MHU	4 Victoria Avenue	300	19400	64	No	Waiuku Cosmopolitan Club; majority of site subject to steep slopes or flooding	1	0
18	MHS	53A Kitchener Road	400	11560	28	Yes	At southern end of site; northern vacant area is steep land or in flood plain; 3800m2 available - allow for 6 new lots, providing for access	7	6
18	MHS	53 Kitchener Road	400	7210	18	No	Vacant land is steep >1V:4H	1	0

Analysis

18	MHS	61 Kitchener Road	400	15093	37	Yes	At southern end of site; rest of site is too steep, already developed or in floodplain; 5540m2 available from measuring - allow for 10 new lots, providing for access	11	10
18	MHS	9 Ron Wyatt Lane	400	12043	30	Yes	At southern end of site; rest of site is too steep, already developed or in floodplain; 4320m2 available from measuring - allow for 8 new lots, providing for access (no existing house)	8	7
18	MHS	11 Ron Wyatt Lane	400	4359	10	No	Covered in dense bush with relatively steep land either side of central OLFP (not shown on Geomaps but obvious from aerial); orphan site with no access and no existing house	1	0
18	MHS	25 Fernleigh Avenue	400	9223	23	Yes	Approx 6670m2 available outside of OLFP - allow for 10 new lots taking into account access and lot layout (no existing house)	10	10
18	MHS	79 Kitchener Road	400	10549	26	Yes	Two areas developable either side of OLFP - total area = 4800m2 - allow for 6 lots taking into account access, site layout and OLFP	7	6
19	MHS	26 Collingwood Road	400	6070	15	Yes	Allow for 10 new houses, taking into account site shape and access (no existing house)	10	9
19	MHS	44 Collingwood Road	400	18780	46	Yes	Some OLFPs and two flooding areas - allow for 20 new houses taking into account these factors, shape and access (no existing house)	20	19
19	MHS	108 Collingwood Road	400	42271	105	Yes	Knight & Dickey Contractor's Depot - long term established business - estimate 50 houses, if it was to be redeveloped	50	50
20	MHS	121 Collingwood Road	400	6505	16	No	Floodplain occupies significant portion of site; long term established business (Smithies Garden Centre)	1	0
20	MHS	131 Collingwood Road	400	7411	18	No	Floodplain occupies significant portion of site; long term established business (Smithies Garden Centre)	1	0
20	MHS	141 Collingwood Road	400	25147	62	Yes	Estimated 16 new houses based on access, site layout and floodplain through middle	17	16
24	SH	44 Sandspit Road	600	10702	17	Yes	Estimate 5 new lots - 4 at western end and one east of existing house	6	5
25	MHS	2 Hamilton Drive	400	16187	40	Yes	6 existing houses (Percy Hamilton Trust pensioner flats for elderly) - estimate 10 new flats	16	10
26	MHS	77 Martyn Street	400	4894	12	Yes	No floodplain or OLFP shown on Geomaps. Site has 1 house on it. Estimate 6 new houses based on geometry of lot and allowing for access.	9	8
27	MHS	48 Kaiwaka Road	400	6005	15	Yes	The site has multiple OLFPs and a floodplain area shown on the north east corner. Estimate 5 new houses based on OLFP and floodplain issues on the site and allowing for access.	6	5

Analysis

							No floodplain or OLFP shown on Geomaps. Site has 1 house on it. Estimate 9 new houses based on lot shape geometry & providing for access		
28	MHS	38 Kitchener Road	400	7350	18	Yes		10	9
29	MHS	7 Brights Road	400	4681	11	Yes	Large house occupies ~50% of site; estimated 2000m2 available for subdivision (measured off plan) - say 4 lots allowing for access	5	4
29	MHS	5J Brights Road	400	4310	10	No	House occupies majority of site	1	0
30	MHS	41 Matai Street	400	5057	12	Yes	Space for ~8 new houses allowing for access	9	8
		<b>No of lots</b>	<b>23</b>		<b>647</b>			<b>214</b>	<b>188</b>

***Appendix F***

***Population/Household Projections and Water  
Demand/Wastewater Forecasts***

**Population Projections**

Year	Population			H'holds			pers/HH	FTL Proj'n - Pop'n		FTL Proj'n-H'holds	
	NZ Stats Actual	NZ Stats Proj'n	Incr/yr	Actual	Low	Incr/yr		High	Medium	High	Medium
2006	7460			2610			2.86	7460	7460	2610	2610
2013	8320	8550	123	2920	3000	44	2.85	8320	8320	2920	2920
2018	9170	9270	170	3210	3250	58	2.86	9170	9170	3210	3210
2020	9640	9466	235	3380	3318	85	2.85	9640	9640	3380	3380
2023		9760	98		3420	34	2.85	10666	10153	3740	3560
2025		9956			3488			11350	10495	3980	3680
2028		10250	98		3590	34	2.86	12376	11008	4340	3860
2030		10432			3654			13060	11350	4580	3980
2035		10887			3814			14058	11849	4930	4155
2038		11160	91		3910	32	2.85	14656	12148	5140	4260
2050		12252			4294			17050	13345	5980	4680

**Timing for Estimated Residential Capacity to be Filled (for graph)**

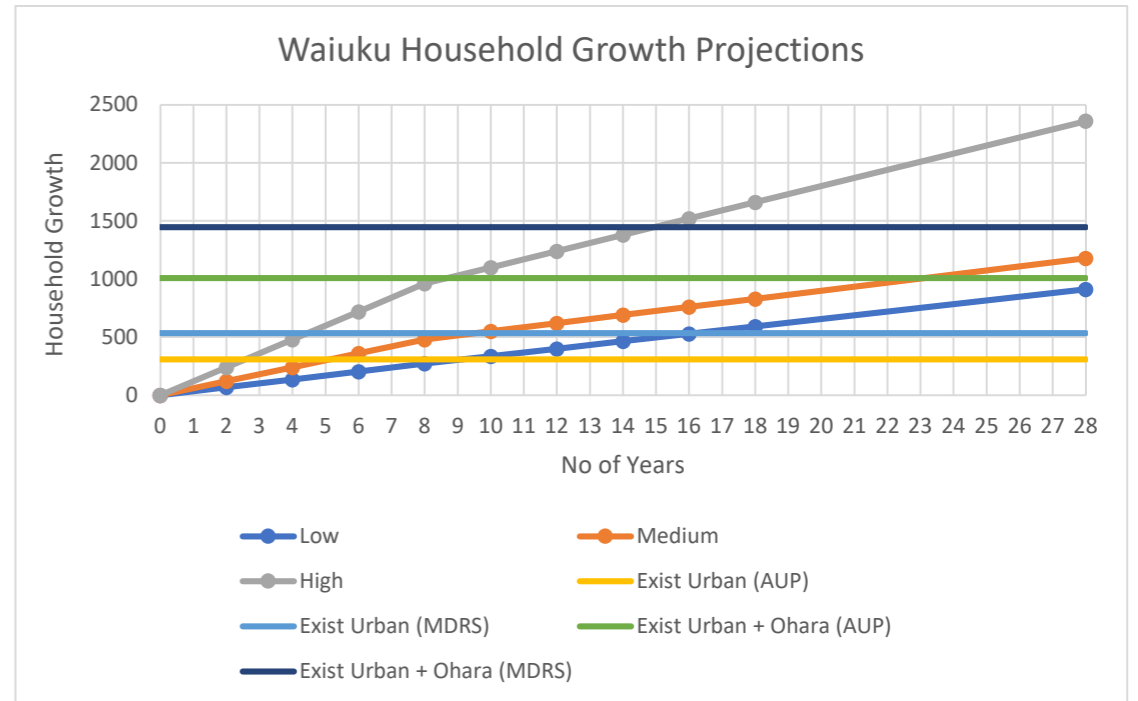
Year	Low	Medium	High	Exist Urban (AUP)	Exist Urban (MDRS)	Exist Urban + Ohara (AUP)	Exist Urban + Ohara (MDRS)
2024	2	68	120	309	536	1009	1446
2026	4	136	240	309	536	1009	1446
2028	6	204	360	309	536	1009	1446
2030	8	272	480	309	536	1009	1446
2032	10	336	550	309	536	1009	1446
2034	12	400	620	309	536	1009	1446
2036	14	464	690	309	536	1009	1446
2038	16	528	760	309	536	1009	1446
2040	18	592	830	309	536	1009	1446
2050	28	912	1180	309	536	1009	1446

2020-30	34		120	60	120	60
>2030	32		70	35	70	35
No/HH			2.85	2.85		

2020-30	34	60	120	309	536	1009	1446
>2030	32	35	70				

**Timing for Estimated Residential Capacity to be Filled (Yrs)**

Est popn	Scenarios		Estimated New dwellings	No of Yrs to Reach Capacity		
	Urban Area	Zoning		Low	Medium	High
10521	1	Without AUP MHS	309	9.1	5.2	2.6
11168	2	O'Hara EHA MDRS	536	16.3	9.6	4.5
12516	3	With AUP MHS	1009	31.0	23.1	8.4
13761	4	O'Hara EHA MDRS	1446	44.7	35.6	14.9



2020 actual pop'n 9640

Based on:

> Watercare no of households from 2020 water consumption data = 3315

> Max feasible capacity for new dwellings in existing urban zoned areas = 309 based on AUP:OP zonings and 536 based on EHA MDRS zonings

> O'Hara Plan Change area: 700 lots (AUP(OP) zonings)

910 lots (EHA MDRS zonings)



**Watercare - Waiuku Water Consumption Summary**

Year	Domestic		Non-domestic		Dom + non-dom		Pop'n	Total		NRW		PCC			ND/D		NRW/conn.
	Use(m3/yr)		Use(m3/yr)		Use(m3/yr)			Use(m3/yr)	Use(m3/yr)	m3/yr	%	Dom	Dom+ND	gross	Usage	Conn'n	
2016	502345	3133	98634	163	600979	3296	8240	600979	910277	309298	34.0	176	200	303	19.6	5.2	257
2017	515414	3179	104059	168	619473	3347	8368	619473	827279	207806	25.1	178	203	271	20.2	5.3	170
2018	524539	3189	104804	177	629343	3366	8415	629343	853813	224470	26.3	180	205	278	20.0	5.6	183
2019	525933	3224	94127	175	620060	3399	8498	620060	860732	240672	28.0	179	200	277	17.9	5.4	194
2020	557073	3315	91962	227	649035	3542	8855	649035	940247	291212	31.0	184	201	291	16.5	6.8	225
											Avg	179	202	284	18.8	5.7	206

NRW = non revenue water

Pop'n = calculation = no of connections x 2.5 HUE

**Waiuku: NZ Stats (Low) Population Projections to 2038, extrapolated to 2050**

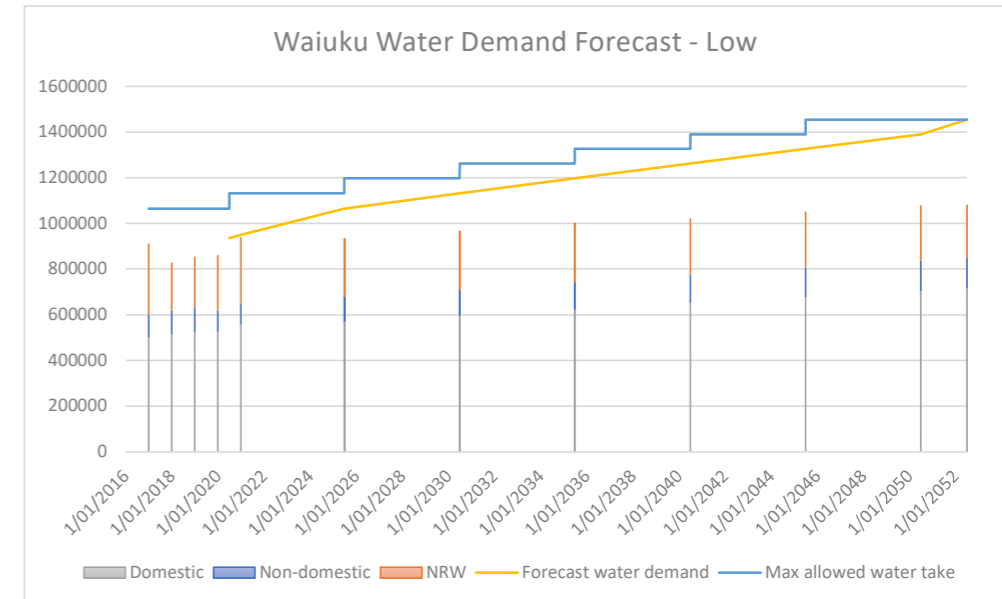
Year	Population	PCC	Consumption (m3/yr)				Watercare			Connections			NRW	Breakdown (%)		
			Domestic	Non-domestic	NRW	Total	Forecast water demand	Max allowed water take	WSL Increase in water demand	Domestic	Non-domestic	Total		Loss per conn'n	Domestic	Non-domestic
31/12/2016			502345	98634	309298	910277		1065080						55.2	10.8	34.0
31/12/2017			515414	104059	207806	827279		1065080						62.3	12.6	25.1
31/12/2018	9170	157	524539	104804	224470	853813		1065080						61.4	12.3	26.3
31/12/2019			525933	94127	240672	860732		1065080						61.1	10.9	28.0
30/06/2020								1065080								
1/07/2020							936032	1132370								
31/12/2020	9640	158	557073	91962	291212	940247	948937	1132370		3315	227	3542	225	59.2	9.8	31.0
30/06/2025	9956	157	572417	107854	253050	933321	1065080	1132370	129048	3488	237	3725	186	61.3	11.6	27.1
1/07/2025							1065080	1198060								
30/06/2030	10432	157	599784	113011	251717	964512	1132370	1198060	67290	3654	246	3900	177	62.2	11.7	26.1
1/07/2030							1132370	1262050								
30/06/2035	10887	157	625944	117940	255716	999600	1198060	1262050	65690	3910	261	4171	168	62.6	11.8	25.6
1/07/2035							1198060	1326020								
30/06/2040	11342	157	652104	122869	247217	1022190.33	1262050	1326020	63990	3980	265	4244	159	63.8	12.0	24.2
1/07/2040							1262050	1389920								
30/06/2045	11797	157	678264	127798	244191	1050252.98	1326020	1389920	63970	4139	274	4413	151	64.6	12.2	23.3
1/07/2045							1326020	1453820								
30/06/2050	12252	157	704424	132727	240849	1078000.23	1389920	1453820	63900	4299	283	4582	144	65.3	12.3	22.3
1/07/2050							1389920	1453820								
30/06/2052	12434	157	714888	134699	232176	1081763.15	1453820	1453820	63900	4363	286	4649	137	66.1	12.5	21.5

**Growth rate**

Year	Incremental (p.a.)		Cumulative	
	Resid	Non-resid	Resid	Non-resid
2025	0.55	3.46	2.8	17.3
2030	0.96	0.96	7.7	22.9
2035	0.87	0.87	12.4	28.2
2040	0.84	0.84	17.1	33.6
2045	0.80	0.80	21.8	39.0
2050	0.77	0.77	26.5	44.3
2052	0.30	0.30	28.3	46.5

**Notes:**

- Domestic demand based on:
    - Population projections from Statistics NZ, Urban Economics report - Figure 6
    - Actual domestic water consumption data per capita from 2018 and 2020 from Watercare data and Stats NZ population data = 157 L/cap.d
  - Estimated non-residential demand is 18.8 % of residential demand based on actual 2016-2020 average
  - Watercare's Water Efficiency Plan advises Auckland's NRW is currently 181L/connection/day (FY21) and that their target is to maintain this at or below 186L/connection/day. Assume this is achieved by 2025 for Waiuku and that there is 5 % reduction in NRW for each 5yr period going forward. This would reduce NRW water losses from around 30% of total water produced to 18.5% by 2052.
- International data:  
Australia NRW losses = 10% of water production (source: non-revenue water losses - GHD)  
See Wikipedia



Year	Population	PCC	WW Generation (m3/yr)			PE	Breakdown (%)		Increase
			Domestic	Non-domestic	Total		Domestic	Non-domestic	
31/12/2013	8584	180	564355	89442	653798	9944	86.3	13.7	
31/12/2018	9170	180	602882	113594	716476	10898	84.1	15.9	
31/12/2020	9640	180	633782	119417	753198	11456	84.1	15.9	
31/12/2025	9956	180	654557	123331	777888	11832	84.1	15.9	24690
31/12/2030	10432	180	685852	129228	815079	12398	84.1	15.9	37191
31/12/2035	10887	180	715766	134864	850630	12938	84.1	15.9	35550
31/12/2050	12252	180	805508	151773	957281	14561	84.1	15.9	106651

## Notes:

- Watercare - median flows to Waiuku WWTP in 2013-14 were 1790 m3/d = 653798 m3/yr
- Estimated domestic ww based on NZ Stats population data and 180 L/cap.d except for 2013 where used Watercare census figure (8584)
- Estimate non-residential demand from 2018 onwards same as for water = 18.8 % of residential demand

**Waiuku: Medium Population Growth based on 60 households/yr from 2020-2030 and 35 households per year post-2030**

Year	Consumption (m3/yr)				Watercare (m3/yr)			Connections (no)			NRW	Breakdown (%)		
	Domestic	Non-domestic	NRW	Total	Forecast water demand	Max allowed water take	WSL Increase in water demand	Domestic	Non-domestic	Total	Loss per conn'n	Domestic	Non-domestic	NRW
31/12/2016	502345	98634	309298	910277		1065080						55.2	10.8	34.0
31/12/2017	515414	104059	207806	827279		1065080						62.3	12.6	25.1
31/12/2018	524539	104804	224470	853813		1065080						61.4	12.3	26.3
31/12/2019	525933	94127	240672	860732		1065080						61.1	10.9	28.0
30/06/2020						1065080								
1/07/2020					936032	1132370								
31/12/2020	557073	91962	291212	940247	948937	1132370		3315	227	3542	206	59.2	9.8	31.0
30/06/2025	607472	131628	288008	1027108	1065080	1132370	129048	3975	264	4239	186	59.1	12.8	28.0
1/07/2025					1065080	1198060								
30/06/2030	663470	143762	314524	1121757	1132370	1198060	67290	4575	298	4873	177	59.1	12.8	28.0
1/07/2030					1132370	1262050								
30/06/2035	696136	150840	321473	1168449	1198060	1262050	65690	4925	318	5243	168	59.6	12.9	27.5
1/07/2035					1198060	1326020								
30/06/2040	728802	157918	326940	1213660	1262050	1326020	63990	5275	338	5613	159	60.0	13.0	26.9
1/07/2040					1262050	1389920								
30/06/2045	761468	164996	331057	1257521	1326020	1389920	63970	5625	358	5983	151	60.6	13.1	26.3
1/07/2045					1326020	1453820								
30/06/2050	794133	172074	333945	1300152	1389920	1453820	63900	5975	378	6353	144	61.1	13.2	25.7
1/07/2050					1389920	1453820								
30/06/2052	807200	174906	335716	1317821	1453820	1453820	63900	6325	397	6722	137	61.3	13.3	25.5

**Growth rate**

	Incremental (p.a.)		Cumulative	
	Resid	Non-resid	Resid	Non-resid
2025	1.81	8.63	9.0	43.1
2030	1.84	1.84	19.1	56.3
2035	0.98	0.98	25.0	64.0
2040	0.94	0.94	30.8	71.7
2045	0.90	0.90	36.7	79.4
2050	0.86	0.86	42.6	87.1
2052	0.33	0.33	44.9	90.2

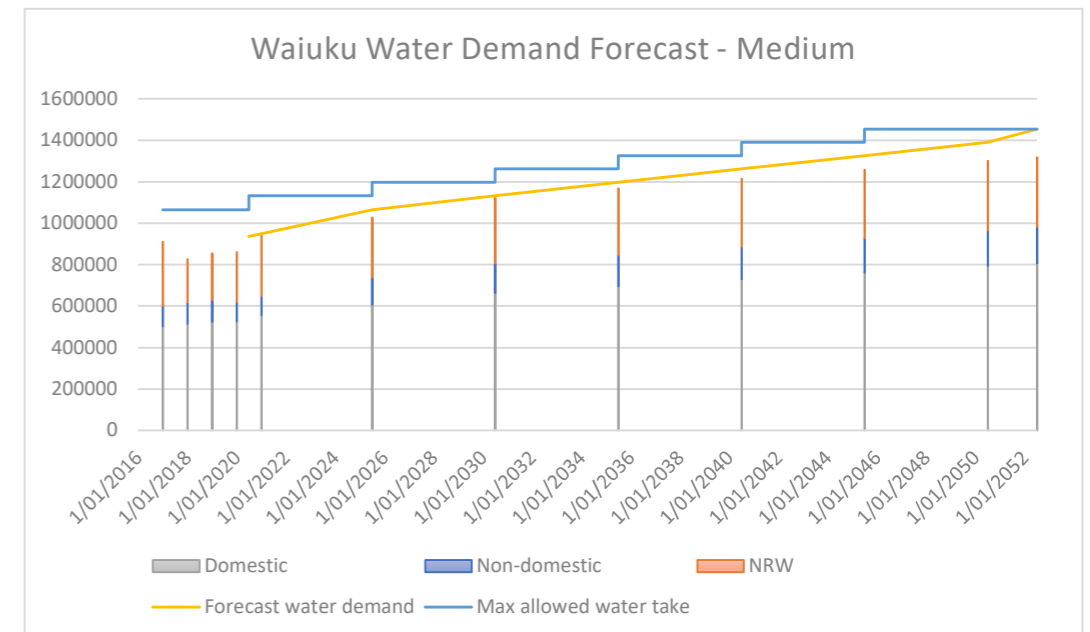
Exceeds allowable take as of 30 Jun (end of current period)

Exceeds allowable take as of 1 Jul (start of next period)

Exceeds maximum allowable take

**Notes:**

- From Urban Economics Report, assume:
    - No of extra households per year over period 2020-2030 = 60
    - No of extra households per year post 2030 = 35
    - Adopt 2.85 people per dwelling for 2-4 bedroom houses and 179 L/cap.d (2.85 from Stats NZ data - more conservative than WSL 2.5 HUE but less conservative than 3 pers/HH from COP for 2-4 bedroom HHs; 179L/cap.d is from 2016-20 actual water consumption data)
  - Estimated non-residential demand is 18.8 % of residential demand based on actual 2016-2020 average x 1.15 to allow for Fernleigh Business Park
  - Watercare's Water Efficiency Plan advises Auckland's NRW is currently 181L/connection/day (FY21) and that their target is to maintain this at or below 186L/connection/day. Assume this is achieved by 2025 for Waiuku and that there is 5 % reduction in NRW for each 5yr period going forward. This would reduce NRW water losses from around 30% of total water produced to 18.5% by 2052.
- International data:  
Australia NRW losses = 10% of water production (source: non-revenue water losses - GHD)  
See Wikipedia



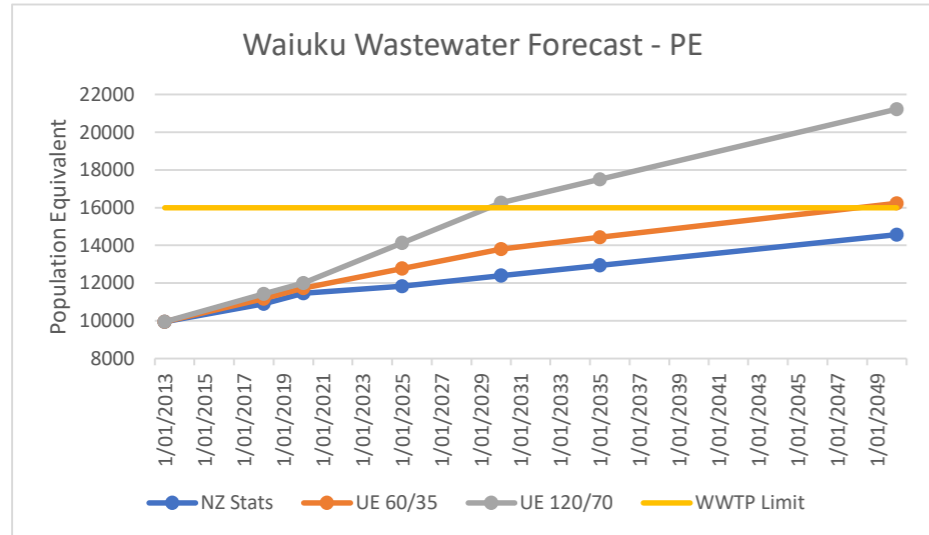
Wastewater

Year	Population	PCC	WW Generation (m3/yr)			PE	Breakdown (%)	
			Domestic	Non-domestic	Total		Domestic	Non-domestic
31/12/2013	8584	180	564355	89442	653798	9944	86.3	13.7
31/12/2018	9170	180	602882	130634	733515	11157	82.2	17.8
31/12/2020	9640	180	633782	137329	771111	11729	82.2	17.8
31/12/2025	10495	180	689994	149509	839503	12769	82.2	17.8
31/12/2030	11350	180	746206	161689	907895	13809	82.2	17.8
31/12/2035	11849	180	778996	168794	947790	14416	82.2	17.8
31/12/2050	13345	180	877367	190110	1067477	16237	82.2	17.8

Date	PE			WWTP Limit
	NZ Stats	UE 60/35	UE 120/70	
31/12/2013	9944	9944	9944	16000
31/12/2018	10898	11157	11416	16000
31/12/2020	11456	11729	12001	16000
31/12/2025	11832	12769	14130	16000
31/12/2030	12398	13809	16259	16000
31/12/2035	12938	14416	17501	16000
31/12/2050	14561	16237	21226	16000

Notes:

- Watercare - median flows to Waiuku WWTP in 2013-14 were 1790 m3/d = 653798 m3/yr
- Estimated domestic ww based on:
  - No of extra households per year over period 2020-2030 = 60
  - No of extra households per year post 2030 = 35
  - Occupancy of 2.85 people/HH and 180 L/cap.d
- Estimate non-residential demand from 2018 onwards same as for water = 18.8 % of residential demand x 1.15 factor for FBP



Waiuku: High Population Growth based on 120 households/yr from 2020-2030 and 70 households per year post-2030

Year	Consumption (m3/yr)				Watercare (m3/yr)			Connections (no)			NRW	Breakdown (%)		
	Domestic	Non-domestic	NRW	Total	Forecast water demand	Max allowed water take	WSL Increase in water demand	Domestic	Non-domestic	Total	Loss per conn'n	Domestic	Non-domestic	NRW
31/12/2016	502345	98634	309298	910277		1065080						55.2	10.8	34.0
31/12/2017	515414	104059	207806	827279		1065080						62.3	12.6	25.1
31/12/2018	524539	104804	224470	853813		1065080						61.4	12.3	26.3
31/12/2019	525933	94127	240672	860732		1065080						61.1	10.9	28.0
30/06/2020						1065080								
1/07/2020					936032	1132370								
31/12/2020	557073	91962	291212	940247	948937	1132370		3315	227	3542	206	59.2	9.8	31.0
30/06/2025	657870	161142	288008	1107020	1065080	1132370	129048	3975	264	4239	186	59.4	14.6	26.0
1/07/2025					1065080	1198060								
30/06/2030	769867	188575	314524	1272967	1132370	1198060	67290	4575	298	4873	177	60.5	14.8	24.7
1/07/2030					1132370	1262050								
30/06/2035	835199	204578	321473	1361249	1198060	1262050	65690	4925	318	5243	168	61.4	15.0	23.6
1/07/2035					1198060	1326020								
30/06/2040	900531	220580	326940	1448051	1262050	1326020	63990	5275	338	5613	159	62.2	15.2	22.6
1/07/2040					1262050	1389920								
30/06/2045	965862	236583	331057	1533502	1326020	1389920	63970	5625	358	5983	151	63.0	15.4	21.6
1/07/2045					1326020	1453820								
30/06/2050	1031194	252586	333945	1617724	1389920	1453820	63900	5975	378	6353	144	63.7	15.6	20.6
1/07/2050					1389920	1453820								
30/06/2052	1057326	258987	335716	1652029	1453820	1453820	63900	6325	397	6722	137	64.0	15.7	20.3

Growth rate

	Incremental (p.a.)		Cumulative	
	Resid	Non-resid	Resid	Non-resid
2025	3.62	15.05	18.1	75.2
2030	3.40	3.40	38.2	105.1
2035	1.70	1.70	49.9	122.5
2040	1.56	1.56	61.7	139.9
2045	1.45	1.45	73.4	157.3
2050	1.35	1.35	85.1	174.7
2052	0.51	0.51	89.8	181.6

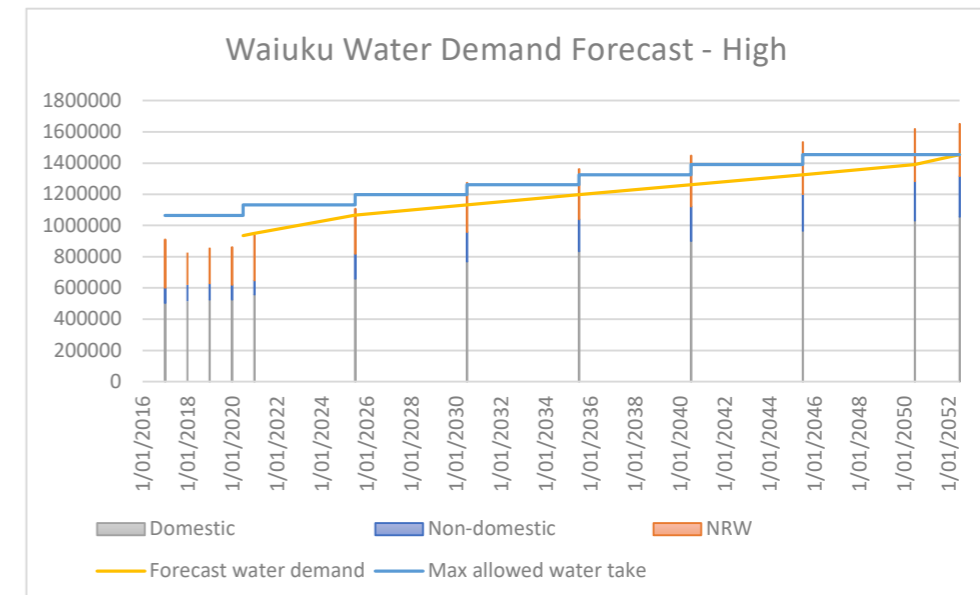
Exceeds allowable take as of 30 Jun (end of current period)

Exceeds allowable take as of 1 Jul (start of next period)

Exceeds maximum allowable take

Notes:

- From Urban Economics Report, assume:
    - No of extra households per year over period 2020-2030 = 120
    - No of extra households per year post 2030 = 70
    - Adopt 2.85 people per dwelling for 2-4 bedroom houses and 179 L/cap.d (2.85 from Stats NZ data - more conservative than WSL 2.5 HUE but less conservative than 3 pers/HH from COP for 2-4 bedroom HHs; 179L/cap.d is from 2016-20 actual water consumption data)
  - Estimated non-residential demand is 18.8 % of residential demand based on actual 2016-2020 average x 1.3 to allow for Fernleigh Business Park
  - Watercare's Water Efficiency Plan advises Auckland's NRW is currently 181L/connection/day (FY21) and that their target is to maintain this at or below 186L/connection/day. Assume this is achieved by 2025 for Waiuku and that there is 5 % reduction in NRW for each 5yr period going forward. This would reduce NRW water losses from around 30% of total water produced to 18.5% by 2052.
- International data:  
 Australia NRW losses = 10% of water production (source: non-revenue water losses - GHD)  
 Also see Wikipedia



**Wastewater**

Year	Population	PCC	WW Generation (m3/yr)			PE	Breakdown (%)	
			Domestic	Non-domestic	Total		Domestic	Non-domestic
31/12/2013	8584	180	564355	89442	653798	9944	86.3	13.7
31/12/2018	9170	180	602882	147673	750554	11416	80.3	19.7
31/12/2020	9640	180	633782	155242	789023	12001	80.3	19.7
31/12/2025	11350	180	746206	182779	928985	14130	80.3	19.7
31/12/2030	13060	180	858630	210317	1068947	16259	80.3	19.7
31/12/2035	14058	180	924210	226381	1150591	17501	80.3	19.7
31/12/2050	17050	180	1120952	274571	1395524	21226	80.3	19.7

Notes:

1. Watercare - median flows to Waiuku WWTP in 2013-14 were 1790 m3/d = 653798 m3/yr
2. Estimated domestic ww based on:
  - a. No of extra households per year over period 2020-2030 = 120
  - b. No of extra households per year post 2030 = 70
  - c. Occupancy of 2.85 people/HH and 180 L/cap.d
3. Estimate non-residential demand from 2018 onwards same as for water = 18.8 % of residential demand x 1.3 factor for FBP

Waiuku WWTP PE reached around 2030  
 At this time, projected population 13060 which is in excess of max projected population with existing AUP zonings including PC area and hence means EHA MDRS zonings required to achieve it  
 When population reaches 13,761, more land needs to be rezoned to urban residential for population to continue to grow  
 PE at this time is 17, 132